

CHEMICAL STABILIZATION
TECHNICIAN CERTIFICATION
PROGRAM

GEOTECHNICAL ENGINEERING UNIT



GEOPAVEMENT SECTION

CHEMICALLY STABILIZED SUBGRADE/BASE
ESSENTIALS CLASS

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**NC DOT - DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT – GEOPAVERMENT**

**Chemically Stabilized Subgrade/Base Essentials
Class Schedule**

INTRODUCTION

8:30 - 8:45 BRIEF HIGHLIGHTS OF ALL TYPES OF LIME/CEMENT STABILIZATION AND THE BENEFITS OF STABILIZED SUBGRADES AND BASES.

LIME STABILIZATION

8:45 - 10:15 SLIDES DEPICTING THE DIFFERENT TYPES OF LIME STABILIZATION, CONSTRUCTION METHODS AND PROCESSES FOR THE FIRST DAY OF OPERATION; HIGHLIGHTING SPECIFICATIONS FOR THE DIFFERENT TYPES OF LIME. QUESTIONS/DISCUSSIONS.

10:15 - 10:30 BREAK

10:30 - 11:15 FINAL DAY OF LIME OPERATIONS; PROTECTING TREATED AREAS DURING PAVING OPERATIONS, AND HOW TO WINTERIZE A STABILIZED PROJECT.

11:15 - 11:30 REVIEW LIME STABILIZATION

11:30 - 12:30 LUNCH

CEMENT STABILIZATION

12:30 - 1:30 SLIDES ON SOIL CEMENT STABILIZATION, WITH A HIGHLIGHTING OF SPECIFICATIONS. QUESTIONS/ ANSWERS.

1:30 - 2:15 SLIDES ON PLANT-MIXED CEMENT TREATED (CTB) WITH A HIGHLIGHTING OF THE SPECIFICATIONS. QUESTIONS/ANSWERS.

2:15 - 2:30 BREAK

2:30 - 3:00 SLIDES ON ROAD MIXED CTB WITH A HIGHLIGHTING OF THE SPECIFICATIONS. QUESTIONS /ANSWERS.

3:00 - 3:30 CONCLUSION AND SUMMARY

- A. DISCUSS IMPORTANCE OF INSPECTION.
- B. DISCUSS LIMITATIONS IN DETAIL AND WHY THEY ARE TO BE IMPOSED.
- C. IMPORTANT ITEMS THAT WILL BE ADDRESSED IN THE EXAM.

3:30 - 3:45 QUESTION AND ANSWER TIME

3:45 - 4:30 EXAM

CLASS SCHEDULE SUBJECT TO CHANGE

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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT – GEOPAVEMENT SECTION
LIME/CEMENT STABILIZATION PROCEDURES**

(NOTE: THIS HANDOUT DOES NOT OVERRIDE SPECIFICATIONS)

CONSTRUCTION PROCEDURES USING HYDRATED LIME

1. PRELIMINARY TESTING AND PROCEDURES:

A. REFER TO INSPECTOR'S CHECK LIST IN CONSTRUCTION MANUAL (SECTION 501, LIME TREATED SOIL, PG. 5-15 & 16,) FOR A ROUTINE THAT FITS IN WITH THE SEQUENCE OF CONSTRUCTION OPERATIONS.

B. FIELD TESTS TO DETERMINE OPTIMUM MOISTURES OF MAJOR SOIL TYPES ON THE PROJECT SHOULD BE CONDUCTED BY PROJECT CONSTRUCTION PERSONNEL PRIOR TO THE STARTING OF SUBGRADE STABILIZATION (SPECS. BOOK 501-8B).

C. A MINIMUM PERIOD OF 24 DAYS BETWEEN SAMPLE ACQUISITION AND PROCESSING BY THE STATE MATERIALS LABORATORY IS REQUIRED (SPECS. BOOK 501-8 (REVISION 11/18/03 SP 5R20) & CONSTRUCTION MANUAL 501-1).

D. PRIOR TO SUBGRADE STABILIZATION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTORS REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS (SPECS. BOOK 501-4). A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING. BEFORE THE LIME IS SPREAD, THE HAZARDS AND SAFEGUARDS INVOLVED WHEN WORKING WITH HYDRATED LIME SHOULD ALSO BE DISCUSSED.

2. PREPARATION:

A. CHECK AREA TO BE STABILIZED FOR GRADE, TYPICAL SECTION, AND IN-PLACE MOISTURE CONTENT OF SUBGRADE. SOIL MOISTURE SHOULD NOT EXCEED 6 % ABOVE OPTIMUM WHEN HYDRATED LIME IS SPREAD (SPECS. BOOK 501-6 & 501-8D).

B. DETERMINE "PULL", THE AREA TO BE COVERED BY THE TRUCKLOAD OF LIME.

EXAMPLE:

GIVEN: LOAD WEIGHT = 45,000 LBS.

WIDTH = 34 FT

RECOMMENDED RATE = 21 lbs/s.y. (3½% FOR 8" DEPTH)

$$\frac{1 \text{ s.y.}}{9 \text{ ft}^2} \times 34 = 3.78 \frac{\text{S.Y.}}{\text{ft.}} \times 21 \text{ lbs/sy} = 79.3 \text{ LBS. PER LIN. FT. } \frac{45,000 \text{ lbs}}{79.3 \text{ lbs/lin.ft}} = \mathbf{567 \text{ LIN. FT.}}$$

C. ALL WEIGHT TICKETS MUST HAVE A N. C. CERTIFIED WEIGHMASTER'S STAMP ON THEM (SPECS. BOOK 106-7, 2ND PARAGRAPH).

D. THE AREA TO BE COVERED SHOULD THEN BE MARKED OFF AND SCARIFIED (OR PARTIALLY PULVERIZED) PRIOR TO SPREADING THE HYDRATED LIME (SPECS. BOOK 501-7).

E. A ½ GALLON SAMPLE OF LIME IN AN AIR TIGHT CONTAINER SHOULD BE OBTAINED FROM EVERY 4TH LOAD (OR AT LEAST 1 A DAY) AND SENT TO THE CHEMICAL LAB FOR TESTING.

3. APPLICATION OF HYDRATED LIME:

HYDRATED LIME IS NORMALLY SPREAD BY THE TANKER TRUCK BY BLOWING IT OUT OF THE BACK INTO A TRIANGLE SHAPED DEFLECTOR THAT DROPS THE LIME ON THE GROUND. THIS METHOD CANNOT BE CALIBRATED. THEREFORE, THE EMPTYING OF THE TRUCK VERSUS THE AREA COVERED SHOULD BE MONITORED TO ENSURE AN UNIFORM COVERAGE.

4. PRIMARY MIXING: (SPECS. BOOK 501-9A)

A. IMMEDIATELY AFTER THE LIME IS SPREAD, DRY MIXING SHOULD BEGIN, FOLLOWED BY THE ADDITION OF WATER AND CONTINUED MIXING UNTIL ADEQUATE PULVERIZATION AND A UNIFORM MIXTURE OF THE SOIL, LIME, AND WATER HAS BEEN OBTAINED TO THE RECOMMENDED DEPTH.

B. THE MOISTURE CONTENT AT THIS TIME SHOULD BE BETWEEN OPTIMUM AND OPTIMUM PLUS 3 %. A MOISTURE TEST SHOULD THEN BE PERFORMED AND RECORDED.

C. DEPTHS SHOULD BE CHECKED VERY CLOSELY AT THE BEGINNING OF THE MIXING OPERATION.

5. PRELIMINARY CURING OR "MELLOWING" : (SPECS. BOOK 501-9B)

A. IMMEDIATELY AFTER PRIMARY MIXING, THE STABILIZED LIFT SHOULD BE SHAPED AND LIGHTLY COMPACTED TO PREVENT THE ENTRANCE OF SURFACE WATER AND EVAPORATION. THEN, IT IS LEFT TO MELLOW FOR 1 TO 4 DAYS AS NEEDED, TO BREAK DOWN CLAY CLOUDS.

B. THE AREA MUST BE COMPLETED WITHIN 4 DAYS.

6. FINAL MIXING AND COMPACTION: (SPECS. BOOK 501-9C, 501-10)

A. AFTER THE "MELLOWING" PERIOD, THE STABILIZED LIFT SHOULD AGAIN BE MIXED FULL DEPTH TO COMPLETE PULVERIZATION. IT IS IMPORTANT TO CHECK THE MIXING DEPTH DURING THE FINAL MIXING TO ENSURE THAT THE SPECIFIED DEPTH IS THOROUGHLY MIXED. THE LAYER MAY NEED TO BE AERATED OR HAVE WATER ADDED TO OBTAIN THE REQUIRED MOISTURE CONTENT FOR COMPACTION.

B. THE MOISTURE CONTENT DURING FINAL COMPACTION AND FINISHING SHOULD BE MAINTAINED BETWEEN OPTIMUM AND OPTIMUM PLUS 2 %. A MOISTURE TEST SHOULD THEN BE PERFORMED AND RECORDED.

C. IMMEDIATELY AFTER FINAL MIXING, COMPACTION SHOULD BEGIN, ACCOMPANIED BY GRADING AND SHAPING TO PREVENT THE CREATION OF COMPACTION PLANES. FINAL MIXING AND COMPACTION OPERATIONS ARE TO BE COMPLETED IN THE SAME DAY DURING DAYLIGHT HOURS.

D. AT LEAST 97% COMPACTION IS REQUIRED.

E. THE COMPACTED THICKNESS OF THE COMPLETED LIME TREATED SOIL LAYER WILL BE DETERMINED BY MEASUREMENTS MADE IN TEST HOLES LOCATED AT RANDOM INTERVALS NOT TO EXCEED 500 FT. (SPECS. BOOK 501-11).

7. SEALING AND CURING: (SPECS. BOOK 501-12 & 543)

A. AFTER THE REQUIRED COMPACTION AND SHAPING IS COMPLETED, THE STABILIZED LIFT SHOULD BE PROTECTED FROM DRYING FOR A 7 DAY CURING PERIOD WITH A SEAL COAT.

B. THE APPROVED SEAL COATS ARE: RS-1H, RS-1, CRS-1H, CRS-1, AND CRS-2.

C. THE RECOMMENDED RATE OF SEAL APPLICATION IS FROM .10 TO .20 GALLONS PER S.Y. OR .45 TO .90 LITERS PER SQUARE METER.

D. ONE FULL DAY (24 HRS.) WITH THE TEMPERATURE AT 50°F OR ABOVE CONSTITUTES ONE CURING DAY. THE CURING PERIOD SHALL BE 7 DAYS. IF THE TEMPERATURE FALLS BELOW 50°F, CURING TIME WILL BE PRORATED ACCORDINGLY, BUT IN NOT LESS THAN ½ DAY INCREMENTS. IF THE TEMPERATURE DOES NOT EXCEED 50°F LONGER THAN 12 HRS./DAY, NO CURING TIME IS ACQUIRED (SPECS. BOOK 543-4).

E. NO CONSTRUCTION EQUIPMENT WILL BE ALLOWED ON THE STABILIZED LIFT DURING THE CURING PERIOD (SPECS. BOOK 501-13).

8. MAINTENANCE AND REPAIR: (SPECS. BOOK 501-14)

A. THE STABILIZED LIFT WILL BE PROTECTED FROM FREEZING AND MAINTAINED BY THE CONTRACTOR UNTIL A LAYER OF PAVEMENT STRUCTURE HAS BEEN PLACED OVER IT. NO LIME TREATED SOIL WILL BE CONSTRUCTED THAT WILL NOT BE COVERED WITH A LAYER OF PAVEMENT, BASE, OR OTHER CONSTRUCTION MATERIAL BY DECEMBER 1 OF THAT CALENDAR YEAR (SPECS. BOOK 501-3).

B. ANY MAINTENANCE OR REPAIR NECESSARY WILL BE PERFORMED BY THE CONTRACTOR AT NO COST TO THE D.O.T. AND SHALL BE REPEATED AS OFTEN AS MAY BE NECESSARY TO KEEP THE LIME TREATED SOIL IN AN ACCEPTABLE CONDITION UNTIL ALL WORK IS COMPLETED AND ACCEPTED.

C. THE CONTRACTOR'S EQUIPMENT WILL BE ALLOWED ON THE STABILIZED LIFT ONLY AS NEEDED TO DISCHARGE PAVING MATERIALS INTO THE SPREADER BOX. THE HEAVY LOADS IMPOSED BY HAULING & PAVING EQUIPMENT MAY CREATE A MAJOR PROBLEM IN SOME STABILIZED LAYERS. THE WHEEL LOADS FROM THIS EQUIPMENT MAY PRODUCE HIGHER STRESSES IN THE STABILIZED SOILS THAN THE STRESSES TO BE ANTICIPATED FROM TRAFFIC LOADS AFTER THE ROAD IS IN SERVICE (SPECS. BOOK 501-13).

D. BLOTTING SAND CAN BE USED FOR LOCAL TRAFFIC, IF NECESSARY.

CONSTRUCTION PROCEDURE USING QUICKLIME

1. PRELIMINARY TESTING AND PROCEDURES:

A. REFER TO INSPECTOR'S CHECK LIST IN CONSTRUCTION MANUAL (SECTION 501, LIME TREATED SOIL, PG 5-15 & 16) FOR A ROUTINE THAT FITS IN WITH THE SEQUENCE OF CONSTRUCTION OPERATIONS.

B. FIELD TESTS TO DETERMINE OPTIMUM MOISTURES OF MAJOR SOIL TYPES ON THE PROJECT SHOULD BE CONDUCTED BY PROJECT CONSTRUCTION PERSONNEL PRIOR TO THE STARTING OF SUBGRADE STABILIZATION (SPECS. BOOK 501-8C).

C. A MINIMUM PERIOD OF 24 DAYS BETWEEN SAMPLE ACQUISITION AND PROCESSING BY THE STATE MATERIALS LABORATORY IS REQUIRED (SPECS. BOOK 501-8 (REVISION 11/18/03 SP 5R20) & CONSTRUCTION MANUAL 501-1)

D. PRIOR TO SUBGRADE STABILIZATION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTORS REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS (SPECS. BOOK 501-4). A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING. BEFORE THE LIME IS SPREAD, THE HAZARDS AND SAFEGUARDS INVOLVED WHEN WORKING WITH QUICKLIME SHOULD ALSO BE DISCUSSED.

2. PREPARATION:

A. CHECK AREA TO BE STABILIZED FOR GRADE, TYPICAL SECTION, AND IN-PLACE MOISTURE CONTENT OF SUBGRADE. SOIL MOISTURE SHOULD NOT EXCEED A MAXIMUM OF 4.0% ABOVE OPTIMUM WHEN QUICKLIME IS SPREAD. (SPECS. BOOK 501-6, 501-8C).

B. DETERMINE "PULL", THE AREA TO BE COVERED BY THE TRUCK LOAD OF LIME (SAME METHOD AS WITH HYDRATED LIME).

C. ALL WEIGHT TICKETS MUST HAVE A N.C. CERTIFIED WEIGHMASTER'S STAMP ON THEM (SPECS. BOOK 106-7, 2ND PARAGRAPH).

D. THE AREA TO BE COVERED SHOULD THEN BE MARKED OFF (SPECS. BOOK 501-7).

E. A ½ GAL. SAMPLE OF LIME IN AN AIR TIGHT CONTAINER SHOULD BE OBTAINED FROM EVERY 4TH LOAD (OR AT LEAST 1 A DAY) AND SENT TO THE CHEMICAL LAB FOR TESTING.

3. APPLICATION OF QUICKLIME: (SPECS. BOOK 501-8C)

A. AS WITH HYDRATED LIME, QUICKLIME MAY BE BLOWN OUT OF THE BACK OF THE TANKER TRUCK INTO A TRIANGLE SHAPED DEFLECTOR THAT DROPS IT ON THE GROUND OR INTO A LARGE CROSS PIPE WITH HOLES IN THE BOTTOM. NEITHER OF THESE METHODS CAN BE ACCURATELY CALIBRATED. THEREFORE, THE EMPTYING OF THE TRUCK VERSUS THE AREA COVERED SHOULD BE MONITORED TO ENSURE A UNIFORM COVERAGE. AN ADDITIONAL METHOD OF APPLICATION IS "BELLY DUMP" OR "BOTTOM DUMP". THIS METHOD REQUIRES THE LIME TANKER TO RELEASE THE QUICKLIME WITH THE BOTTOM DISCHARGE VALVES OPEN WHILE DRIVING SLOWLY OVER THE UNSCARIFIED AREA, CREATING A WINDROW OF QUICKLIME. THEN LIME IS SPREAD UNIFORMLY OVER THE DETERMINED AREA WITH A MOTORGRADER.

B. FIRST AID:

1. **SKIN** - TREAT AS A STANDARD BURN; WASH WITH WATER AND SOAP, APPLY BURN OINTMENT, KEEP COVERED WITH STERILE BANDAGES.
2. **EYES** - HOLD WORKERS EYES OPEN, FLUSH WITH WATER IMMEDIATELY (CONSTRUCTION MANUAL 501-5).
3. **SEEK MEDICAL TREATMENT WITHOUT DELAY FOR THE ABOVE**

4. SLAKING AND PRIMARY MIXING: (SPECS. BOOK 501-9A)

A. AFTER THE QUICKLIME IS SPREAD, WATER IS APPLIED TO SLAKE THE LIME, OR IT CAN BE MIXED INTO THE SOIL TO A DEPTH OF 2 - 3 INCHES AND THEN WATER IS APPLIED TO SLAKE OR CONVERT TO HYDRATED LIME. THIS ALTERNATIVE METHOD IS USED TO INHIBIT DUST AND STEAM IN POPULATED AREAS. AT LEAST THREE PASSES WITH THE WATER TRUCK WILL NORMALLY BE REQUIRED.

B. FULL-DEPTH MIXING SHOULD BEGIN IMMEDIATELY AFTER SLAKING AND CONTINUE WITH THE ADDITION OF WATER AS NEEDED, UNTIL ADEQUATE PULVERIZATION AND A UNIFORM MIXTURE OF SOIL, LIME, AND WATER HAS BEEN OBTAINED TO THE RECOMMENDED DEPTH.

C. THE MOISTURE CONTENT AT THIS TIME SHOULD BE BETWEEN OPTIMUM AND OPTIMUM PLUS 3 %. A MOISTURE TEST SHOULD THEN BE PERFORMED AND RECORDED.

D. DEPTHS SHOULD BE CHECKED VERY CLOSELY AT THE BEGINNING OF THE MIXING OPERATION.

5. PRELIMINARY CURING OR "MELLOWING": (SPECS. BOOK 501-9B)

FROM THIS POINT ON, THE COMPLETION OF LIME STABILIZATION USING QUICKLIME IS THE SAME AS WITH HYDRATED LIME. REFER BACK TO HEADINGS #5, 6, 7, AND 8 UNDER HYDRATED LIME.

CONSTRUCTION PROCEDURES USING LIME SLURRY

1. PRELIMINARY TESTING AND PROCEDURES:

A. REFER TO INSPECTOR'S CHECK LIST IN CONSTRUCTION MANUAL (SECTION 501, LIME TREATED SOIL, PG. 5-15 & 16) FOR A ROUTINE THAT FITS IN WITH THE SEQUENCE OF CONSTRUCTION OPERATIONS.

B. FIELD TESTS TO DETERMINE OPTIMUM MOISTURES OF MAJOR SOIL TYPES ON THE PROJECT SHOULD BE CONDUCTED BY PROJECT CONSTRUCTION PERSONNEL PRIOR TO THE STARTING OF SUBGRADE STABILIZATION (SPECS. BOOK 501-8B)

C. A MINIMUM PERIOD OF 24 DAYS BETWEEN SAMPLE ACQUISITION AND PROCESSING BY THE STATE MATERIALS LABORATORY IS REQUIRED (SPECS. BOOK 501-8 (REVISION 11/18/03 SP 5R20) & CONSTRUCTION MANUAL 501-1)

D. PRIOR TO SUBGRADE STABILIZATION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTOR'S REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS (SPECS. BOOK 501-4). A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING. BEFORE THE LIME IS SPREAD, THE HAZARDS AND SAFEGUARDS INVOLVED WHEN WORKING WITH LIME SLURRY SHOULD ALSO BE DISCUSSED.

2. PREPARATION:

A. CHECK AREA TO BE STABILIZED FOR GRADE, TYPICAL SECTION, AND IN-PLACE MOISTURE CONTENT OF SUBGRADE. SOIL MOISTURE SHOULD NOT EXCEED 2% ABOVE OPTIMUM (SPECS. BOOK 501-6, 501-8B).

B. DETERMINE "PULL", THE AREA TO BE COVERED BY THE TRUCKLOAD OF LIME, THE SAME AS WITH HYDRATED LIME (SEE APPENDIX A).

C. ALL WEIGHT TICKETS MUST HAVE A N.C. CERTIFIED WEIGHMASTER'S STAMP ON THEM (SPECS. BOOK 106-7, 2ND PARAGRAPH).

D. THE AREA TO BE COVERED SHOULD THEN BE MARKED OFF AND SCARIFIED (OR PARTIALLY PULVERIZED) PRIOR TO SPREADING THE LIME SLURRY (SPECS. BOOK 501-7).

E. A ½ GALLON SAMPLE OF LIME IN AN AIR TIGHT CONTAINER SHOULD BE OBTAINED FROM EVERY 4TH LOAD (OR AT LEAST 1 A DAY) AND SENT TO THE CHEMICAL LAB FOR TESTING.

3. APPLICATION OF SLURRY: (SPECS. BOOK 501-8B)

A. EITHER HYDRATED OR QUICKLIME MAY BE USED TO PRODUCE THE LIME SLURRY. THE SLURRY WILL NORMALLY BE MIXED IN A SEPARATE HOLDING TANK AND TRANSPORTED TO THE ROADWAY IN A TANKER TRUCK EQUIPPED TO PROVIDE CONTINUOUS AGITATION UNTIL SPREAD. THE SLURRY SHALL HAVE A DRY SOLID CONTENT OF AT LEAST 30% BY WEIGHT (SPECS. BOOK 501-8B).

B. DURING APPLICATION, RATE OF SPREAD CAN BE CHECKED BY KNOWING THE TONS OF HYDRATED LIME PRODUCED IN THE BATCH AT THE MIXING (OR HOLDING) TANK, THE CAPACITY AND WIDTH OF SPREAD OF THE SPREADER TRUCK, AND THE AREA TO BE COVERED BY THE BATCH. THE LINEAR FEET TO BE COVERED BY EACH LOAD OF THE SPREADER TRUCK CAN THEN BE DETERMINED. APPLICATION OF SLURRY SHALL BE IN 2 EQUAL SPREADS, WITH THE FIRST SPREAD BEING PARTIALLY MIXED IN TO THE SOIL TO A MINIMUM DEPTH OF 3 INCHES, AND THE 2ND SPREAD MIXED FULL DEPTH (8 INCHES).

C. FIRST AID:

1. **SKIN** - TREAT AS A STANDARD BURN; WASH WITH WATER AND SOAP, APPLY BURN OINTMENT, KEEP COVERED WITH STERILE BANDAGES.
2. **EYES** - HOLD WORKERS EYES OPEN, FLUSH WITH WATER IMMEDIATELY (CONSTRUCTION MANUAL 501-5).
3. ***SEEK MEDICAL TREATMENT WITHOUT DELAY FOR THE ABOVE***

4. PRIMARY MIXING: (SPECS. BOOK 501-9A)

A. IMMEDIATELY AFTER THE SLURRY HAS BEEN APPLIED, FULL-DEPTH MIXING SHOULD BEGIN AND CONTINUED WITH THE ADDITION OF WATER AS NEEDED UNTIL PULVERIZATION AND A UNIFORM MIXTURE OF SOIL, LIME, AND WATER HAS BEEN OBTAINED TO THE RECOMMENDED DEPTH.

B. THE MOISTURE CONTENT AT THIS TIME SHOULD BE BETWEEN OPTIMUM AND OPTIMUM PLUS 3 %. A MOISTURE TEST SHOULD THEN BE PERFORMED AND RECORDED.

C. DEPTHS SHOULD BE CHECKED VERY CLOSELY AT THE BEGINNING OF THE MIXING OPERATION.

5. PRELIMINARY CURING OR "MELLOWING":

FROM THIS POINT ON, THE COMPLETION OF LIME STABILIZATION USING LIME SLURRY IS THE SAME AS WITH HYDRATED LIME OR QUICKLIME. REFER BACK TO HEADLINES #5, 6, 7, AND 8 UNDER HYDRATED LIME.

CONSTRUCTION PROCEDURES USING SOIL-CEMENT

1. PRELIMINARY TESTING AND PROCEDURES:

- A. REFER TO INSPECTOR'S CHECK LIST IN CONSTRUCTION MANUAL (SECTION 542, SOIL-CEMENT BASE, PG. 5-50) FOR STEPS INTO A ROUTINE THAT FITS IN WITH THE SEQUENCE OF CONSTRUCTION OPERATIONS.
- B. FIELD TESTS TO DETERMINE OPTIMUM MOISTURES OF MAJOR SOIL TYPES ON THE PROJECT SHOULD BE CONDUCTED BY PROJECT CONSTRUCTION PERSONNEL PRIOR TO THE START OF SUBGRADE STABILIZATION (SPECS. BOOK 542-7).
- C. A MINIMUM PERIOD OF 24 DAYS BETWEEN SAMPLE ACQUISITION AND PROCESSING BY THE STATE MATERIALS LABORATORY IS REQUIRED (SPECS. BOOK 542-7, (REVISION 11/18/03 SP 5R20)
- D. PRIOR TO SUBGRADE STABILIZATION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTOR'S REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS (SPECS. BOOK 542-4). A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING.

2. PREPARATION:

- A. THE SUBGRADE SHOULD BE CHECKED FOR GRADE, TYPICAL SECTION, AND IN-PLACE MOISTURE CONTENT OF SUBGRADE. SOIL MOISTURE SHOULD NOT EXCEED OPTIMUM (SPECS. BOOK 542-5).
- B. DETERMINE "PULL", THE AREA TO BE COVERED BY THE LOAD OF CEMENT (***SAME METHOD AS WITH HYDRATED LIME OR QUICKLIME AS PRESENTED ON PG. 4***)
- C. ALL WEIGHT TICKETS MUST HAVE A N.C. CERTIFIED WEIGHMASTER'S STAMP ON THEM (SPECS. BOOK 106-7, 2ND PARAGRAPH).
- D. THE AREA TO BE COVERED SHOULD THEN BE MARKED OFF AND SCARIFIED OR PARTIALLY PULVERIZED WITH THE ROTARY MIXER BEFORE THE CEMENT IS SPREAD. (SPECS. BOOK 542-6)
- E. A ½ GAL. SAMPLE OF CEMENT IN AN AIR TIGHT CONTAINER SHOULD BE OBTAINED FROM EVERY 4TH LOAD (OR AT LEAST 1 A DAY) AND SENT IN TO THE PHYSICAL LAB FOR TESTING.

3. APPLICATION OF CEMENT: (SPECS. BOOK 542-7)

THE CEMENT WILL BE SPREAD WITH AN APPROVED VARIABLE RATE SPREADER THAT CAN BE ADJUSTED TO THE REQUIRED RATE. THE CEMENT RATE CAN BE CALIBRATED BY PLACING A CANVAS (SQ.METER OR SQ. YD.), OF KNOWN SIZE IN FRONT OF THE SPREADER, LETTING THE SPREADER PASS OVER IT AND THEN WEIGHING THE CEMENT ON THE CANVAS. ADJUSTMENTS CAN THEN BE MADE AND THE PROCEDURE REPEATED UNTIL THE REQUIRED RATE OF SPREAD IS OBTAINED.

4. MIXING, COMPACTION, AND FINISHING: (SPECS. BOOK 542-8 to 10)

- A. DRY MIXING SHOULD BEGIN IMMEDIATELY AFTER CEMENT IS SPREAD. DEPTHS SHOULD BE CHECKED VERY CLOSELY AT THE BEGINNING OF THE MIXING OPERATION.
- B. WATER SHOULD THEN BE ADDED AND MIXING CONTINUED UNTIL ADEQUATE PULVERIZATION AND A HOMOGENEOUS MIX OF SOIL, CEMENT, AND WATER IS OBTAINED FOR THE FULL DEPTH AND WIDTH OF THE PULL.
- C. A MOISTURE TEST SHOULD THEN BE PERFORMED AND RECORDED, ASSURING THE MOISTURE CONTENT AT THE TIME OF COMPACTION IS BETWEEN OPTIMUM AND OPTIMUM PLUS 2 %.
- D. IMMEDIATELY AFTER WET MIXING, COMPACTION SHOULD BEGIN, ACCOMPANIED BY GRADING AND SHAPING TO PREVENT CREATION OF COMPACTION PLANES.
- E. CARE SHOULD BE TAKEN AT THE TRANSVERSE CONSTRUCTION JOINT TO INSURE PROPER MIXING AND COMPACTION.
- F. AT LEAST 97% COMPACTION IS REQUIRED.
- G. ALL WORK, INCLUDING FINISHING, SHOULD BE COMPLETED WITHIN 4 HRS. AFTER WATER IS ADDED, AND NO SOIL-CEMENT MIXTURE SHOULD BE LEFT UNDISTURBED FOR MORE THAN 30 MINUTES UNTIL COMPLETED.
- H. THE COMPACTED THICKNESS OF THE COMPLETED SOIL-CEMENT BASE WILL BE DETERMINED BY MEASUREMENTS MADE IN TEST HOLES LOCATED AT RANDOM INTERVALS NOT TO EXCEED 500 FT. (SPECS. BOOK 542-11).
- I. AT THE END OF EACH DAY'S CONSTRUCTION, A STRAIGHT TRANSVERSE CONSTRUCTION JOINT SHALL BE FORMED BY CUTTING BACK INTO THE COMPLETED WORK TO FORM A TRUE VERTICAL FACE.

5. SEALING AND CURING: (SPECS. BOOK 542-12&13, 543-1 THRU 6)

- A. AFTER THE REQUIRED COMPACTION AND FINISHING IS COMPLETED, THE STABILIZED SECTION SHOULD BE PROTECTED FROM DRYING BY A SEAL COAT FOR A 7 DAY CURING PERIOD.
- B. THE APPROVED SEAL COATS ARE: RS-1H, RS-1, CRS-1H, CRS-1, AND CRS-2.
- C. THE RECOMMENDED RATE OF APPLICATION WILL BE .10 TO .20 GALLONS PER S.Y. OR .45 TO .90 LITERS PER SQUARE METER.
- D. THE SEAL COAT SHOULD BE APPLIED AS SOON AS COMPACTION AND FINISHING ARE COMPLETE, BUT NO LATER THAN 24 HRS., UNLESS DELAYED BY RAIN. THE SURFACE SHOULD BE KEPT MOIST UNTIL THE SEAL COAT APPLICATION IS COMPLETE.
- E. ONE FULL DAY WITH THE TEMPERATURE AT 50°F OR ABOVE CONSTITUTES ONE CURING DAY. THE CURING PERIOD SHALL BE 7 DAYS. IF THE TEMPERATURE FALLS BELOW 50°F, CURING TIME WILL BE PRO-RATED ACCORDINGLY BUT IN NOT LESS THAN ½ DAY INCREMENTS. IF THE TEMPERATURE DOES NOT EXCEED 50°F LONGER THAN 12 HRS./DAY, NO CURING TIME IS ACQUIRED.
- F. THE STABILIZED AREA MAY BE OPENED TO LOCAL, LIGHTWEIGHT TRAFFIC AS SOON AS IT IS COMPLETE, BUT WILL HAVE TO BE SANDED AT THE RATE OF 10 LBS. PER S.Y. TO PREVENT DESTRUCTION OF THE SEAL COAT.

6. MAINTENANCE AND REPAIR: (SPECS. BOOK 542-14,15)

A. THE STABILIZED LIFT WILL BE PROTECTED FROM FREEZING AND MAINTAINED BY THE CONTRACTOR UNTIL A LAYER OF PAVEMENT HAS BEEN PLACED OVER IT. NO CEMENT-TREATED SOIL WILL BE CONSTRUCTED THAT WILL NOT BE COVERED WITH A LAYER OF PAVEMENT, BASE, OR OTHER CONSTRUCTION MATERIAL BY DECEMBER 1 OF THAT CALENDAR YEAR .

B. ANY MAINTENANCE OR REPAIR NECESSARY WILL BE PERFORMED BY THE CONTRACTOR AT NO COST TO THE D.O.T. AND SHALL BE REPEATED AS OFTEN AS MAY BE NECESSARY TO KEEP THE CEMENT-TREATED SOIL IN AN ACCEPTABLE CONDITION UNTIL ALL WORK IS COMPLETED AND ACCEPTED.

C. THE CONTRACTOR'S EQUIPMENT WILL BE ALLOWED ON THE STABILIZED GRADE ONLY AS NEEDED TO DISCHARGE PAVING MATERIALS INTO THE SPREADER BOX DURING PAVING OPERATION.

CONSTRUCTION PROCEDURES USING ROAD-MIXED CTB

1. REASONS FOR ROAD-MIXED CTB INSTEAD OF PLANT-MIXED CTB:

A. CONTRACTOR'S PREFERENCE.

B. WIDENING WORK - USING SHOULDER BASE OR TO PREVENT HAZARD OF DROP OFF AT THE EDGE OF PAVEMENT.

2. PRELIMINARY TESTING AND PROCEDURES

A. REFER TO INSPECTOR'S CHECKLIST IN CONSTRUCTION MANUAL (SECTION 540, ROAD MIXED CEMENT-TREATED BASE COURSE, PG. 5-23) FOR A ROUTINE THAT FITS IN WITH THE SEQUENCE OF CONSTRUCTION OPERATIONS.

B. PRIOR TO BASE PRODUCTION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTOR'S REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS (SPECS. BOOK 540). A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING.

C. AGGREGATE SHOULD NOT BE PLACED AHEAD FOR MORE THAN A WEEKS WORK. AGGREGATE SHALL BE PLACED ON THE PREPARED SUBGRADE BY MEANS OF MECHANICAL SPREADING EQUIPMENT TO ENSURE UNIFORM DEPTH AND TO MINIMIZE SEGREGATION.

D. DEPTH OF AGGREGATE MUST BE AT LEAST 1 INCH THICKER THAN IS TO BE STABILIZED, IN ORDER TO PREVENT CONTAMINATING WITH SUBGRADE SOIL DURING MIXING.

3. PREPARATION:

A. CHECK AREA TO BE STABILIZED FOR GRADE, TYPICAL SECTION, AND IN-PLACE MOISTURE CONTENT OF GRADE. MOISTURE SHOULD NOT EXCEED OPTIMUM MOISTURE.

B. DETERMINE "PULL", THE AREA TO BE COVERED BY THE TRUCK LOAD OF CEMENT.

C. ALL WEIGHT TICKETS MUST HAVE A CERTIFIED N.C. WEIGHMASTER'S STAMP ON THEM (SPECS. BOOK 106-7, 2ND PARAGRAPH).

D. THE AREA TO BE COVERED SHOULD THEN BE MARKED OFF AND SCARIFIED PRIOR TO SPREADING CEMENT.

E. A ½ GALLON SAMPLE OF CEMENT SHOULD BE OBTAINED FROM EVERY FOURTH LOAD (OR AT LEAST ONE A DAY) AND SENT TO THE PHYSICAL LAB FOR TESTING.

4. CEMENT APPLICATION: (SPECS. BOOK 540-5).
 - A. THE CEMENT WILL BE SPREAD WITH AN APPROVED VARIABLE RATE SPREADER THAT CAN BE ADJUSTED TO THE REQUIRED RATE. THE CEMENT RATE CAN BE CALIBRATED BY PLACING A CANVAS OF KNOWN SIZE, (SQ. METER OR SQ.YD.), IN FRONT OF THE SPREADER, LETTING THE SPREADER PASS OVER IT AND THEN WEIGHING THE CEMENT ON THE CANVAS. ADJUSTMENTS CAN THEN BE MADE AND THE PROCEDURE REPEATED UNTIL THE REQUIRED RATE OF SPREAD IS OBTAINED.
 - B. WHEN SPREADING BEGINS, CHECK AND CALIBRATE THE RATE OF CEMENT.
 - C. THE SURFACE SHOULD BE RELATIVELY DRY WHEN CEMENT IS SPREAD.
5. DRY MIXING, COMPACTION, AND FINISHING: (SPECS. BOOK 540-5 (C-2), 540-6).
 - A. DRY MIXING SHOULD BEGIN IMMEDIATELY AFTER CEMENT IS SPREAD (ONE OR MORE PASSES WITH ROTARY MIXER AS NEEDED).
 - B. DURING DRY MIXING, THE DEPTH OF MIX SHOULD BE CHECKED WITH STRINGLINE, AND MIXERS CALIBRATED AS NEEDED.
 - C. IMMEDIATELY FOLLOWING DRY MIXING, WATER SHOULD BE ADDED AND MIXING CONTINUED UNTIL A HOMOGENEOUS MIX OF AGGREGATE, CEMENT, AND WATER IS OBTAINED FOR THE FULL DEPTH AND WIDTH OF THE LIFT.
 - D. DEPTHS SHOULD BE CONTINUOUSLY MONITORED DUE TO MOVEMENT OF MATERIALS DURING MIXING CAUSED BY SUPERELEVATION, PARTICULARLY ON CURVES, RAMPS, AND LOOPS.
 - E. WHEN FINAL MIXING IS COMPLETE AND COMPACTION BEGINS, THE MOISTURE CONTENT SHOULD BE BETWEEN OPTIMUM AND OPTIMUM PLUS ONE AND ONE HALF PERCENT.
 - F. COMPACTION SHOULD BEGIN AS SOON AS FINAL MIXING IS COMPLETE AND SHOULD BE ACCOMPANIED BY GRADING AND SHAPING TO AVOID CREATING COMPACTION PLANES.
 - G. AT LEAST 97% COMPACTION IS REQUIRED. THE AASHTO UNIT WEIGHT AND OPTIMUM MOISTURE WILL BE FURNISHED BY THE SOILS LABORATORY. NUCLEAR DENSITIES MAY BE USED UPON APPROVAL BY THE RESIDENT ENGINEER.
 - H. CARE SHOULD BE TAKEN AT THE TRANSVERSE CONSTRUCTION JOINT TO ENSURE PROPER MIXING AND COMPACTION.
 - I. SPRAYING OR FOGGING WITH WATER MAY BE REQUIRED DURING COMPACTION TO PREVENT THE SURFACE FROM DRYING.
 - J. THE FINAL COMPACTION AND FINISHING SHOULD BE COMPLETED WITHIN 3 HRS. FROM THE TIME WATER IS ADDED AND SHOULD NOT BE LEFT UNDISTURBED FOR MORE THAN 30 MINUTES DURING THIS TIME.

6. CONSTRUCTION JOINTS: (SPEC. BOOK 540-7).

A. AT THE END OF EACH DAY, A STRAIGHT TRANSVERSE VERTICAL JOINT WILL BE CUT IN LARGE OR VERY WIDE AREAS; A SIMILAR LONGITUDINAL JOINT MAY BE REQUIRED.

7. CURING AND SEALING: (SPECS. BOOK 540-9, 543-1 THRU 6).

A. AFTER THE CTB HAS BEEN COMPLETED, IT SHALL BE PROTECTED FROM DRYING FOR A 7 DAY CURING PERIOD WITH A SEAL COAT.

B. THE APPROVED SEAL COATS ARE: RS-1, RS-1H, CRS-1, CRS-1H, AND CRS-2.

C. THE RECOMMENDED RATE OF APPLICATION WILL BE .10 TO .20 GALLONS PER S.Y. OR .45 TO .90 LITERS PER SQUARE METER.

D. THE SEAL COAT SHOULD BE APPLIED AS SOON AS COMPACTION AND FINISHING IS COMPLETE AND NO MORE THAN 24 HOURS AFTER COMPLETION UNLESS DELAYED BY RAIN. THE CTB SURFACE SHALL BE KEPT MOIST UNTIL THE SEAL COAT APPLICATION IS COMPLETE.

E. 1 FULL DAY WITH THE TEMPERATURE AT 50°F OR ABOVE CONSTITUTES 1 CURING DAY. THE CURING PERIOD SHALL BE 7 DAYS. IF THE TEMPERATURE FALLS BELOW 50°F, CURING TIME WILL BE PRO-RATED ACCORDINGLY BUT IN NOT LESS THAN ½ DAY INCREMENTS. IF THE TEMPERATURE DOES NOT EXCEED 50°F LONGER THAN 12 HRS./DAY, NO CURING TIME IS ACQUIRED.

8. MAINTENANCE: (SPECS. BOOK 540-12).

A. THE CONTRACTOR WILL MAINTAIN CTB UNTIL FINAL ACCEPTANCE OF THE PROJECT. ANY MAINTENANCE OR REPAIRS SHALL BE PERFORMED BY THE CONTRACTOR AT NO COST TO THE DEPARTMENT.

B. IF NECESSARY TO OPEN AREA TO LOCAL TRAFFIC, IT SHOULD BE PROTECTED BY BLOTTING SAND AT THE RATE OF APPROXIMATELY 10 LBS./PER S.Y. (OR METRIC EQUIVALENT).

C. CONSTRUCTION EQUIPMENT SHALL NOT DRIVE ON THE CTB EXCEPT AS NECESSARY TO DISCHARGE PAVEMENT MATERIALS INTO THE SPREADER DURING PAVING OPERATIONS.

D. NO CTB SHALL BE PRODUCED THAT WILL NOT BE COVERED WITH PAVEMENT BY DEC. 1 OF THAT CALENDAR YEAR.

CONSTRUCTION PROCEDURES FOR USING PLANT-MIXED CTB
CONTINUOUS FLOW PUG MILL

1. PRELIMINARY TESTING AND PROCEDURES:

A. AGGREGATE SHOULD BE STOCKPILED AND TESTED FOR CTB SPECIFICATIONS AT LEAST 6 WEEKS PRIOR TO USE (RESIDENT ENGINEER'S RESPONSIBILITY).

B. PRIOR TO BEGINNING CONSTRUCTION, ADDITIONAL REPRESENTATIVE SAMPLES SHOULD BE SUBMITTED TO THE STATE MATERIALS LABORATORY TO DETERMINE AGGREGATE UNIT WEIGHT (RESIDENT ENGINEER'S RESPONSIBILITY).

C. IF THE CONTRACTOR PROPOSES TO USE QUARRY PRODUCTION AS THE SOURCE OF AGGREGATE AND IS NOT DOCUMENTED BY A CURRENT APPROVED JOB MIX FORMULA, THE CONTRACTOR SHALL SUBMIT SAMPLES OF ALL AGGREGATES AT LEAST 3 WEEKS PRIOR TO BEGINNING PRODUCTION. (SEE 540-5 (A) OF SPECS.)

D. IF THE CONTRACTOR FAILS TO MAINTAIN THE PRODUCTION WITHIN SPECIFIED RANGE, PRODUCTION WILL CEASE UNTIL A NEW MIX DESIGN HAS BEEN ESTABLISHED AND APPROVED BY THE ENGINEER.

E. PRIOR TO BASE PRODUCTION, A MEETING BETWEEN DIVISION CONSTRUCTION PERSONNEL AND THE CONTRACTOR'S REPRESENTATIVES WILL BE HELD. THIS MEETING WILL CONSIST OF CHECKING EQUIPMENT AND ANSWERING QUESTIONS CONCERNING THE SPECIFICATIONS. A REPRESENTATIVE FROM THE GEOTECHNICAL ENGINEERING UNIT MAY BE REQUESTED TO ATTEND THIS MEETING.

F. SUBGRADE SHOULD BE STABLE AND CHECKED FOR GRADE AND TYPICAL SECTION.

2. CHECK LIST FOR PLANT:

A. CEMENT STORAGE SILO SHOULD BE MARKED IN 1 FOOT DEPTH INCREMENTS SO THAT CEMENT CONTAINED COULD BE CALCULATED AT ANYTIME.

B. A READILY VISIBLE AIR PRESSURE GAUGE SHOULD BE USED WHEN AIR PRESSURE IS USED IN THE CEMENT FEEDING SYSTEM (4 PSI RECOMMENDED).

C. A VARIABLE SPEED MOTOR WITH A READILY VISIBLE RPM DIAL SHOULD BE USED AS A CEMENT FEEDER MOTOR.

D. A WATER GAUGE (SHOWING GALLONS PER MIN.) AND DOUBLE VALVE WATER SYSTEM SHOULD BE USED FOR CONTROLLING THE ADDITION OF WATER. ONE VALVE SHOULD CONTROL FLOW - THE OTHER VALVE IS AN ON-OFF VALVE, CONNECTED TO THE PLANT CONTROLS SO THAT IT REGULATES THE WATER FLOW WHEN THE PLANT IS STARTED AND STOPPED.

E. THE GEOTECHNICAL ENGINEERING UNIT SHOULD BE CONTACTED FOR PLANT APPROVAL.

F. WATER SHOULD BE INTRODUCED INTO THE CTB MIXTURE BY A SPRAY BAR LOCATED NEAR THE BACK OF THE PUG MILL.

G. IN SOME OF THE SHORTER MIXING BINS, (6 FT. OR LESS) IT MAY BE NECESSARY TO REVERSE 2 OR MORE PADDLES IN ORDER TO LENGTHEN MIXING TIME AND ENSURE A HOMOGENEOUS MIX.

H. FEEDER BELTS SHOULD BE VISIBLE TO THE PLANT OPERATOR SO THAT IF CEMENT OR AGGREGATE FLOW STOPS OR CHANGES APPRECIABLY, THE OPERATOR CAN STOP THE PUG MILL.

I. CERTIFIED WEIGHTS FOR CEMENT TANKERS MAY BE ACCEPTED OR TANKERS MAY BE WEIGHED ON THE CERTIFIED SCALES AT THE QUARRY WHERE THE PLANT IS LOCATED.

J. A ½ GALLON SAMPLE OF CEMENT SHOULD BE OBTAINED FROM EVERY 4TH LOAD (OR AT LEAST 1 A DAY) AND SENT TO THE PHYSICAL LAB FOR TESTING.

3. CALIBRATING A CONTINUOUS MIX PLANT: (PUG MILL) (SPECS. BOOK 540-5(B)(c)).

A. CHECK IN-PLACE MOISTURE OF STOCKPILE BY DIGGING INTO THE SIDE WITH A LOADER AND OBTAINING A REPRESENTATIVE SAMPLE TO DETERMINE MOISTURE CONTENT.

B. CHECK RATE OF AGGREGATE FLOW THROUGH PUG MILL BY RUNNING 2 ONE MINUTE CYCLES INTO TRUCKS AND WEIGHING. IF THESE 2 WEIGHTS ARE VERY CLOSE, AVERAGE THE 2 AND USE AS RATE OF AGGREGATE FLOW. IF THERE IS AN APPRECIABLE DIFFERENCE IN THE 2 WEIGHTS, THEN 2 ADDITIONAL 1 MINUTE CYCLES SHOULD BE RUN AND WEIGHED. NOTE: BEFORE 1 MIN. TIME CYCLES ARE STARTED, THE PUG MILL SHOULD BE STARTED AND HAVE BELTS AND MILL AT OPERATING CAPACITY. AGGREGATE USED DURING CALIBRATION MAY BE DUMPED BACK ON THE SURGE PILE FOR USE IN CTB.

C. WHEN AVERAGE WEIGHT OF AGGREGATE FLOW PER MIN. IS DETERMINED, IT SHOULD BE CORRECTED FOR IN-PLACE MOISTURE CONTENT TO DETERMINE DRY AGGREGATE FLOW PER MINUTE.

D. THE REQUIRED RATE OF CEMENT FLOW (IN LBS. PER MIN.) IS THEN DETERMINED BY MULTIPLYING THE RATE OF CEMENT IN %, AS SHOWN IN THE CONTRACT OR AS DIRECTED BY THE ENGINEER, WITH THE WEIGHT OF DRY AGGREGATE PER MINUTE.

E. THE REQUIRED AMOUNT OF CEMENT (IN LBS. PER MIN.) SHOULD THEN BE DIVIDED BY 4 TO REDUCE THE CEMENT CALIBRATIONS TO 15 SEC. CYCLES. THIS WILL PROVIDE FOR EASIER HANDLING AND LESS WASTE OF CEMENT.

F. CEMENT FLOW CAN THEN BE CALIBRATED BY DIVERTING CEMENT FROM THE CEMENT FEEDER BELT TO A 55 GALLON DRUM ON PLATFORM SCALES AND RUNNING THE CEMENT FEEDER FOR A 15 SEC. CYCLE. THE CEMENT CAN BE WEIGHED, THE VARIABLE SPEED FEEDER MOTOR CAN BE ADJUSTED AS NEEDED, AND THE CHECK CYCLE REPEATED UNTIL DESIRED RATE OF CEMENT FLOW IS ACHIEVED.

G. THE APPROXIMATE AMOUNT OF WATER IN GAL. PER MIN. CAN BE CALCULATED BY ADDING THE DESIRED RATE ABOVE OPTIMUM AT THE PLANT, PLUS OPTIMUM, MINUS IN-PLACE MOISTURE OF AGGREGATE = % MOISTURE TO BE ADDED. THE % MOISTURE x TOTAL DRY AGGREGATE AND CEMENT FLOW PER MIN. WILL EQUAL LBS. OF WATER PER MIN., DIVIDED BY 8.33 (LBS. PER GAL.) = GAL. PER MIN. TO BE ADDED. MOISTURE CONTENT OF THE CEMENT-TREATED BASE MUST BE CONTROLLED WITHIN OPTIMUM TO OPTIMUM PLUS 1.5 %.

CALIBRATION EXAMPLE:

GIVEN : RATE OF CEMENT REQUIRED - 3.5%

OPTIMUM MOISTURE - 5.3%

IN-PLACE MOISTURE OF AGGREGATE - 3.2%

1 GALLON = 8.33 LBS.

TWO 1 MIN. RUNS OF ABC = 10,400 & 10,700 = 10,550 LBS. AVG. WT. PER MIN.

10,550 DIVIDED BY 1.032 = 10,223 LBS. OF DRY AGGREGATE

10,223 X 3.5% = 358 LBS. = 89.5 LBS. CEMENT PER 15 SEC.

4

10,223 LBS. DRY AGGREGATE + 358 LBS. CEMENT = 10,581 DRY WT. OF
AGGREGATE AND CEMENT

10,581 LBS. X (.053 + .015 - .032) = 381 LBS. OR 46 GAL. OF WATER PER MIN.

1. 10,223 AVG. LBS. DRY AGGREGATE PER MIN.

2. 358 LBS. CEMENT PER MIN.

3. 46 GAL. OF WATER PER MIN.

H. IN CTB PUGMILL, OUR CALCULATED WATER TO BE ADDED IS TO HELP THE CONTRACTOR GET STARTED. IT IS HIS RESPONSIBILITY TO PRODUCE THE MIX AT THE REQUIRED MOISTURE CONTENT. WE SHOULD NOT INSIST HE SET HIS WATER GAUGE AT WHAT WE CALCULATED TO BE NEEDED.

I. ALL WATER, AIR AND RPM GAUGES SHOULD BE READILY VISIBLE AND SHOULD BE MONITORED PERIODICALLY DURING THE OPERATION OF THE PUG MILL.

J. CALIBRATIONS SHOULD BE CHECKED ONCE A DAY.

4. PLACING PLANT-MIXED CTB: (SPECS. BOOK 540-5(B)(2)).

A. SUBGRADE SHOULD BE FIRM, STABLE, AND CHECKED FOR GRADE AND TYPICAL SECTION. IF SUBGRADE SURFACE IS VERY DRY, IT SHOULD BE SPRINKLED WITH WATER PRIOR TO PLACING CTB.

B. TRUCKS HAULING CTB FROM THE PLANT TO THE ROADWAY WILL BE COVERED WITH A TARP TO PREVENT DRYING OF THE CTB.

C. IN NO CASE SHALL THE TIME BETWEEN THE LOADING OF THE HAUL TRUCKS AND THE BEGINNING OF COMPACTION EXCEED ONE HOUR.

D. PLACEMENT OF THE CTB SHOULD PROGRESS OVER THE FULL WIDTH OF THE ROADWAY USING 2 OR MORE SPREADERS AS NECESSARY.

5. COMPACTION: (SPECS. BOOK 540-6).

A. COMPACTION SHOULD BEGIN AS SOON AS POSSIBLE AFTER CTB IS PLACED AND SHOULD BE ACCOMPANIED BY GRADING AND SHAPING TO AVOID CREATING COMPACTION PLANES.

B. A MINIMUM OF 97% COMPACTION IS REQUIRED AND THE AASHTO UNIT WEIGHT AND OPTIMUM MOISTURE WILL BE FURNISHED BY THE SOILS LAB. NUCLEAR DENSITIES MAY BE USED UPON APPROVAL BY THE ENGINEER.

C. THE REMAINING WORK OF COMPLETING PLANT-MIXED CTB IS THE SAME AS FOR ROAD-MIXED CTB. REFER BACK TO HEADINGS # 6, 7, 8, AND 9 UNDER ROAD-MIXED CTB.

**CONSTRUCTION PROCEDURES USING PLANT-MIXED CTB
BATCH PLANT**

1. ADVANCE WORK REQUIRED:

AS WITH CONTINUOUS FLOW PUG MILL, AGGREGATE SHOULD BE STOCKPILED AND TESTED FOR CTB SPECIFICATIONS AT LEAST 6 WEEKS PRIOR TO USE, AND WHEN STOCKPILE IS COMPLETE, ADDITIONAL SAMPLES SHOULD BE SUBMITTED TO THE STATE MATERIALS LABORATORY TO DETERMINE THE UNIT WEIGHT (RESIDENT ENGINEER'S RESPONSIBILITY).

2. CHECKING BATCH PLANT:

A. THE CEMENT STORAGE SILO SHOULD BE MARKED OR CALIBRATED TO ENABLE THE CALCULATION OF CEMENT USED EACH DAY AS WITH A CONTINUOUS FLOW PLANT.

B. CHECK ALL NECESSARY VALVES, SWITCHES, AND GAUGES AS WITH CONTINUOUS FLOW PLANTS.

C. AGGREGATE FEEDER BIN SHOULD BE ABLE TO MAINTAIN GOOD PRODUCTION WITH MINIMUM SEGREGATION.

D. CERTIFIED CEMENT TANKER WEIGHTS OR WEIGHING ON CERTIFIED SCALES WILL BE ACCEPTABLE.

3. CALIBRATING BATCH PLANT:

A. AT THE BEGINNING OF THE PROJECT, ALL SCALES FOR THE BATCHING OPERATION WILL BE CHECKED BY A REGISTERED OR LICENSED SCALE PERSON IN THE PRESENCE OF A D.O.T. REPRESENTATIVE.

B. THE CONTRACTOR WILL FURNISH THE REQUIRED STANDARD 50 LB. WEIGHTS AND PERSONNEL TO ASSIST IN CALIBRATING ALL SCALES.

C. AFTER THE INITIAL CALIBRATION, THE SCALES SHOULD AGAIN BE CHECKED WITH THE STANDARD WEIGHTS AT THE END OF THE FIRST DAYS OPERATION, AND AT LEAST TWICE WEEKLY AFTER THAT.

D. WHEN WORK BEGINS, SEVERAL MOISTURE TESTS WILL BE RUN ON THE MIXED CTB TO ASSURE THAT THE CALCULATIONS ARE CORRECT AND THE DESIRED MOISTURE CONTENT IS BEING OBTAINED (OPTIMUM TO PLUS ONE AND ONE HALF PERCENT)

E. SCALES SHOULD BE MONITORED ON A REGULAR BASIS TO MAKE SURE THAT THE DIAL INDICATOR RETURNS TO ZERO WHEN THE HOPPERS ARE DUMPED. FAILURE TO DO SO WOULD INDICATE THAT MATERIAL IS STICKING AND ACCUMULATING IN THE HOPPERS. IF SO, HOPPERS SHOULD BE CLEANED OUT.

F. OCCASIONAL MOISTURE TESTS SHOULD BE PERFORMED ON MATERIAL FROM THE AGGREGATE STOCKPILE TO MAKE SURE IN-PLACE MOISTURE DOES NOT CHANGE.

G. AT LEAST 2 MOISTURE TESTS PER DAY SHOULD BE RUN ON THE MIXED CTB AS IT IS PRODUCED, TO ENSURE THE CONTINUED CORRECT MOISTURE CONTENT (OPTIMUM TO PLUS 1 1/2%).

CHEMICAL STABILIZATION RELATED TESTS AND MEASUREMENTS

1. TESTS AND MEASUREMENTS PERFORMED BY PROJECT PERSONNEL BEFORE AND DURING CONSTRUCTION:
 - A. CHECK SUBGRADE FOR GRADE, TYPICAL SECTION, IN-PLACE MOISTURE AND STABILITY PRIOR TO CONSTRUCTION.
 - B. MEET WITH CONSTRUCTION PERSONNEL TO INSPECT EQUIPMENT AND DISCUSS SPECIFICATIONS PRIOR TO CONSTRUCTION.
 - C. MAKE SURE THAT AGGREGATE IS TESTED FOR SPECIFICATIONS, UNIT WEIGHT AND RATE OF CEMENT REQUIRED PRIOR TO CONSTRUCTION WHEN WORKING WITH CTB. MAKE SURE JOB MIX FORMULA HAS BEEN APPROVED PRIOR TO PRODUCTION.
 - D. CHECK THE RATE OF APPLICATION, DRY MIXING, WET MIXING, COMPACTION, FINISHING AND SEALING OPERATIONS. THERE WILL BE MANY MOISTURE TESTS NEEDED AS WELL AS DENSITY TESTS. BE SURE THAT ALL TIME AND TEMPERATURE RESTRICTIONS ARE ADHERED TO. A GOOD OPERATION WILL REQUIRE TWO FULL TIME INSPECTORS (ONE ALSO BEING A DENSITY OPERATOR).
2. WORK PERFORMED BY THE GEOTECHNICAL ENGINEERING UNIT BEFORE THE PROJECT IS LET TO CONTRACT AND DURING CONSTRUCTION:
 - A. THE GEOTECHNICAL ENGINEERING UNIT MAKES A SUBSURFACE INVESTIGATION AND EVALUATION TO DETERMINE WHETHER OR NOT LIME/CEMENT STABILIZATION IS FEASIBLE OR PRACTICAL (POSSIBLE WIDENING JOBS, NARROW WIDTHS, ALTERNATING FROM SIDE TO SIDE OR POSSIBLE COARSE, WELL DRAINING SANDS THAT WOULD NOT BENEFIT FROM LIME/CEMENT STABILIZATION, TRAFFIC CONTROL, ETC.).
 - B. IF LIME/CEMENT STABILIZATION IS CONSIDERED, THEN PRELIMINARY SAMPLES OF THE VARIOUS SOIL TYPES ALONG THE PROJECT ARE TAKEN TO DETERMINE THE TYPE OF STABILIZATION AND THE APPROXIMATE RATES TO BE SET UP IN THE CONTRACT.
 - C. AFTER THE PROJECT IS UNDER CONSTRUCTION, IT IS MONITORED SO THAT SAMPLES OF THE ACTUAL SUBGRADE CAN BE TAKEN AS SOON AS POSSIBLE TO DETERMINE THE SPECIFIC RATES AND TYPE OF STABILIZATION TO BE USED AT DIFFERENT LOCATIONS OVER THE PROJECT. THESE ARE TIME CONSUMING TESTS, SO IT IS IMPERATIVE THAT THESE SAMPLES BE TAKEN AS SOON AS SUBGRADE ELEVATION IS REACHED.
 - D. WHEN THE STABILIZATION WORK BEGINS, THE GEOTECHNICAL ENGINEERING UNIT WILL PROVIDE ANY ASSISTANCE NEEDED TO THE PROJECT PERSONNEL. THIS WILL INCLUDE ATTENDING THE PREVIOUSLY MENTIONED MEETING WITH THE CONTRACTOR'S PERSONNEL TO CHECK EQUIPMENT AND DISCUSS THE SPECIFICATIONS AND ALSO BEING ON THE PROJECT TO WORK WITH THE INSPECTORS DURING CONSTRUCTION (AS TIME AND WORK LOAD PERMITS).
 - E. THE GEOTECHNICAL ENGINEERING UNIT WILL ALSO BE PERFORMING TESTS, COMPACTING SPECIMENS, CHECKING FOR CEMENT UNIFORMITY, CHECKING pH, ETC. AS TIME PERMITS, AS LONG AS THE WORK IS IN PROGRESS. THIS IS DONE TO ENSURE THAT THE DESIRED RESULTS ARE ACHIEVED ON THE PROJECT AS WELL AS HELPING IN THE DESIGN OF FUTURE PROJECTS.
 - F. DUE TO THE SEQUENCE OF THE WORK AND INVOLVEMENT BETWEEN THE GEOTECHNICAL ENGINEERING AND CONSTRUCTION UNITS, IT IS IMPERATIVE THAT THERE BE ADEQUATE COMMUNICATIONS TO ENSURE THAT ALL WORK IS DONE AS NEEDED.

APPENDIX A

PURE QUICKLIME X 1.32 = HYDRATED LIME
(CaO) (Ca(OH)²)

QUICKLIME X (% PURITY) X 1.32 = A
DELIVERED

QUICKLIME X (% INERT MATERIAL) X 1.0 = B
DELIVERED

A + B = TOTAL HYDRATED LIME PRODUCED (PAY QUANTITY & PULL)

FIGURING COVERAGE AREA ON METRIC JOBS

GIVEN: LOAD WEIGHT: 45,000 lbs / 2000 lbs/ton = 22.5 TONS (ENGLISH)
22.5 X 0.9072 = 20.4 TONS (METRIC)

RDWY. WIDTH: 10.36 m
RECOMMENDED RATE: 11 kg / m²

10.36m X 11 kg/m² = 113.96 kg PER LIN. METER
20.41tons(METRIC) X 1000 kg/met.ton= 20,410 kg IN TANKER
20,410 kg / 113.96 kg/lin.meter = 179.09 LIN. METERS TO BE COVERED.

APPENDIX B

INSPECTOR'S CHECKLIST FOR SOIL & BASE STABILIZATION

BEFORE SOIL STABILIZATION BEGINS:

1. HAS THE SOIL BEEN **SAMPLED** BY THE GEOTECHNICAL ENGINEERING UNIT? THE SUBGRADE ELEVATION MUST BE WITHIN **TWO** INCHES OF THE FINAL SUBGRADE ELEVATION BEFORE THE GEOTECHNICAL ENGINEERING UNIT CAN SAMPLE IT. GIVE THE GEOTECHNICAL ENGINEERING UNIT A MINIMUM OF **24 DAYS** TO SAMPLE THE SOIL, RUN LAB TESTS ON THE SOIL, AND MAKE FINAL SOIL STABILIZATION RECOMMENDATIONS.
2. IF THERE ARE CLAY SOILS ON THE PROJECT OR LIME SLURRY HAS BEEN USED PREVIOUSLY, MAKE SURE LOCAL WATER SOURCES HAVE BEEN SAMPLED FOR APPROVED USE IN THE LIME SLURRY TANK. THE SAMPLES MUST BE SENT TO THE LOCAL NCDOT MATERIALS AND TESTS LABORATORY. THE WATER SAMPLES WILL BE TESTED IN ACCORDANCE WITH SPEC. 1024-4. MUNICIPAL WATER LINES DO NOT NEED TO BE TESTED.
3. THE SOIL SUBGRADE SHOULD BE CUT $\frac{1}{4}$ TO $\frac{1}{2}$ INCH LOW BEFORE SOIL STABILIZATION CONSTRUCTION.
4. IS THERE A TRAFFIC CONTROL PLAN READY FOR SOIL STABILIZATION? HAVE ADEQUATE TEMPORARY HAUL ROADS BEEN CONSTRUCTED? ARE THERE ADEQUATE DRAINAGE STRUCTURES AND WEEPS TO PROTECT THE SOIL SUBGRADE FROM EXCESSIVE WATER AND EROSION?
5. COVER OPEN MANHOLES AND DRAINAGE STRUCTURES (DROP INLETS) WITH PLYWOOD OR CARDBOARD, ESPECIALLY FOR LIME SLURRY STABILIZATION.
6. ENSURE THAT THERE ARE NO ROCKS GREATER THAN 2 INCHES DIAMETER OR OTHER DEBRIS IN THE SUBGRADE.

LIME-TREATED SOIL STABILIZATION:

1. ARE WEATHER CONDITIONS SUITABLE FOR LIME SOIL STABILIZATION: I.E. TEMPERATURE, MOISTURE, VISIBILITY?
2. OBTAIN ONE SAMPLE OF LIME (1/2 GALLON) EVERY 4TH LOAD (AT LEAST ONE PER DAY) AND SUBMIT TO MATERIALS & TESTS CHEMICAL LAB.
3. HAS THE PROPER QUANTITY OF LIME BEEN SPREAD UNIFORMLY OVER THE "PULL AREA" (DOES THE ACTUAL AMOUNT OF LIME SPREAD EQUAL THE DESIGN RATE?)? REMEMBER TO USE THE "A + B" FORMULA FOR LIME SLURRY CALCULATIONS. LIME MUST BE MIXED INTO THE SOIL WITHIN 2 HOURS OF APPLICATION.
4. HAS THE SOIL LIME MIXTURE BEEN PULVERIZED COMPLETELY? THE FINAL MIXING DEPTH SHOULD BE 8 INCHES. THE MOISTURE RANGE PRIOR TO MELLOWING SHOULD BE OPTIMUM TO OPTIMUM PLUS 3%. THE MELLOWING PERIOD SHOULD BE A MINIMUM OF 24 HOURS TO A MAXIMUM OF 4 DAYS AT THE DISCRETION OF THE ENGINEER.
5. HAS THE FINAL SOIL LIME MIXTURE BEEN UNIFORMLY MIXED TO 8 INCHES DEPTH? THE FINAL MOISTURE RANGE SHOULD BE OPTIMUM TO OPTIMUM PLUS 2%. THE SPEC. FOR FINAL COMPACTED TREATMENT DEPTH TOLERANCE IS BETWEEN $\frac{1}{2}$ INCH SHALLOW AND 1 INCH DEEP.

6. HAS AN APPROVED CURING SEAL BEEN APPLIED WITHIN 24 HOURS TO THE TREATED SUBGRADE (MAKE SURE THE SUBGRADE IS MOIST BEFORE TACKING)? PROTECT THE TREATED SUBGRADE FROM HEAVY CONSTRUCTION TRAFFIC. REMEMBER THAT SEVEN FULL CURING DAYS ARE REQUIRED (1 CURING DAY = 24 HOURS ABOVE 50° FAHRENHEIT).

SOIL-CEMENT STABILIZATION:

1. ARE WEATHER CONDITIONS SUITABLE FOR SOIL-CEMENT STABILIZATION: I.E. TEMPERATURE, MOISTURE?
2. OBTAIN ONE SAMPLE OF CEMENT (1/2 GALLON) EVERY 4TH LOAD (AT LEAST ONE PER DAY) AND SUBMIT TO MATERIALS & TESTS CHEMICAL LAB.
3. HAS THE CEMENT SPREAD RATE BEEN CALIBRATED WHEN THE SUBCONTRACTOR MOBILIZES ONTO THE PROJECT AND IS READY TO BEGIN STABILIZATION? HAS THE PROPER AMOUNT OF CEMENT BEEN SPREAD OVER THE "PULL AREA"? THE SOIL-CEMENT MIXTURE MUST BE DRY-MIXED AND COMPLETELY PULVERIZED TO A DEPTH OF 7 INCHES.
4. AFTER WATER IS ADDED TO THE SOIL-CEMENT MIXTURE, THE CONTRACTOR HAS 4 HOURS TO COMPLETE THE STABILIZATION. THE MIXTURE MUST BE WET-MIXED TO A DEPTH OF 7 INCHES. FINAL MOISTURE RANGE MUST BE OPTIMUM TO OPTIMUM PLUS 2%. THE SPEC. FOR FINAL COMPACTED TREATMENT DEPTH TOLERANCE IS BETWEEN ½ INCH SHALLOW AND 1 INCH DEEP.
5. HAS A TRANSVERSE VERTICAL CONSTRUCTION JOINT BEEN CUT AT THE END OF THE DAY'S WORK BY THE SUBCONTRACTOR?
6. HAS AN APPROVED CURING SEAL BEEN APPLIED WITHIN 24 HOURS TO THE TREATED SUBGRADE (MAKE SURE THE SUBGRADE IS MOIST BEFORE TACKING)? PROTECT THE TREATED SUBGRADE FROM HEAVY CONSTRUCTION TRAFFIC. REMEMBER THAT SEVEN FULL CURING DAYS ARE REQUIRED (1 CURING DAY = 24 HOURS ABOVE 50° FAHRENHEIT).

ROAD MIXED CEMENT-TREATED BASE STABILIZATION:

1. HAS UP TO ONE WEEK'S WORK OF AGGREGATE BEEN PLACED ON THE SUBGRADE FOR CTB STABILIZATION?
2. IS THE DEPTH OF THE AGGREGATE 1 INCH THICKER THAN THE DESIGN THICKNESS TO BE STABILIZED?
3. ARE WEATHER CONDITIONS SUITABLE FOR CEMENT-TREATED BASE STABILIZATION: I.E. TEMPERATURE, MOISTURE?
4. OBTAIN ONE SAMPLE OF CEMENT (1/2 GALLON) EVERY 4TH LOAD (AT LEAST ONE PER DAY) AND SUBMIT TO MATERIALS & TESTS CHEMICAL LAB.
5. HAS THE CEMENT SPREAD RATE BEEN CALIBRATED WHEN THE SUBCONTRACTOR MOBILIZES ONTO THE PROJECT AND IS READY TO BEGIN STABILIZATION? HAS THE PROPER AMOUNT OF CEMENT BEEN SPREAD OVER THE "PULL AREA"?

6. AFTER WATER IS ADDED TO THE CTB MIXTURE, THE CONTRACTOR HAS 3 HOURS TO COMPLETE THE STABILIZATION. THE MIXTURE MUST BE WET-MIXED TO THE DESIGN DEPTH. FINAL MOISTURE RANGE MUST BE OPTIMUM TO OPTIMUM PLUS 1.5%.
7. HAS A TRANSVERSE VERTICAL CONSTRUCTION JOINT BEEN CUT AT THE END OF THE DAY'S WORK BY THE SUBCONTRACTOR?
8. HAS AN APPROVED CURING SEAL BEEN APPLIED WITHIN 24 HOURS TO THE TREATED SUBGRADE (MAKE SURE THE SUBGRADE IS MOIST BEFORE TACKING)? PROTECT THE TREATED SUBGRADE FROM HEAVY CONSTRUCTION TRAFFIC. REMEMBER THAT SEVEN FULL CURING DAYS ARE REQUIRED (1 CURING DAY = 24 HOURS ABOVE 50° FAHRENHEIT).

PLANT MIXED CEMENT-TREATED BASE STABILIZATION:

1. THE AGGREGATE SHOULD BE STOCKPILED AND TESTED FOR CTB SPECIFICATIONS AT LEAST 6 WEEKS PRIOR TO USE. IN ADDITION, SAMPLES SHOULD BE SUBMITTED TO MATERIALS & TESTS LAB TO DETERMINE AGGREGATE UNIT WEIGHT.
2. IF A CURRENT APPROVED JOB MIX FORMULA DOES NOT EXIST, THE CONTRACTOR SHALL SUBMIT SAMPLES OF ALL PROPOSED AGGREGATES AT LEAST 3 WEEKS PRIOR TO CTB PRODUCTION.
3. THE CTB PLANT SHOULD BE INSPECTED WITH THE GEOTECHNICAL ENGINEERING UNIT BEFORE CTB PRODUCTION BEGINS. ENSURE THAT THERE ARE ADEQUATE METERS OR GAUGES TO DETERMINE FLOW RATES.
4. HAS THE CTB PLANT BEEN CALIBRATED? THE AGGREGATE FLOW RATE, CEMENT FLOW RATE, AND WATER FLOW RATE WILL BE CHECKED.
5. OBTAIN ONE SAMPLE OF CEMENT (1/2 GALLON) EVERY 4TH LOAD (AT LEAST ONE PER DAY) AND SUBMIT TO MATERIALS & TESTS CHEMICAL LAB.
6. ARE THE DUMP TRUCKS HAULING THE CTB COVERED WITH A TARP? THE DUMP TRUCKS HAVE ONE HOUR TO GET THE CTB ON TO THE PROJECT SITE. THE FINAL MOISTURE RANGE OF THE CTB SHOULD BE OPTIMUM TO OPTIMUM PLUS 1.5%. TAKE THREE MOISTURE SAMPLES OF THE CTB PER DAY. THE CTB CONSTRUCTION MUST BE FINISHED WITHIN 3 HOURS OF THE APPLICATION OF WATER TO THE CTB MIXTURE AT THE PLANT.
7. HAS A TRANSVERSE VERTICAL CONSTRUCTION JOINT BEEN CUT AT THE END OF THE DAY'S WORK BY THE SUBCONTRACTOR?
8. HAS AN APPROVED CURING SEAL BEEN APPLIED WITHIN 24 HOURS TO THE TREATED SUBGRADE (MAKE SURE THE SUBGRADE IS MOIST BEFORE TACKING)? PROTECT THE TREATED SUBGRADE FROM HEAVY CONSTRUCTION TRAFFIC. REMEMBER THAT SEVEN FULL CURING DAYS ARE REQUIRED (1 CURING DAY = 24 HOURS ABOVE 50° FAHRENHEIT).

NOTES

