SECTION 02750 - CONCRETE PAVING

1. RELATED DOCUMENTS

   A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND OTHER SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

   B. FLORIDA DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (FDOT SPECS), LATEST EDITION.

2. SUMMARY

   A. THIS SECTION INCLUDES CONCRETE WORK FOR THE FOLLOWING:

      1. WALKWAYS.

      2. PADS.

3. SUBMITTALS

   A. PRODUCT DATA FOR PROPRIETARY MATERIALS AND ITEMS, INCLUDING REINFORCEMENT AND FORMING ACCESSORIES, ADMIXTURES, JOINT SYSTEMS, CURING COMPOUNDS, DRY-SHAKE FINISH MATERIALS, AND OTHERS IF REQUESTED BY ENGINEER.

   B. DESIGN MIXES FOR EACH CLASS OF CONCRETE. INCLUDE REVISED MIX PROPORTIONS WHEN CHARACTERISTICS OF MATERIALS, PROJECT CONDITIONS, WEATHER, TEST RESULTS, OR OTHER CIRCUMSTANCES WARRANT ADJUSTMENTS.

   C. MATERIAL CERTIFICATES IN LIEU OF MATERIAL LABORATORY TEST REPORTS WHEN PERMITTED BY ENGINEER. MATERIAL CERTIFICATES SHALL BE SIGNED BY MANUFACTURER AND CONTRACTOR CERTIFYING THAT EACH MATERIAL ITEM COMPLIES WITH OR EXCEEDS REQUIREMENTS. PROVIDE CERTIFICATION FROM ADMIXTURE MANUFACTURERS THAT CHLORIDE CONTENT COMPLIES WITH REQUIREMENTS.

4. QUALITY ASSURANCE

   A. CONCRETE TESTING SERVICE: ENGAGE A QUALIFIED INDEPENDENT TESTING AGENCY TO PERFORM MATERIALS EVALUATION TESTS AND TO DESIGN CONCRETE MIXES.

5. PROJECT CONDITIONS

   A. UTILIZE BARRICADES AND WARNING SIGNS AS REQUIRED, AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.

6. GENERAL REQUIREMENTS

   A. CONCRETE SHALL CONFORM TO REQUIREMENTS OF FDOT SPECS, SECTION 345 FOR CURBS, GUTTERS, WALKS, STRUCTURES AND MISCELLANEOUS CONCRETE.

   B. CONCRETE FOR PAVEMENT SHALL CONFORM TO REQUIREMENTS OF FDOT SPECS, SECTION 350.

C. EXPOSED CONCRETE WITH GRAFFITI INSCRIBED ON IT SHALL BE REPLACED FROM JOINT TO JOINT. GRINDING OR RUBBING WILL NOT BE ACCEPTED AS A CORRECTION METHOD.

D. ALL CONCRETE, INCLUDING SIDEWALKS, SHALL HAVE WELDED STEEL WIRE FABRIC REINFORCEMENT AND A VAPOR BARRIER. FIBER MESH CONCRETE IS NOT AN ACCEPTABLE SUBSTITUTE FOR THE WELDED WIRE FABRIC.

7. REINFORCING MATERIALS

A. REINFORCING BARS AND TIE BARS: ASTM A 615, GRADE 60, DEFORMED.

B. WELDED STEEL WIRE FABRIC: ASTM A 185.

1. FURNISH IN FLAT SHEETS, NOT ROLLS, UNLESS OTHERWISE ACCEPTABLE TO ENGINEER.

C. DEFORMED-STEEL WELDED WIRE FABRIC: ASTM A 497.

D. FABRICATED BAR MATS: WELDED OR CLIP-ASSEMBLED STEEL BAR MATS, ASTM A 184. USE ASTM A 615, GRADE 60 STEEL BARS, UNLESS OTHERWISE INDICATED.

E. JOINT DOWEL BARS: PLAIN STEEL BARS, ASTM A 615, GRADE 60. CUT BARS TRUE TO LENGTH WITH ENDS SQUARE AND FREE OF BURRS.

F. HOOK BOLTS: ASTM A 307, GRADE A BOLTS, INTERNALLY AND EXTERNALLY THREADED. DESIGN HOOK BOLT JOINT ASSEMBLY TO HOLD COUPLING AGAINST PAVEMENT FORM AND IN POSITION DURING CONCRETING OPERATIONS, AND TO PERMIT REMOVAL WITHOUT DAMAGE TO CONCRETE OR HOOK BOLT.

G. SUPPORTS FOR REINFORCEMENT: CHAIRS, SPACERS, DOWEL BAR SUPPORTS AND OTHER DEVICES FOR SPACING, SUPPORTING, AND FASTENING REINFORCING BARS, WELDED WIRE FABRIC, AND DOWELS IN PLACE. USE WIRE BAR-TYPE SUPPORTS COMPLYING WITH CRSI SPECIFICATIONS.

1. USE SUPPORTS WITH SAND PLATES OR HORIZONTAL RUNNERS WHERE BASE MATERIAL WILL NOT SUPPORT CHAIR LEGS.

8. CONCRETE MATERIALS

A. PORTLAND CEMENT ASTM C 150, TYPE I.

1. USE ONE BRAND OF CEMENT THROUGHOUT PROJECT UNLESS OTHERWISE ACCEPTABLE TO ENGINEER.

2. ALL MATERIALS USED FOR CONCRETE, AND THE DESIGN OF ALL CONCRETE MIXES, SHALL CONFORM WITH THE RECOMMENDATIONS OF THE AMERICAN CONCRETE INSTITUTE (ACI 318). ALL CONCRETE SHALL DEVELOP A 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI. IF ANY CONCRETE SHOULD FAIL TO MEET THE STRENGTH REQUIREMENT THE STRUCTURE SHALL BE REMOVED AS NECESSARY TO REMOVE THE DEFECTIVE CONCRETE AND SHALL THEN BE REBUILT AT THE CONTRACTOR'S EXPENSE.

B. FLY ASH: ASTM C 618, TYPE F.

C. NORMAL-WEIGHT AGGREGATES: ASTM C 33, CLASS 4, AND AS FOLLOWS:

1. PROVIDE AGGREGATES FROM A SINGLE SOURCE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

2. MAXIMUM AGGREGATE SIZE: 1-1/2 INCHES.

3. DO NOT USE FINE OR COARSE AGGREGATES THAT CONTAIN SUBSTANCES THAT CAUSE SPALLING.

4. LOCAL AGGREGATES NOT COMPLYING WITH ASTM C 33 THAT HAVE BEEN SHOWN TO PRODUCE CONCRETE OF ADEQUATE STRENGTH AND DURABILITY BY SPECIAL TESTS OR ACTUAL SERVICE MAY BE USED WHEN ACCEPTABLE TO ENGINEER.

D. WATER: POTABLE.

E. FIBER REINFORCEMENT: NOT ALLOWED.

9. ADMIXTURES

A. PROVIDE CONCRETE ADMIXTURES THAT CONTAIN NOT MORE THAN 0.1 PERCENT CHLORIDE IONS.

B. AIR-ENTRAINING ADMIXTURE: ASTM C 260, CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER REQUIRED ADMIXTURES.

C. WATER-REDUCING ADMIXTURE: ASTM C 494, TYPE A.

D. HIGH-RANGE WATER-REDUCING ADMIXTURE: ASTM C 494, TYPE F OR TYPE G.

E. WATER-REDUCING AND ACCELERATING ADMIXTURE: ASTM C 494, TYPE E.

F. WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494, TYPE D.

10. CONCRETE MIX

A. PREPARE DESIGN MIXES FOR EACH TYPE AND STRENGTH OF NORMAL-WEIGHT CONCRETE BY EITHER LABORATORY TRIAL BATCH OR FIELD EXPERIENCE METHODS AS SPECIFIED IN ACI 301. FOR THE TRIAL BATCH METHOD, USE A QUALIFIED INDEPENDENT TESTING AGENCY FOR PREPARING AND REPORTING PROPOSED MIX DESIGNS.

1. DO NOT USE THE OWNER'S FIELD QUALITY-CONTROL TESTING AGENCY AS THE INDEPENDENT TESTING AGENCY.

2. LIMIT USE OF FLY ASH TO 25 PERCENT OF CEMENT CONTENT BY WEIGHT.

B. PROPORTION MIXES ACCORDING TO ACI 211.1 AND ACI 301 TO PROVIDE NORMAL-WEIGHT CONCRETE WITH THE FOLLOWING PROPERTIES:

1. COMPRESSIVE STRENGTH (28-DAY): 3000 PSI.

2. MAXIMUM WATER-CEMENT RATIO AT POINT OF PLACEMENT: 0.58 MAXIMUM (NON-AIR-ENTRAINED).

3. MAXIMUM WATER-CEMENT RATIO AT POINT OF PLACEMENT: 0.46 MAXIMUM (AIR-ENTRAINED).

4. SLUMP LIMIT AT POINT OF PLACEMENT: 3 INCHES MAXIMUM FOR SLABS AND SLOPING SURFACES AND 4 INCHES MAXIMUM FOR OTHER CONCRETE.

    a. SLUMP LIMIT FOR CONCRETE CONTAINING HIGH-RANGE WATER-REDUCING ADMIXTURE (SUPERPLASTICIZER): NOT MORE THAN 8 INCHES AFTER ADDING ADMIXTURE TO SITE-VERIFIED 2-TO-3-INCH SLUMP CONCRETE.

C. ADD AIR-ENTRAINING ADMIXTURE AT MANUFACTURER'S PRESCRIBED RATE TO RESULT IN CONCRETE AT POINT OF PLACEMENT HAVING AN AIR CONTENT AS FOLLOWS WITH A TOLERANCE OF PLUS OR MINUS 1-1/2 PERCENT:

1. AIR CONTENT: 3.0 TO 6.0 PERCENT.

D. ADJUSTMENT TO CONCRETE MIXES: MIX DESIGN ADJUSTMENTS MAY BE REQUESTED BY CONTRACTOR WHEN CHARACTERISTICS OF MATERIALS, PROJECT CONDITIONS, WEATHER, TEST RESULTS, OR OTHER CIRCUMSTANCES WARRANT.

11. CONCRETE MIXING

A. READY-MIXED CONCRETE: COMPLY WITH REQUIREMENTS AND WITH ASTM C 94.

1. WHEN AIR TEMPERATURE IS BETWEEN 85 DEG F (30 DEG C) AND 90 DEG F (32 DEG C), REDUCE MIXING AND DELIVERY TIME FROM 1-1/2 HOURS TO 75 MINUTES; WHEN AIR TEMPERATURE IS ABOVE 90 DEG F (32 DEG C), REDUCE MIXING AND DELIVERY TIME TO 60 MINUTES.

12. SURFACE PREPARATION

A. PROOF-ROLL PREPARED BASE OR SUBGRADE SURFACE TO CHECK FOR UNSTABLE AREAS AND VERIFY NEED FOR ADDITIONAL COMPACTION. DO NOT BEGIN CONCRETE WORK UNTIL SUCH CONDITIONS HAVE BEEN CORRECTED AND ARE READY TO RECEIVE PAVING.

B. REMOVE LOOSE MATERIAL FROM COMPACTED SUBBASE SURFACE IMMEDIATELY BEFORE PLACING CONCRETE.

13. EDGE FORMS AND SCREED CONSTRUCTION

A. SET, BRACE, AND SECURE EDGE FORMS, BULKHEADS, AND INTERMEDIATE SCREED GUIDES FOR PAVING TO REQUIRED LINES, GRADES, AND ELEVATIONS. INSTALL SUFFICIENT FORMS TO ALLOW CONTINUOUS PROGRESS OF WORK AND SO THAT FORMS CAN REMAIN IN PLACE AT LEAST 24 HOURS AFTER CONCRETE PLACEMENT.

B. CHECK COMPLETED FORMWORK AND SCREEDS FOR GRADE AND ALIGNMENT TO FOLLOWING TOLERANCES:

1. TOP OF FORMS: NOT MORE THAN 1/8 INCH IN 10 FEET.

2. VERTICAL FACE ON LONGITUDINAL AXIS: NOT MORE THAN 1/4 INCH IN 10 FEET.

C. CLEAN FORMS AFTER EACH USE AND COAT WITH FORM RELEASE AGENT AS REQUIRED TO ENSURE SEPARATION FROM CONCRETE WITHOUT DAMAGE.

14. PLACING REINFORCEMENT

A. GENERAL

1. COMPLY WITH CONCRETE REINFORCING STEEL INSTITUTE'S RECOMMENDED PRACTICE FOR "PLACING REINFORCING BARS" FOR PLACING AND SUPPORTING REINFORCEMENT.

2. CLEAN REINFORCEMENT OF LOOSE RUST AND MILL SCALE, EARTH, ICE, OR OTHER BOND-REDUCING MATERIALS.

3. ARRANGE, SPACE, AND SECURELY TIE BARS AND BAR SUPPORTS TO HOLD REINFORCEMENT IN POSITION DURING CONCRETE PLACEMENT. SECURE REINFORCEMENT AGAINST DISPLACEMENT BY FORMWORK, CONSTRUCTION, OR CONCRETE PLACEMENT OPERATIONS. LOCATE AND SUPPORT REINFORCING BY METAL CHAIRS, RUNNERS, BOLSTERS, SPACERS AND HANGERS, AS REQUIRED. SET WIRE TIES SO ENDS ARE DIRECTED INTO CONCRETE, NOT TOWARD EXPOSED CONCRETE SURFACES. MAINTAIN MINIMUM COVER TO REINFORCEMENT.

4. INSTALL WELDED WIRE FABRIC IN LENGTHS AS LONG AS PRACTICABLE. LAP ADJOINING PIECES AT LEAST ONE FULL MESH AND LACE SPLICES WITH WIRE. OFFSET LAPS OF ADJOINING WIDTHS TO PREVENT CONTINUOUS LAPS IN EITHER DIRECTION.

5. INSTALL FABRICATED BAR MATS IN LENGTHS AS LONG AS PRACTICABLE. HANDLE UNITS TO KEEP THEM FLAT AND FREE OF DISTORTIONS. STRAIGHTEN BENDS, KINKS, AND OTHER IRREGULARITIES OR REPLACE UNITS AS REQUIRED BEFORE PLACEMENT. SET MATS FOR A MINIMUM 2-INCH OVERLAP TO ADJACENT MATS.

6. TEMPORARY SHIELDS ARE TO BE PLACED OVER EXPOSED REBAR ENDS WHEN LEFT EXPOSED FOR MORE THAN 4 HOURS. “COVER” METHODS SHALL BE APPROVED BY ENGINEER PRIOR TO USE.

15. JOINT

A. GENERAL

1. CONSTRUCT CONTRACTION, CONSTRUCTION, AND ISOLATION JOINTS TRUE TO LINE WITH FACES PERPENDICULAR TO SURFACE PLANE OF CONCRETE. CONSTRUCT TRANSVERSE JOINTS AT RIGHT ANGLES TO THE CENTERLINE, UNLESS INDICATED OTHERWISE.

2. WHEN JOINING EXISTING PAVING, PLACE TRANSVERSE JOINTS TO ALIGN WITH PREVIOUSLY PLACED JOINTS, UNLESS INDICATED OTHERWISE.

B. CONTRACTION JOINTS: PROVIDE WEAKENED-PLANE CONTRACTION JOINTS, SECTIONING CONCRETE INTO AREAS AS SHOWN ON DRAWINGS. IF NOT SPECIFIED ON DRAWINGS INTERVALS SHALL BE NOT GREATER THAN 10 FEET OR LESS THAN 5 FEET. CONSTRUCT CONTRACTION JOINTS FOR A DEPTH EQUAL TO AT LEAST 1/4 OF THE CONCRETE THICKNESS, AS FOLLOWS:

C. TOOLED JOINTS: FORM CONTRACTION JOINTS IN FRESH CONCRETE BY GROOVING AND FINISHING EACH EDGE OF JOINT WITH A RADIUSED JOINTER TOOL.

D. SAWED JOINTS: FORM CONTRACTION JOINTS WITH POWER SAWS EQUIPPED WITH SHATTERPROOF ABRASIVE OR DIAMOND-RIMMED BLADES. CUT 1/8-INCH-WIDE JOINTS INTO HARDENED CONCRETE WHEN CUTTING ACTION WILL NOT TEAR, ABRADE, OR OTHERWISE DAMAGE SURFACE AND BEFORE DEVELOPMENT OF RANDOM CONTRACTION CRACKS.

E. INSERTS: FORM CONTRACTION JOINTS BY INSERTING PREMOLDED PLASTIC, HARDBOARD, OR FIBERBOARD STRIPS INTO FRESH CONCRETE UNTIL TOP SURFACE OF STRIP IS FLUSH WITH PAVING SURFACE. RADIUS EACH JOINT EDGE WITH A JOINTER TOOL. CAREFULLY REMOVE STRIPS OR CAPS OF TWO-PIECE ASSEMBLIES AFTER CONCRETE HAS HARDENED. CLEAN GROOVE OF LOOSE DEBRIS.

F. CONSTRUCTION JOINTS: SET CONSTRUCTION JOINTS AT SIDE AND END TERMINATIONS OF PAVING AND AT LOCATIONS WHERE PAVING OPERATIONS ARE STOPPED FOR MORE THAN ½ HOUR, UNLESS PAVING TERMINATES AT ISOLATION JOINTS.

1. PROVIDE PREFORMED GALVANIZED STEEL OR PLASTIC KEYWAY-SECTION FORMS OR BULKHEAD FORMS WITH KEYS, UNLESS INDICATED OTHERWISE. EMBED KEYS AT LEAST 1-1/2 INCHES INTO CONCRETE.

2. CONTINUE REINFORCEMENT ACROSS CONSTRUCTION JOINTS UNLESS INDICATED OTHERWISE.

G. EXPANSION JOINTS: FORM EXPANSION JOINTS OF PREFORMED JOINT FILLER STRIPS ABUTTING CONCRETE CURBS, CATCH BASINS, MANHOLES, INLETS, STRUCTURES, WALKS, OTHER FIXED OBJECTS, AND WHERE INDICATED.

1. LOCATE EXPANSION JOINTS AT INTERVALS OF 30 FEET, UNLESS INDICATED OTHERWISE.

2. EXTEND JOINT FILLERS FULL WIDTH AND DEPTH OF JOINT, NOT LESS THAN ½ INCH OR MORE THAN 1 INCH BELOW FINISHED SURFACE WHERE JOINT SEALANT IS INDICATED. PLACE TOP OF JOINT FILLER FLUSH WITH FINISHED CONCRETE SURFACE WHEN NO JOINT SEALANT IS REQUIRED.

3. FURNISH JOINT FILLERS IN ONE-PIECE LENGTHS FOR FULL WIDTH BEING PLACED WHEREVER POSSIBLE. WHERE MORE THAN ONE LENGTH IS REQUIRED, LACE OR CLIP JOINT FILLER SECTIONS TOGETHER.

4. PROTECT TOP EDGE OF JOINT FILLER DURING CONCRETE PLACEMENT WITH A METAL, PLASTIC, OR OTHER TEMPORARY PREFORMED CAP. REMOVE PROTECTIVE CAP AFTER CONCRETE HAS BEEN PLACED ON BOTH SIDES OF JOINT.

5. FILLERS AND SEALANTS: SUBMIT SPECIFICATIONS TO ENGINEER FOR APPROVAL.

6. INSTALL DOWEL BARS AND SUPPORT ASSEMBLIES AT JOINTS WHERE INDICATED. LUBRICATE OR ASPHALT-COAT ONE HALF OF DOWEL LENGTH TO PREVENT CONCRETE BONDING TO ONE SIDE OF JOINT

16. CONCRETE PLACEMENT

A. COMPLY WITH REQUIREMENTS AND WITH ACI 304R FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

B. DEPOSIT AND SPREAD CONCRETE IN A CONTINUOUS OPERATION BETWEEN TRANSVERSE JOINTS. DO NOT PUSH OR DRAG CONCRETE INTO PLACE OR USE VIBRATORS TO MOVE CONCRETE INTO PLACE. NO CONCRETE WILL BE PLACED ON CONCRETE WHICH HAS HARDENED SUFFICIENTLY TO CAUSE THE FORMATION OF SEAMS OR PLANES OF WEAKNESS. DEPOSIT CONCRETE AS NEARLY AS PRACTICAL TO ITS FINAL LOCATION TO AVOID SEGREGATION.

1. WHEN CONCRETE PLACING IS INTERRUPTED FOR MORE THAN ½ HOUR, PLACE A CONSTRUCTION JOINT.

C. USE A BONDING AGENT AT LOCATIONS WHERE FRESH CONCRETE IS PLACED AGAINST HARDENED OR PARTIALLY HARDENED CONCRETE SURFACES.

D. CONSOLIDATE CONCRETE BY MECHANICAL VIBRATING EQUIPMENT SUPPLEMENTED BY HAND-SPADING, RODDING, OR TAMPING. USE EQUIPMENT AND PROCEDURES TO CONSOLIDATE CONCRETE COMPLYING WITH ACI 309R.

E. SCREED PAVED SURFACES WITH A STRAIGHTEDGE AND STRIKE OFF. USE BULL FLOATS OR DARBIES TO FORM A SMOOTH SURFACE PLANE BEFORE EXCESS MOISTURE OR BLEED WATER APPEARS ON THE SURFACE. DO NOT FURTHER DISTURB CONCRETE SURFACES PRIOR TO BEGINNING FINISHING OPERATIONS.

F. PLACE CONCRETE IN TWO OPERATIONS; STRIKE OFF INITIAL POUR FOR ENTIRE WIDTH OF PLACEMENT AND TO THE REQUIRED DEPTH BELOW FINISH SURFACE. LAY WELDED WIRE FABRIC OR FABRICATED BAR MATS IMMEDIATELY IN FINAL POSITION. PLACE TOP LAYER OF CONCRETE, STRIKE OFF, AND SCREED.

1. REMOVE AND REPLACE PORTIONS OF BOTTOM LAYER OF CONCRETE THAT HAVE BEEN PLACED MORE THAN 15 MINUTES WITHOUT BEING COVERED BY TOP LAYER OR USE BONDING AGENT IF ACCEPTABLE TO ENGINEER.

G. WHEN ADJOINING PAVEMENT LANES ARE PLACED IN SEPARATE POURS, DO NOT OPERATE EQUIPMENT ON CONCRETE UNTIL PAVEMENT HAS ATTAINED 85 PERCENT OF ITS 28-DAY COMPRESSIVE STRENGTH, OR SUFFICIENT STRENGTH TO CARRY LOADS WITHOUT DAMAGE OR INJURY.

H. COLD-WEATHER PLACEMENT: COMPLY WITH PROVISIONS OF ACI 306R AND AS FOLLOWS. PROTECT CONCRETE WORK FROM PHYSICAL DAMAGE OR REDUCED STRENGTH THAT COULD BE CAUSED BY FROST, FREEZING ACTIONS, OR LOW TEMPERATURES.

I. HOT-WEATHER PLACEMENT: PLACE CONCRETE COMPLYING WITH ACI 305R AND AS SPECIFIED WHEN HOT WEATHER CONDITIONS EXIST.

17. CONCRETE FINISHING

A. FLOAT FINISH: BEGIN FLOATING WHEN BLEED WATER SHEEN HAS DISAPPEARED AND THE CONCRETE SURFACE HAS STIFFENED SUFFICIENTLY TO PERMIT OPERATIONS. FLOAT SURFACE WITH POWER-DRIVEN FLOATS, OR BY HAND-FLOATING IF AREA IS SMALL OR INACCESSIBLE TO POWER UNITS. FINISH SURFACES TO TRUE PLANES WITHIN A TOLERANCE OF 1/4 INCH IN 10 FEET AS DETERMINED BY A 10-FOOT-LONG STRAIGHTEDGE PLACED ANYWHERE ON THE SURFACE IN ANY DIRECTION. CUT DOWN HIGH SPOTS AND FILL LOW SPOTS. REFLOAT SURFACE IMMEDIATELY TO A UNIFORM GRANULAR TEXTURE.

1. MEDIUM-TO-FINE-TEXTURED BROOM FINISH: DRAW A SOFT BRISTLE BROOM ACROSS CONCRETE SURFACE PERPENDICULAR TO LINE OF TRAFFIC TO PROVIDE A UNIFORM FINE LINE TEXTURE FINISH.

2. TINE FINISH: APPLY TO CURB CUT RAMPS AND OTHER AREAS AS NOTED ON THE DRAWINGS. FINISH SHALL BE APPLIED BY AN APPROVED HAND METHOD AND SHALL CONSIST OF TRANSVERSE GROOVES WHICH ARE 0.03 TO 0.12 INCH IN WIDTH AND 0.10 TO 0.15 INCH IN DEPTH, SPACED AT APPROXIMATELY ½ INCH CENTER TO CENTER.

B. FINAL TOOLING: TOOL EDGES OF PAVING, GUTTERS, CURBS, AND JOINTS FORMED IN FRESH CONCRETE WITH A JOINTING TOOL TO THE FOLLOWING RADIUS. REPEAT TOOLING OF EDGES AND JOINTS AFTER APPLYING SURFACE FINISHES. ELIMINATE TOOL MARKS ON CONCRETE SURFACES.

1. RADIUS: ½ INCH.

18. CONCRETE PROTECTION AND CURING

A. GENERAL: PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING AND EXCESSIVE COLD OR HOT TEMPERATURES. COMPLY WITH THE RECOMMENDATIONS OF ACI 306R FOR COLD WEATHER PROTECTION AND ACI 305R FOR HOT WEATHER PROTECTION DURING CURING.

B. EVAPORATION CONTROL: IN HOT, DRY, AND WINDY WEATHER, PROTECT CONCRETE FROM RAPID MOISTURE LOSS BEFORE AND DURING FINISHING OPERATIONS WITH AN EVAPORATION-CONTROL MATERIAL. APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS AFTER SCREEDING AND BULL FLOATING, BUT BEFORE FLOATING.

C. BEGIN CURING AFTER FINISHING CONCRETE BUT NOT BEFORE FREE WATER HAS DISAPPEARED FROM CONCRETE SURFACE.

D. CURING METHODS: CURE CONCRETE BY MOISTURE CURING, MOISTURE-RETAINING-COVER CURING, CURING COMPOUND, OR A COMBINATION OF THESE AS FOLLOWS:

1. MOISTURE CURING: KEEP SURFACES CONTINUOUSLY MOIST FOR NOT LESS THAN 7 DAYS WITH THE FOLLOWING MATERIALS:

a. WATER.

b. CONTINUOUS WATER-FOG SPRAY.

c. ABSORPTIVE COVER, WATER SATURATED, AND KEPT CONTINUOUSLY WET. COVER CONCRETE SURFACES AND EDGES WITH A 12-INCH LAP OVER ADJACENT ABSORPTIVE COVERS.

2. MOISTURE-RETAINING-COVER CURING: COVER CONCRETE SURFACES WITH MOISTURE-RETAINING COVER FOR CURING CONCRETE, PLACED IN WIDEST PRACTICABLE WIDTH, WITH SIDES AND ENDS LAPPED AT LEAST 12 INCHES, AND SEALED BY WATERPROOF TAPE OR ADHESIVE. IMMEDIATELY REPAIR ANY HOLES OR TEARS DURING CURING PERIOD USING COVER MATERIAL AND WATERPROOF TAPE.

3. CURING COMPOUND: APPLY UNIFORMLY IN CONTINUOUS OPERATION BY POWER SPRAY OR ROLLER ACCORDING TO MANUFACTURER'S DIRECTIONS. RECOAT AREAS SUBJECTED TO HEAVY RAINFALL WITHIN 3 HOURS AFTER INITIAL APPLICATION. MAINTAIN CONTINUITY OF COATING AND REPAIR DAMAGE DURING CURING PERIOD.

19. FIELD QUALITY CONTROL TESTING

A. EMPLOY A QUALIFIED INDEPENDENT TESTING AND INSPECTION AGENCY, AT CONTRACTOR'S EXPENSE. THE AGENCY SHALL BE UNDER THE DIRECTION OF A PROFESSIONAL ENGINEER, LICENSED IN THE STATE OF FLORIDA. THE AGENCY IS TO SAMPLE MATERIALS, PERFORM TESTS, AND SUBMIT TEST REPORTS DURING CONCRETE PLACEMENT AS FOLLOWS:

1. SAMPLING FRESH CONCRETE: ASTM C 172, EXCEPT MODIFIED FOR SLUMP TO COMPLY WITH ASTM C 94.

a. SLUMP: ASTM C 143; ONE TEST AT POINT OF PLACEMENT FOR EACH COMPRESSIVE-STRENGTH TEST BUT NO LESS THAN ONE TEST FOR EACH DAY'S POUR OF EACH TYPE OF CONCRETE. ADDITIONAL TESTS WILL BE REQUIRED WHEN CONCRETE CONSISTENCY CHANGES.

b. AIR CONTENT: ASTM C 231, PRESSURE METHOD; ONE TEST FOR EACH COMPRESSIVE-STRENGTH TEST BUT NO LESS THAN ONE TEST FOR EACH DAY'S POUR OF EACH TYPE OF AIR-ENTRAINED CONCRETE.

c. CONCRETE TEMPERATURE: ASTM C 1064; ONE TEST HOURLY WHEN AIR TEMPERATURE IS 40 DEG F (4 DEG C) AND BELOW AND WHEN 80 DEG F (27 DEG C) AND ABOVE, AND ONE TEST FOR EACH SET OF COMPRESSIVE-STRENGTH SPECIMENS.

d. COMPRESSION TEST SPECIMENS: ASTM C 31; ONE SET OF THREE STANDARD CYLINDERS FOR EACH COMPRESSIVE- STRENGTH TEST, UNLESS DIRECTED OTHERWISE. MOLD AND STORE CYLINDERS FOR LABORATORY-CURED TEST SPECIMENS EXCEPT WHEN FIELD-CURED TEST SPECIMENS ARE REQUIRED.

e. COMPRESSIVE-STRENGTH TESTS: ASTM C 39; ONE SET FOR EACH DAY'S POUR OF EACH CONCRETE CLASS EXCEEDING 10 CU. YD. BUT LESS THAN 50 CU. YD., PLUS ONE SET FOR EACH ADDITIONAL 50 CU. YD. TEST TWO SPECIMENS AT 28 DAYS, AND RETAIN ONE SPECIMEN IN RESERVE FOR EARLIER OR LATER TESTING IF REQUIRED.

f. CONTRACTOR SHALL REPLACE MATERIALS REMOVED FOR TESTING PURPOSES. SHOULD ANY WORK OR MATERIALS FAIL TO MEET THE REQUIREMENTS SET FORTH IN THE PLANS AND SPECIFICATIONS, CONTRACTOR SHALL PAY FOR RETESTING OF SAME.

2. BASIS FOR ACCEPTANCE OF CONCRETE WILL BE PER DOT SECTION 345-8.2, 8.3 AND 8.4.

B. TEST RESULTS WILL BE REPORTED IN WRITING TO ENGINEER, CONCRETE MANUFACTURER, AND CONTRACTOR WITHIN 24 HOURS OF TESTING. REPORTS OF COMPRESSIVE STRENGTH TESTS SHALL CONTAIN THE PROJECT IDENTIFICATION NAME AND NUMBER, DATE OF CONCRETE PLACEMENT, NAME OF CONCRETE TESTING AGENCY, CONCRETE TYPE AND CLASS, LOCATION OF CONCRETE BATCH IN THE WORK, DESIGN COMPRESSIVE STRENGTH AT 28 DAYS, CONCRETE MIX PROPORTIONS AND MATERIALS, COMPRESSIVE BREAKING STRENGTH, AND TYPE OF BREAK FOR BOTH 7-DAY AND 28-DAY TESTS.

C. NONDESTRUCTIVE TESTING: IMPACT HAMMER, SONOSCOPE, OR OTHER NONDESTRUCTIVE DEVICE MAY BE PERMITTED BUT SHALL NOT BE USED AS THE SOLE BASIS FOR ACCEPTANCE OR REJECTION.

D. ADDITIONAL TESTS: THE TESTING AGENCY WILL MAKE ADDITIONAL TESTS OF THE CONCRETE WHEN TEST RESULTS INDICATE SLUMP, AIR ENTRAINMENT, CONCRETE STRENGTHS, OR OTHER REQUIREMENTS HAVE NOT BEEN MET, AS DIRECTED BY ENGINEER. TESTING AGENCY MAY CONDUCT TESTS TO DETERMINE ADEQUACY OF CONCRETE BY CORED CYLINDERS COMPLYING WITH ASTM C 42, OR BY OTHER METHODS AS DIRECTED.

20. REPAIRS AND PROTECTION

A. REMOVE AND REPLACE CONCRETE WORK THAT IS BROKEN, DAMAGED, OR DEFECTIVE, OR DOES NOT MEET THE REQUIREMENTS OF THIS SECTION.

B. DRILL TEST CORES WHERE DIRECTED BY ENGINEER WHEN NECESSARY TO DETERMINE MAGNITUDE OF CRACKS OR DEFECTIVE AREAS. FILL DRILLED CORE HOLES IN SATISFACTORY CONCRETE AREAS WITH PORTLAND CEMENT CONCRETE BONDED TO PAVING WITH EPOXY ADHESIVE.

C. PROTECT CONCRETE FROM DAMAGE. EXCLUDE TRAFFIC FROM CONCRETE PAVEMENT FOR AT LEAST 14 DAYS AFTER PLACEMENT. WHEN CONSTRUCTION TRAFFIC IS PERMITTED, MAINTAIN CONCRETE AS CLEAN AS POSSIBLE BY REMOVING SURFACE STAINS AND SPILLAGE OF MATERIALS AS THEY OCCUR.

D. MAINTAIN CONCRETE WORK FREE OF STAINS, DISCOLORATION, DIRT, AND OTHER FOREIGN MATERIAL. SWEEP CONCRETE PAVING NOT MORE THAN 2 DAYS PRIOR TO DATE SCHEDULED FOR SUBSTANTIAL COMPLETION INSPECTIONS.

E. EXPOSED CONCRETE THAT MUST BE REMOVED OR CUT DUE TO CONTRACTOR ERROR SHALL BE REMOVED FROM EXPANSION JOINT TO EXPANSION JOINT AT NO COST TO THE OWNER.

END OF SECTION