

CONCRETE SPECIFICATIONS

- A. CEMENT
 1. PROVIDE AN APPROVED STANDARD BRAND PORTLAND CEMENT CONFORMING TO ASTM C 150.
 2. PROVIDE TYPE I NORMAL STRENGTH OR TYPE III HIGH EARLY STRENGTH.
- B. AIR ENTRAINED CEMENT
 1. PROVIDE AN APPROVED STANDARD BRAND TYPE I-A PORTLAND CEMENT CONFORMING TO ASTM C 494.
- C. FINE AGGREGATES
 1. PROVIDE FINE AGGREGATES CONFORMING TO ASTM C 33 CONSISTING OF NATURAL SAND HAVING CLEAN, HARD, STRONG, DURABLE, UNCOATED GRAINS, FREE OF INJURIOUS AMOUNTS OF DUST, LUMPS, SOFT OR FLAKY PARTICLES, SHALE, ALKALI, ORGANIC MATTER, OR OTHER DELETERIOUS SUBSTANCES.
 2. PROVIDE FINE AGGREGATES WITH A MINIMUM OF NINE PERCENT PASSING THROUGH A NO. 100 SIEVE.
 3. IN ADDITION NOT MORE THAN 45 PERCENT IS TO BE RETAINED BETWEEN ANY TWO CONSECUTIVE SIEVES.
- D. COARSE AGGREGATES
 1. PROVIDE COARSE AGGREGATES CONFORMING TO ASTM C 33 CONSISTING OF CRUSHED STONE OR WASHED GRAVEL HAVING A CLEAN, HARD, STRONG, DURABLE, UNCOATED PARTICLE-FREE FROM INJURIOUS AMOUNTS OF SOFT OR FLAKY PIECES, ALKALI, ORGANIC MATTER, OR OTHER DELETERIOUS SUBSTANCES.
 2. PROVIDE COARSE AGGREGATE WITH A MAXIMUM OF 1-1/2 INCHES, WITH A MINIMUM OF 95 PERCENT PASSING A 1-1/2 INCH SIEVE.
 3. NOT MORE THAN FIVE PERCENT IS TO PASS A NO. 4 SIEVE.
- E. WATER
 1. USE CLEAN WATER FREE OF INJURIOUS AMOUNTS OF OILS, ACIDS, ALKALI, SILTS, ORGANIC MATERIALS, OR OTHER SUBSTANCES THAT MAY BE DELETERIOUS TO CONCRETE OR STEEL.
- F. CONCRETE MIX DESIGN
 1. REQUIRE BATCH TICKETS TO BE FURNISHED UPON DELIVERY OF THE CONCRETE TO ENSURE CONCRETE MEETS THE SPECIFICATION. CONTRACTOR TO PROVIDE PLANT BATCH CERTIFICATIONS TO OWNER'S FIELD REPRESENTATIVE.
 2. PROVIDE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS WITH A MINIMUM OF SIX BAGS (564 LBS.) OF CEMENT IN EACH CUBIC YARD OF CONCRETE CONFORMING TO ASTM C 94 FOR READY-MIXED CONCRETE. ALL CONCRETE SHALL BE CERTIFIED AS HIGH-EARLY STRENGTH, 4000 P.S.I. 28-DAY COMPRESSIVE STRENGTH READY-MIXED CONCRETE.
 3. DO NOT EXCEED THE MAXIMUM WATER CEMENT RATIO OF 0.53.
 4. PROVIDE CONCRETE WITH A MAXIMUM FOUR INCH SLUMP WHEN TESTED WITH A STANDARD SLUMP CONE CONFORMING TO ASTM C 143. SLUMP SHALL BE 2"-4"
 - a) IF CONCRETE DEVELOPS CONSISTENCY OF DIFFICULT WORKABILITY, THEN A SUPER PLASTICIZER ADMIXTURE MAY BE USED WHEN APPROVED BY MURPHY OIL USA, INC.
 - b) DO NOT ADD WATER TO INCREASE SLUMP.
 5. CALCIUM CHLORIDE SHALL NOT BE USED.
 6. CURING COMPOUND TO BE SAFECURE 1000 BY CHEMISTERS APPLIED PER MANUFACTURER'S SPECIFICATIONS.
- G. PROVIDE AIR ENTRAINED CONCRETE FOR ALL CONCRETE TO BE FINISHED INCLUDING FOUNDATIONS, WALKS, PAVEMENTS, AND RETAINING WALLS.
 1. AIR ENTRAINED IS TO BE A MINIMUM OF FIVE PERCENT AND MAXIMUM OF SEVEN PERCENT BY VOLUME.
 2. MEASURE THE AIR CONTENT AT THE POINT OF DISCHARGE INTO FORMS.
- H. PLACING CONCRETE
 1. MIX AND PLACE CONCRETE FOLLOWING ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
 2. SCHEDULE CONCRETING TO BE CONTINUOUS OPERATION UNTIL THE ENTIRE SECTION OR PANEL HAS BEEN COMPLETED.
 3. PROVIDE CONSTRUCTION JOINTS AS INDICATED.
 - a) DEPOSIT CONCRETE INTO THE FINAL POSITION AT THE SPECIFIED SLUMPS WITHOUT SEGREGATION BY RE-HANDLING OR FLOWING.
 - b) DEPOSIT CONCRETE AT A RATE THAT CONCRETE REMAINS PLASTIC AND FLOWABLE UNTIL THE JOINTS BETWEEN THE REINFORCING BARS.
 - c) DO NOT DEPOSIT FRESH CONCRETE ON CONCRETE THAT HAS HARDENED SUFFICIENTLY TO USE FORMATION OF SEAMS OR PLANES OF WEAKNESS WITH THE SECTION OR PANEL.
 - d) DO NOT DEPOSIT PARTIALLY HARDENED CONCRETE OR CONCRETE THAT HAS BEEN CONTAMINATED BY FOREIGN MATERIALS.
 - e) DO NOT RE-TEMPER CONCRETE.
 4. THOROUGHLY COMPACT CONCRETE BY MEANS OF MECHANICAL VIBRATORS SUPERVISED BY EXPERIENCED PERSONNEL AND SCREED ALL FLATWORK.
 - a) PROVIDE SUFFICIENT VIBRATION INTENSITY TO CAUSE FLOW OR SETTLEMENT AROUND REINFORCEMENT, EMBEDDED ITEMS, AND CORNERS OF THE FORMS; BUT NOT LONG ENOUGH TO CAUSE SEGREGATION OF THE MIX.
 - b) SUPPLEMENT MECHANICAL VIBRATION BY HAND SPADING IN CORNERS AND ANGLES OF THE FORMS AND ALONG FORM SURFACES WHILE THE CONCRETE IS PLASTIC TO ENSURE EVEN DENSE SURFACES FREE FROM AGGREGATE POCKETS OR HONEYCOMBS.
 5. PROTECT CONCRETE FROM EXCESSIVE HEAT AND PREMATURE DRYING BY THE USE OF KRAFT PAPER AND WATER MIST.
 6. COAT CONCRETE AFTER ALL FINISHING IS COMPLETE USING THE SPECIFIED CURATIVE AGENTS.
 7. IF SAW CUTTING IS EMPLOYED, IT MUST OCCUR WITHIN 6 HOURS AFTER INITIAL SET.
 - a) SPALLING DUE TO SAW CUTTING ACTIONS MAY RESULT IN REJECTION OF THE CONCRETE WORK.
 8. PROTECT CONCRETE AREA STRUCTURALLY FROM WINDY CONDITIONS UNTIL PROPERLY CURED.
 9. FINISH SHALL BE LIGHT BROOM.
- I. COLD WEATHER REQUIREMENTS
 1. FOLLOW THE REQUIREMENTS OF ACI 306.1-90 AND THE FOLLOWING
 - a) REFER TO: "RECOMMENDED PRACTICES FOR COLD WEATHER MASONRY CONSTRUCTION" AS PUBLISHED BY INTERNATIONAL MASONRY INDUSTRY ALL WEATHER COUNCIL FOR TYPICAL COLD WEATHER MASONRY PRACTICES TO BE FOLLOWED.
 - b) PROVIDE ADEQUATE EQUIPMENT FOR HEATING CONCRETE MATERIALS, AND FOR PROTECTION OF THE CONCRETE DURING FREEZING OR NEAR FREEZING WEATHER.
 - c) MAINTAIN CONCRETE MATERIALS, REINFORCEMENT, FORM WORK, FILLERS, AND GROUT TO BE IN CONTACT WITH THE CONCRETE FREE OF FROST. DO NOT USE FROZEN MATERIALS OR MATERIALS CONTAINING ICE.
 - d) PROVIDE CONCRETE, DELIVERED IN COLD WEATHER, WITH THE FOLLOWING TEMPERATURES

AIR TEM	MIN. CONCRETE TEMP.
30-40 °F	60 °F
0-30 °F	65 °F
BELOW 0 °F	70 °F
 - e) WHEN PRODUCING CONCRETE WITH HEATED AGGREGATES, HEATED WATER OR BOTH, DO NOT ALLOW CONCRETE TO EXCEED 90°F DURING PRODUCTION OR TRANSPORTATION.
 - f) ALL CONCRETE SLABS PLACED AT AIR TEMPERATURES FROM 20°F TO 50°F MAY HAVE AN ACCELERATING WATER REDUCING ADMIXTURE ADDITIVE ADDED TO ACCELERATE SETTING TIME AND STRENGTH ADMIXTURE COMPLYING WITH ASTM C 494, TYPE C.
 - 1) ACCEPTABLE ADMIXTURES ARE EUCLID CHEMICAL COMPANY'S "ACCELGAURD 90", OR EQUAL PRODUCTS BY W. R. MEADOWS, INC. OR W. R. GRACE & CO.
 - (a) ADD ACCELGAURD 80 W / WATER & AGGREGATE TO THE READY MIX CONCRETE TRUCK, BUT DO NOT DISPENSE ON TO DRY CONCRETE.
 - (b) FOR TEMPERATURES 32° F - 60° F, ADD AT A RATE OF 16OZ/100 LBS. OF CONCRETE.
 - (c) FOR TEMPERATURES BELOW 32° F, HEAT AGGREGATE AND USE WARM WATER SO THAT WHEN MIXED CONCRETE TEMPERATURE WILL BE ABOVE 60°.
 - 2) FOLLOW THE MANUFACTURER'S INSTRUCTION FOR THE QUANTITY TO BE ADDED TO THE CONCRETE MIX, DEPENDING UPON THE AMBIENT TEMPERATURE, DESIRED RATE OF ACCELERATION, EARLY STRENGTH GAIN, AND STRIPPING SCHEDULE.
 - g) MAINTAIN CONCRETE ABOVE 50°F IN A MOIST CONDITION FOR A MINIMUM OF SEVEN DAYS AFTER PLACEMENT FOLLOWING THE RECOMMENDATIONS OF ACI 308-92.

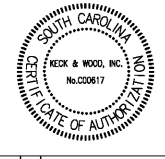
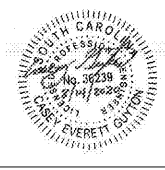
CONCRETE (CONTINUED)

- J. HOT WEATHER REQUIREMENTS
 1. FOLLOWING THE REQUIREMENTS OF ACI 305R.
 2. DURING HOT WEATHER, TAKE STEPS TO REDUCE CONCRETE TEMPERATURE AND WATER EVAPORATION BY PROPER ATTENTION TO INGREDIENTS, PRODUCTION METHODS, HANDLING, PLACING, PROTECTION, AND CURING.
 3. THE PREFERRED PROTECTION IS A COVERING OF KRAFT PAPER, CONFORMING TO ASTM C 171, FOR A TWENTY FOUR HOUR PERIOD AFTER PLACEMENT - VERIFY WITH PM.
- K. CONCRETE FORMWORK
 1. PROVIDE DRESSED LUMBER OR MANUFACTURED FORMS CONFORMING TO THE SHAPE, LINES, AND DIMENSIONS OF CONCRETE STRUCTURES INDICATED ON THE DRAWINGS. FREE FROM DEFECTS AND SUFFICIENTLY TIGHT TO PREVENT LEAKAGE OF MORTAR.
 2. ALL WOODEN FORMS TO BE NO LESS THAN THE SPECIFIED DEPTH OF THE SLAB TO BE POURED, AND NOT LESS THAN NOMINAL 2" X 4" SIZE.
 3. STAKING FOR STRAIGHT SECTIONS SHALL OCCUR NOT LESS FREQUENTLY THAN EVERY FOUR FEET AND SHALL BE BOTH INSIDE AND OUTSIDE OF THE FORM.
 4. FOR CURVES, STAKING SHALL OCCUR NOT LESS THAN EVERY FOOT, AND SHALL BE BOTH INSIDE AND OUTSIDE OF THE FORM.
 5. STEEL FORMS SHALL BE STAKED ACCORDING TO THEIR DESIGN REQUIREMENTS.
 6. ALL REMOVABLE FORMS SHALL BE COATED WITH FORM RELEASE OIL PRIOR TO PLACEMENT OF CONCRETE.
 7. CYLINDRICAL FORMS SHALL BE OF NEW CONSTRUCTION OR EQUIVALENT DISPOSABLE MATERIALS.
 - a) THESE MATERIALS MUST BE REMOVED COMPLETELY AFTER USE. ISLAND FORMS SHALL BE POSITIONED USING MASONRY BLOCKING AND STEEL STAKES BOTH INSIDE AND OUTSIDE OF THE FORM, TO ACHIEVE AN AVERAGE PER PERCENT HEIGHT AS MEASURED AT THE CENTER OF ANY LONG SIDE OF THE ISLAND.
 8. THE SURFACES OF THE ISLAND FORM SHALL BE SHIMMED AGAINST THE STAKES TO PROVIDE A PERFECT 90° CORNER AND 1/8" BOMB FREEBOARD.
 9. ALL FORMS COATED BY REMOVABLE FORMS SHALL BE TOOL-RADIUSED AFTER SURFACE FINISHING TO PROVIDE A SMOOTH BORDER ON ALL SLABS.
 10. FORMS SHALL BE REMOVED NO SOONER THAN 24 HOURS FROM THE TIME OF POUR.
 11. PROPERLY BRACE OR TIE FORMS TOGETHER TO MAINTAIN SHAPE AND POSITION.
 12. PROVIDE SQUARE EDGE WOOD OR, IF AVAILABLE, METAL FORMS FOR FLOOR SLABS.
 13. BEFORE POURING CONCRETE, REMOVE ALL DEBRIS FROM THE FORMWORK.
 14. WET DOWN FORMWORK PRIOR TO PLACEMENT, OR APPLY A FORM RELEASE AGENT FOLLOWING MANUFACTURER'S RECOMMENDATIONS.
 15. DO NOT REMOVE FORMWORK AND BRACING UNTIL CONCRETE HAS GAINED SUFFICIENT STRENGTH TO CARRY ITS OWN WEIGHT, CONSTRUCTION LOADS, AND DESIGN LOADS WHICH ARE LIABLE TO BE IMPOSED ON IT.
 16. REMOVE FORMS IN A MANNER TO ASSURE THE COMPLETE SAFETY OF THE STRUCTURE.
 17. DO NOT PLACE ANY CONCRETE IF THE SUB GRADE HAS STANDING WATER OR IS MUDDY.
- N. STEEL REINFORCEMENT
 1. PROVIDE REINFORCING BARS CONFORMING TO ASTM A 615, GRADE 60 FREE OF LOOSE FLAKY RUST, MUD, OIL, OR OTHER COATINGS WHICH WILL ADVERSELY AFFECT BONDING CAPACITY.
 2. PLACE REINFORCEMENT ACCURATELY AND ADEQUATELY SUPPORTED BY CONCRETE MASONRY UNITS OR OTHER APPROVED SPACERS.
 3. SECURE REINFORCEMENT AGAINST DISPLACEMENT WITHIN TOLERANCES SPECIFIED IN "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318).
 4. HOLD BARS IN PLACE USING A MINIMUM 18 GAUGE ANNEALED IRON WIRE.
 5. SPLICES IN DEFORMED REINFORCING BARS WILL NOT BE PERMITTED UNLESS APPROVED BY MURPHY OIL USA, INC.
 6. REINFORCING ROD TO COMPLY WITH ASTM 615, GRADE 60.
- O. ALTERNATE WELDED WIRE FABRIC REINFORCEMENT
 1. ONLY WHEN INDICATED ON THE DRAWINGS, PROVIDE WELDED WIRE FABRIC CONFORMING TO ASTM A 185 FOR 6X6 W2.9 X W2.9 IN FLAT SHEETS (NOT ROLLED) UNLESS OTHERWISE INDICATED.
 2. INSTALL WELDED WIRE FABRIC IN LENGTHS AS LONG AS PRACTICAL.
 3. THE MINIMUM OVERLAP LENGTH, MEASURED BETWEEN OUTERMOST CROSS WIRES OF EACH FABRIC SHEET, IS NOT TO BE LESS THAN ONE SPACING OF CROSS WIRES PLUS TWO INCHES.
- P. FOUNDATIONS
 1. PROVIDE SMOOTH FINISH AT ALL EXPOSED SURFACES.
 2. CONSTRUCT CORNERS WITH A ONE INCH CHAMFER.
 3. INCREASE THE DEPTH OF FOUNDATIONS, IF REQUIRED BY FROST LINE CONDITIONS OR BY LOCAL CODES.
 4. OBTAIN MURPHY OIL USA, INC. APPROVAL OF ADDITIONAL DEPTH REQUIREMENTS BEFORE PLACING CONCRETE.
 5. CONSTRUCT TOP ELEVATION OF FOUNDATIONS TO WITHIN +1/4 INCH OF THE ELEVATION INDICATED ON THE DRAWINGS.
 6. INSTALL ANCHOR BOLTS WITH A HORIZONTAL TOLERANCE OF +1/8 INCH AND A VERTICAL ALIGNMENT OF +1/8 INCH OUT OF PLUMB.
- Q. GROUT
 1. PROVIDE NON-METALLIC, NON-SHRINK, PREMIXED NON-STAINING GROUT CONTAINING SELECTED SILICA SANDS, ASTM C 150 TYPE I PORTLAND CEMENT, AND SHRINKAGE COMPENSATING AGENTS.
 2. ACCEPTABLE PRODUCTS ARE "EMBECO" BY MASTER BUILDERS AND "FIVE STAR GROUT" BY U.S. GROUT CORPORATION.

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