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**GENERAL CONCRETE NOTES FOR DRAWINGS**

***NOTE TO SPECIFIER: THE PARAGRAPHS BELOW ARE MEANT TO BE INCORPORATED INTO A PROJECT’S GENERAL STRUCTURAL NOTES OR DIRECTLY ONTO THE PLANS. THEY MUST BE CAREFULLY REVIEWED BY A QUALIFIED DESIGN PROFESSIONAL AND EDITED TO MEET THE PARTICULAR REQUIREMENTS OF THE PROJECT AT HAND, ASSURE COMPLIANCE WITH ANY GOVERNING BUILDING CODES, AND COORDINATE WITH OTHER SPECIFICATION SECTIONS AND DRAWINGS. IN NO CASE SHALL THESE GUIDE SPECIFICATIONS BE CONSIDERED TO BE CONTRACT DOCUMENTS OR SERVE AS INSTALLATION INSTRUCTIONS FOR THE PRODUCT BEING DISCUSSED. IN ANY CASES OF DISCREPANCY THE MANUFACTURER'S MOST RECENTLY PUBLISHED DATA SHEET SHALL TAKE PRECEDENT.***

*Note to Specifier: These General Notes cite The American Concrete Institute, ACI 301 Specifications for Concrete Construction. ACI 301 is a Reference Specification that the Architect/Engineer can apply to projects involving concrete construction by citing it in the Project Specification. Note that ACI 301 provides a mandatory requirements checklist and an optional requirements checklist to assist the Architect/Engineer in supplementing the provisions of ACI 301 as required or needed by specifying individual project requirements.*

**CONCRETE**

**CONCRETE GENERAL**

1. EXCEPT WHERE NOTED OTHERWISE IN CONTRACT DOCUMENTS, PERFORM ALL CONCRETE WORK INCLUDING FORMING, REINFORCING, MIXING, PLACING, FINISHING AND CURING IN ACCORDANCE WITH THE ACI MANUAL OF CONCRETE PRACTICE INCLUDING ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE AND ACI 301 SPECIFICATIONS FOR CONCRETE CONSTRUCTION, LATEST EDITIONS.

A. PLACE HOT WEATHER CONCRETE IN ACCORDANCE WITH ACI 305.1

B. PLACE COLD WEATHER CONCRETE IN ACCORDANCE WITH ACI 306.1

1. DELIVER READY MIX CONCRETE IN ACCORDANCE WITH ASTM C94.
2. PRIOR TO CONSTRUCTION SUBMIT FOR APPROVAL LOCATIONS OF CONSTRUCTION JOINTS NOT SHOWN ON DRAWNGS.
3. PROVIDE CONCRETE SURFACES FREE OF DEPRESSIONS, PROTRUSIONS, BUGHOLES, HONEYCOMB, AND LAITANCE FROM FORMS OR FINISHING EQUIPMENT.
4. GENERAL CONTRACTOR TO CONDUCT A PRE-CONCRETE MEETING AT LEAST 30 DAYS PRIOR TO CONCRETE PLACEMENT. THE PURPOSE OF THE MEETING BEING TO DISCUSS REQUIRED METHODS AND PROCEDURES TO ACHIEVE THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. GENERAL CONTRACTOR MUST SEND A PRECONCRETE CONFERENCE AGENDA TO ALL INVOLVED PARTIES A MINIMUM OF 10 DAYS PRIOR TO MEETING. RESPONSIBLE REPRESENTATIVES FROM ALL PARTIES INVOLVED ARE TO ATTEND INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

A. GENERAL CONTRACTOR: PROJECT MANAGER AND SUPERINTENDENT

B. TESTING AGENCY: RESPONSIBLE FOR CONCRETE MIXES, QUALITY CONTROL, FLOOR TOLERANCE TESTING, ETC.

C. READY-MIX CONCRETE PRODUCER: CONCRETE MIX DISCUSSION

D. CONCRETE CONTRACTOR

E. CHEMICAL ADMIXTURE AND FIBER MANUFACTURER

I. RECORD, TYPE AND PRINT MINUTES OF MEETING AND DISTRIBUTE TO ALL PARTIES CONCERNED WITHIN 5 DAYS OF THE MEETING. TRANSMIT ONE COPY OF THE MINUTES TO ARCHITECT/ENGINEER FOR INFORMATION PURPOSES.

1. PROPORTION CONCRETE MIX DESIGNS APPROPRIATELY TO REACH THE REQUIRED DESIGN STRENGTH AND OTHER PROPERTIES NOTED AND TO BE APPROPRIATE FOR THEIR INTENDED USE. USE CONCRETE ADMIXTURES IN ACCORDANCE WITH ASTM C494. USE AIR-ENTRAINING ADMIXTURES IN ACCORDANCE WITH ASTM C260.
2. SUBMIT FOR REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, CONCRETE MIX DESIGNS FOR EACH INTENDED USE ON THE PROJECT. CONTENTS OF THE MIX DESIGN ARE TO COMPLY WITH, AND INCLUDE ALL INFORMATION REQUIRED BY, ACI 318. THIS INCLUDES, BUT IS NOT LIMITED TO NUMBER OF TESTS AND AGE OF TESTS INCLUDED IN THE MIX DESIGN REPORT.
3. WATER/CEMENTITIOUS RATIO: MAXIMUM WATER/CEMENTITIOUS RATIO OF 0.45 (4500 PSI AT 28 DAYS OR MORE) FOR ALL CONCRETE SUBJECT TO FREEZING AND THAWING (F2). MAXIMUM WATER/CEMENTITIOUS RATIO OF 0.40 (5000 PSI AT 28 DAYS OR MORE) FOR ALL STEEL REINFORCED CONCRETE SUBJECTED TO BRACKISH WATER, SALT SPRAY OR DEICERS (F2, C2). MAXIMUM W/C RATIO OF 0.53 UNLESS SPECIFIED OTHERWISE FOR ALL TROWEL FINISHED INTERIOR SLABS, SUBJECTED TO VEHICULAR TRAFFIC.
4. AIR CONTENT: 4.5 PERCENT TO 7.5 PERCENT FOR ALL CONCRETE EXPOSED TO FREEZING AND THAWING AND/OR REQUIRED TO BE WATERTIGHT. MAXIMUM AIR CONTENT OF 3 PERCENT FOR ALL INTERIOR FLOOR SLABS AND ALL FLOOR SLABS TO RECEIVE DRY-SHAKE HARDENERS. MEASURE AIR CONTENT IN ACCORDANCE WITH ASTM C231/231M AT POINT OF PLACEMENT IN ALL MEMBERS (AFTER PUMPING IF APPLICABLE).
5. SLUMP: MEASURE CONCRETE SLUMP IN ACCORDANCE WITH ASTM C143/C143M. SLUMP TOLERANCES MUST MEET THE REQUIREMENTS OF ACI 117. PROPORTION CONCRETE MIXES TO ACHIEVE A MAXIMUM SLUMP OF 9 INCHES FOR CONCRETE CONTAINING HIGH RANGE WATER REDUCING ADMIXTURE AND 6 INCHES FOR CONCRETE CONTAINING A MID-RANGE WATER REDUCING ADMIXTURE. MAXIMUM 4 INCHES WATER SLUMP FOR ALL OTHER CONCRETE. CONCRETE MUST NOT SHOW VISIBLE SIGNS OF SEGREGATION.
6. UPON ARCHITECT/ENGINEER APPROVAL, SELF-CONSOLIDATING CONCRETE (SCC) MAY BE USED FOR ALL CONCRETE AND HEAVILY REINFORCED MEMBERS AS SHOWN ON THE DRAWINGS. ALL SELF-CONSOLIDATING CONCRETE IS TO CONTAIN SPECIFIED HIGH-RANGE WATER-REDUCING ADMIXTURE AND VISCOSITY-MODIFYING ADMIXTURE WHERE REQUIRED. MINIMUM SPREAD OF 22 INCHES TO 30 INCHES WHEN MEASURED IN ACCORDANCE WITH ASTM C1611 OR AS REQUIRED BY THE SUCCESSFUL TEST PLACEMENT. VERIFY WORKABILITY, PUMPABILITY, AND SETTING TIME OF THE PROPOSED MIX DESIGN WITH A SUCCESSFUL TEST PLACEMENT ONSITE. COMPRESSIVE STRENGTH: 5000 PSI AT 28 DAYS OR AS NOTED ON THE DRAWINGS
7. PROVIDE CONCRETE PROPERTIES LISTED IN THE FOLLOWING TABLE.

**CONCRETE PROPERTIES TABLE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CONCRETE APPLICATION** | **EXPOSURE CLASS PER**  **ACI 318** | **COMPRESSIVE**  **STRENGTH, PSI** | **MAX W/CM** | **PERCENT MAX AIR CONTENT** | **FIBER REINFORCEMENT** | **PERCENT MAX SHRINKAGE at 28 days** |
| **FOOTINGS** | F0, S0, W1, C1 | 3,500 | 0.55 | 3 | UPON APPROVAL | 0.05 |
| **FOUNDATION WALLS** | F2, S0, W1, C1 | 4,500 | 0.45 | 4.5 to 7.5 (1) | UPON APPROVAL | 0.05 |
| **INT. SLAB ON GROUND** | F0, S0, W0, C0 | 4,000 | 0.50 | 3 | YES (3)(5) | 0.04 |
| **EXT. SLAB ON GROUND** | F2, S0, W1, C1 | 4,500 | 0.45 | 4.5 to 7.5 (1) | YES (3)(5) | 0.04 |
| **EXT. STEEL REINFORCED CONCRETE** | F2, S0, W1, C2 | 5,000 | 0.04 | 4.5 to 7.5 (1)3 | YES (3)(5) | 0.04 |
| **SLAB ON METAL DECK** | F0,S0, W0, C0 | 4,000 | 0.50 | 3 | YES (3)(4) | 0.04 |
| **LIGHTWEIGHT CONCRETE** | F0, S0,W0, C0 | 3,500 | 0.55 | 4 to 7 | YES (3)(4)(5) | 0.04 |

TABLE NOTES

(1) AIR ENTRAINMENT IS REQUIRED WHERE CONCRETE WILL BE EXPOSED TO FREEZING CONDITIONS.

(2) MAXIMUM SHRINKAGE PERCENT PER ASTM C 157 (MAY BE MODIFIED BY CURING PERIOD DURATION). TEST TAKES 35 DAYS MINIMUM. BEGIN TESTS AS SOON AS POSSIBLE SO FINAL TEST RESULTS ARE AVAILABLE FOR SUBMITTAL TO ENGINEER. SUBMIT ASTM C 157 RESULTS FOR AT LEAST 3 SPECIMENS. COORDINATE MIX DESIGN WITH ADMIXTURE MANUFACTURER.

(3) PROVIDE SYNTHETIC MICROFIBERS AT MANUFACTURERS RECOMMENDED DOSAGE RATE IN ALL NON-REINFORCED CONCRETE AND CONCRETE NOT RECEIVING SYNTHETIC MACROFIBERS OR STEEL FIBERS.

(4) SYNTHETIC MACROFIBERS OR STEEL FIBERS MAY BE USED TO REPLACE WWF IN CONCRETE ON METAL DECK IN ACCORDANCE WITH IBC2015 AND ANSI/SDI-C1.0. MINIMUM DOSAGE FOR SYNTHETIC MACROFIBER IS 4.0 LBS PER CUBIC YARD OF CONCRETE. MINIMUM DOSAGE FOR STEEL FIBER IS 25 LBS PER CUBIC YARD OF CONCRETE. DO NOT REPLACE STEEL REINFORCING OVER NEGATIVE MOMENT AREAS AS SHOWN ON DRAWINGS.

(5) SYNTHETIC MACROFIBERS OR STEEL FIBERS MAY BE USED TO REPLACE WWF OR STEEL BARS IN SLABS ON GRADE AND TOPPING SLABS. DOSAGE FOR SYNTHETIC MACROFIBERS FIBERS AND/OR STEEL FIBER MUST BE DETERMINED BASED ON THE REQUIRED RESIDUAL STRENGTH (fe3) IN ACCORDANCE WITH ASTM C1609 AND THE GENERAL RECOMMENDATIONS OF ACI 544.4R-18. CONTRACTOR TO SUBMIT FIBER MANUFACTURERS RECOMMENDED DOSAGE RATE AND TESTING INDICATING THAT SPECIFIED (fe3) VALUE IS SATISFIED. UNDER NO CIRCUMSTANCES SHALL MINIMUM DOSAGE RATE BE LESS THAN 3 LBS PER CUBIC YARD OF CONCRETE FOR SYNTHETIC MACROFIBERS OR 20 LBS PER CUBIC YARD OF CONCRETE FOR STEEL FIBERS. THESE MINIMUM DOSAGE RATES APPLY TO ANY REQUIRED (fe3) VALUES OF 100 PSI OR LESS. THE FOLLOWING TABLE MAY BE USED FOR ESTIMATING THE REQUIRED RESIDUAL STRENGTH (fe3). CONTACT FIBER MANUFACTURER FOR RECOMMENDED DOSAGE TO MEET REQUIRED (fe3).

**FIBER REPLACEMENT OF STEEL - REQUIRED RESIDUAL STRENGTH (fe3) TABLE**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SLAB THICKNESS** | **W2.9 6”X6”** | **#3@18” OCEW** | **#3@16” OCEW** | **#3@12” OCEW** | **#4@18” OCEW** | **#4@16” OCEW** | **#4@12” OCEW** |
| **4 INCH** | 115 PSI | 150 PSI | 170 PSI | 225 PSI | 265 PSI | 300 PSI | 400 PSI |
| **5 INCH** | 100 PSI | 120 PSI | 135 PSI | 180 PSI | 210 PSI | 240 PSI | 320 PSI |
| **6 INCH** | 100 PSI | 100 PSI | 110 PSI | 150 PSI | 175 PSI | 200 PSI | 265 PSI |
| **8 INCH** | 100 PSI | 100 PSI | 100 PSI | 110 PSI | 135 PSI | 150 PSI | 200 PSI |
| **10 INCH** | 100 PSI | 100 PSI | 100 PSI | 100 PSI | 105 PSI | 120 PSI | 160 PSI |

**MATERIALS**

1. PORTLAND CEMENT: ASTM C150 TYPE I OR ASTM C595 TYPE IL
2. FLY ASH: ASTM C618, CLASS C OR F MAX: 25 PERCENT BWOC. PROHIBITED IN CONCRETE TO RECEIVE DRY SHAKE HARDENERS.
3. COMBINED FLY ASH AND POZZOLAN: MAX 25 PERCENT
4. SLAG CEMENT: ASTM C989, GRADE 100/120, MAX: 50 PERCENT
5. COMBINED FLY ASH OR POZZOLAN AND SLAG CEMENT: 50 PERCENT PORTLAND CEMENT MINIMUM, WITH FLY ASH OR POZZOLAN NOT EXCEEDING 25 PERCENT.
6. SILICA FUME: ASTM C1240 , MAX: 10 PERCENT
7. COMBINED FLY ASH, POZZOLANS, AND SILICA FUME: 35 PERCENT WITH FLY ASH OR POZZOLANS NOT EXCEEDING 25 PERCENT AND SILICA FUME NOT EXCEEDING 10 PERCENT.
8. COMBINED FLY ASH OR POZZOLANS, SLAG CEMENT, AND SILICA FUME: 50 PERCENT WITH FLY ASH OR POZZOLANS NOT EXCEEDING 25 PERCENT AND SILICA FUME NOT EXCEEDING 10 PERCENT.
9. IN MASS CONCRETE, MORE THAN 2 FEET THICK, THE USAGE RATE MAY BE INCREASED TO 50 PERCENT FOR FLY ASH AND 80 PERCENT FOR SLAG.
10. NORMAL-WEIGHT AGGREGATES: ASTM C33 CLASS 3S OR HIGHER
11. LIGHTWEIGHT AGGREGATE: ASTM C330
12. TOP SIZE AGGREGATE: USE LARGEST TOP SIZE AGGREGATE APPLICATBLE. DO NOT EXCEED 1/3 DEPTH OF SLAB, 1/5 NARROWEST DIMENSION BETWEEN FORMS OR 3/4 MINIMUM CLEARANCE CLEAR DISTANCE BETWEEN REINFORCING BARS AND FORMS, WHICH EVER IS LEAST.

**ADMIXTURES**

1. ACCEPTABLE MANUFACTURERS: EUCLID CHEMICAL, SIKA, GRACE
2. PROVIDE CHEMICAL ADMIXTURES CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER ADMIXTURES AND THAT DO NOT CONTRIBUTE WATER-SOLUBLE CHLORIDE IONS EXCEEDING THOSE PERMITTED IN HARDENED CONCRETE. DO NOT USE CALCIUM CHLORIDE OR ADMIXTURES CONTAINING CALCIUM CHLORIDE
3. AIR ENTRAINING ADMIXTURE: ASTM C260 (DO NOT USE FOR INTERIOR SLABS RECEIVING HARD TROWELED FINISHES OR IN CONCRETE TO RECEIVE DRY SHAKE HARDENERS)
4. WATER REDUCING, RETARDING, ACCELERATING ADMIXTURE: ASTM C494, TYPE A, B, C, D, E, F, G
5. CORROSION INHIBITING ADMIXTURE: ASTM C494, TYPE C
6. SHRINKAGE REDUCING ADMIXTURE: ASTM C494, TYPE S
7. SHRINKAGE COMPENSATING ADMIXTURE: ACI 223 TYPE G
8. INTEGRAL CRYSTALLINE WATERPROOFING ADMIXTURE WHERE SHOWN ON DRAWINGS:

A. BASIS OF DESIGN: VANDEX AM-10 OR VANDEX AM-10L BY EUCLID CHEMICAL

1. INTEGRAL WATER-REPELLING ADMIXTURE WHERE SHOWN ON DRAWINGS:

A. BASIS OF DESIGN: EUCON BARACADE WPT BY EUCLID CHEMICAL

1. INTEGRAL COLOR: ASTM C979, LIQUID/POWDER/GRANULAR COLOR FOR CONCRETE. WHERE SHOWN ON DRAWINGS.

A. BASIS OF DESIGN: INCRETE COLOR-CRETE BY EUCLID CHEMICAL

**FIBER REINFORCEMENT**

1. STEEL FIBERS: COLD DRAWN WIRE OR DEFORMED STEEL, ASTM A820, TYPE I, 1.5-2.5 INCH LONG, ASPECT RATIO OF 50-80, HOOKED-END OR CRIMPED FIBERS. DOSAGE FOR STEEL FIBERS TO BE DETERMINED BASED ON THE REQUIRED RESIDUAL STRENGTH (fe3) IN ACCORDANCE WITH ASTM C1609 AND GENERAL RECOMMENDATIONS OF ACI 544.4R-18. SEE CONCRETE PROPERTIES TABLE ABOVE.

A. BASIS OF DESIGN: PSI STEEL FIBER C6560 OR PSI CRIMPED STEEL FIBER BY EUCLID CHEMICAL

1. SYNTHETIC MICROFIBER: ASTM C1116 TYPE III POLYPROPYLENE VIRGIN MICROFIBERS, 0.25 TO 1.5 INCH LONG, MONOFILAMENT OR FIBRILLATED. TYPICAL DOSAGE 0.5-1.5 LB PER CUBIC YARD OF CONCRETE.

A. BASIS OF DESIGN: PSI FIBERSTRAND SERIES BY EUCLID CHEMICAL

1. SYNTHETIC MACROFIBER: ASTM C1116 TYPE III, POLYOLEFIN VIRGIN MACROFIBERS, 1.5-2.0 INCH LONG, ASPECT RATIO OF 50 TO 90, FLEXIBLE SELF-FIBRILLATING OR RIGID EMBOSSED FIBERS. DOSAGE FOR SYNTHETIC MACROFIBERS TO BE DETERMINED BASED ON THE REQUIRED RESIDUAL STRENGTH (fe3) IN ACCORDANCE WITH ASTM C1609 AND GENERAL RECOMMENDATIONS OF ACI 544.4R-18. SEE CONCRETE PROPERTIES TABLE ABOVE.

A. BASIS OF DESIGN: TUF-STRAND SERIES BY EUCLID CHEMICAL

1. FOR COMPOSITE METAL DECKS, FIBERS MUST BE UL-CERTIFIED FOR 2-HOUR TEST SERIES D700, D800, AND D900 FLOOR-CEILING ASSEMBLIES WHERE SPECIFIED.
2. CONSULT FIBER MANUFACTURER FOR RECOMMENDATIONS REGARDING DOSAGE, MIX DESIGN, MIXING, PUMPING, FINISHING, AND POLISHED CONCRETE FINISHES WITH FIBERS.

**REINFORCING STEEL**

1. DEFORMED BARS: ASTM A615 GRADE 60 UNO. USE ASTM A706 GRADE 60 FOR WELDABLE REBAR.
2. WELDED WIRE FABRIC: ASTM A1064.
3. ALL REINFORCING MUST BE DETAILED, FABRICATED AND PLACED ACCORDING TO ACI AND CRSI RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS.
4. PLACE ALL ITEMS PER APPROVED SHOP DRAWINGS.
5. PROVIDE ALL ACCESSORIES, CHAIRS, SPACER BARS AND SUPPORTS NECESSARY TO SECURE REINFORCING IN ACCORDANCE WITH ACI DETAILING MANUAL.
6. PROVIDE (2) BARS AROUND ALL OPENINGS AND (2) DIAGONAL BARS AT ALL OPENING AND RE-ENTRANT CORNERS. EXTEND BARS A MINIMUM OF 24 INCHES PAST OPENING. THIS REINFORCING IS NOT TO BE REPLACED WITH FIBER REINFORCING.
7. SEE DRAWINGS TYPICAL DETAILS FOR REQUIRED BAR DEVELOPMENT LENGTHS AND LAP SPLICE LENGTHS.
8. DO NOT WELD REINFORCEMENT UNLESS SPECIFICALLY CALLED FOR OR REVIEWED BY STRUCTURAL ENGINEER. WHERE WELDING IS PERMITTED, WELDING OF REINFORCING BARS MUST CONFORM TO: "STRUCTURAL WELDING CODE - REINFORCING STEEL". A CHEMICAL ANALYSIS OF THE REINFORCING BARS TO BE WELDED MUST BE SUBMITTED FOR REVIEW.
9. PROVIDE MINIMUM CONCRETE COVER FOR ALL REINFORCING IN ACCORDANCE WITH ACI 301 AND AS FOLLOWS:

A. CONCRETE CAST AGAINST AND

PERMANENTLY EXPOSED TO EARTH 3 INCHES

B. CONCRETE EXPOSED TO EARTH OR

WEATHER:

SLABS AND JOISTS

#6 THROUGH #18 BARS 2 INCHES

#5 BARS AND SMALLER 1.5 INCHES

BEAMS AND COLUMNS

PRINCIPAL REINFORCEMENT 2.5 INCHES

TIES, STIRRUPS, SPIRALS 2.0 INCHES

WALLS 2.0 INCHES

C. CONCRETE NOT EXPOSED TO WEATHER

OR IN CONTACT WITH GROUND

SLABS, WALLS, JOISTS

#14 AND #18 BARS 1.5 INCHES

#11 BARS AND SMALLER .75”

BEAMS, COLUMNS

PRIMARY REINFORCEMENT 2.5 INCHES

TIES, STIRRUPS, SPIRALS 1.5 INCHES

**SLAB ON GROUND**

1. SEE CONCRETE PROPERTIES TABLE FOR STRENGTH, SHRINKAGE AND OTHER CONCRETE MIX DESIGN REQUIREMENTS.
2. PREPARE SUBGRADE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. CONTRACTOR TO REVIEW THE GEOTECHNICAL REPORT. IF DISCREPANCIES EXIST BETWEEN PROJECT SPECIFICATIONS AND GEOTECHNICAL REPORT, THE MOST STRINGENT REQUIREMENTS ARE TO GOVERN.
3. UNLESS SPECIFIED OTHERWISE, PLACE ALL STEEL REINFORCING BARS AND WELDED WIRE FABRIC ON CHAIRS AT MID DEPTH OR ABOVE IN CONCRETE TOPPING SLABS, SLABS ON GRADE AND SLABS ON METAL DECK. MAINTAIN SPECIFIED COVER REQUIREMENTS.
4. SYNTHETIC MACROFIBERS AND STEEL FIBERS MAY BE USED TO REPLACE WELDED WIRE FABRIC OR STEEL REINFORCING BARS IN CONCRETE TOPPING SLABS AND SLABS ON GRADE EXCEPT WHERE NOTED ON DRAWINGS. SEE CONCRETE PROPERTIES TABLE.
5. CONTROL JOINTS: UNLESS OTHERWISE INDICATED ON DRAWINGS, PLACE SAW-CUT CONTROL JOINTS IN SLABS ON GRADE AT SPACING INTERVALS OF 24 TO 36 TIMES THE SLAB THICKNESS. DO NOT EXCEED MAXIMUM SPACING OF 18 FEET. PERFORM SAW CUTTING UTILIZING ONE OF THE METHODS BELOW:

A. FOR SLABS ON GRADE AND TOPPING SLABS UP TO 9 INCHES THICK USE EARLY ENTRY SAW TO CUT CONTROL JOINTS TO A MINIMUM DEPTH OF 1-1/4 INCHES IMMEDIATELY AFTER FINAL FINISHING WHEN CUTTING ACTION WILL NOT TEAR, RAVEL, ABRADE, OR OTHERWISE DAMAGE SURFACE AND BEFORE CONCRETE DEVELOPS RANDOM CONTRACTION CRACKS. CONCRETE CONTAINING SYNTHETIC MACROFIBER OR STEEL FIBER MUST BE CUT TO 1/3 SLAB THICKNESS (D/3).

B. USE CONVENTIONAL SAW TO CUT CONTROL JOINTS TO A MINIMUM DEPTH OF 1/4 SLAB THICKNESS (D/4), OR 1/3 SLAB THICKNESS (D/3) IF CONCRETE CONTAINS SYNTHETIC MACROFIBER OR STEEL FIBER. BEGIN CUTTING AS SOON AS POSSIBLE AFTER FINAL FINISHING WHEN CUTTING ACTION WILL NOT TEAR, RAVEL, ABRADE, OR OTHERWISE DAMAGE SURFACE AND BEFORE CONCRETE DEVELOPS RANDOM CONTRACTION CRACKS.

**SLAB ON METAL DECK**

1. SEE CONCRETE PROPERTIES TABLE FOR STRENGTH, SHRINKAGE AND OTHER MIX DESIGN REQUIREMENTS FOR NORMAL-WEIGHT OR LIGHTWEIGHT CONCRETE.
2. REINFORCEMENT: USE STEEL BARS OR WIRE MESH PER DRAWINGS. SYNTHETIC MACOFIBER AND STEEL FIBER REINFORCEMENT MAY BE USED IN LIEU OF STEEL BARS OR WELDED WIRE FABRIC. SEE CONCRETE PROPERTIES TABLE. REINFORCING STEEL OVER NEGATIVE MOMENT AREAS AS SHOWN ON DRAWINGS IS NOT TO BE REPLACED.

**CURING**

1. CURE ALL CONCRETE IN ACCORDANCE WITH ACI 308.1.
2. REACTIVE SILICATE BASED CHEMICALS ARE PROHBITED AS CURING COMPOUNDS.
3. EVAPORATION RETARDER: WATERBORNE, MONOMOLECULAR FILM FORMING, MANUFACTURED FOR APPLICATION TO FRESH CONCRETE.

A. BASIS OF DESIGN: EUCOBAR BY EUCLID CHEMICAL

1. ABSORPTIVE COVER: AASHTO M 182, CLASS 2, BURLAP CLOTH MADE FROM JUTE OR KENAF, WEIGHING APPROXIMATELY 9 OZ./SQ. YD. WHEN DRY.
2. MOISTURE-RETAINING COVER: ASTM C 171, POLYETHYLENE FILM OR WHITE BURLAP-POLYETHYLENE SHEET.
3. DISSIPATING CURING COMPOUND: CLEAR, WATERBORNE, MEMBRANE-FORMING: ASTM C 309, TYPE 1, CLASS B, DISSIPATING. COMPOSED OF HYDROCARBON RESINS, AND DISSIPATING AGENTS THAT BEGIN TO BREAK DOWN UPON EXPOSURE TO U.V. LIGHT, AND TRAFFIC, APPROXIMATELY 4 TO 6 WEEKS AFTER APPLICATION, PROVIDING A FILM THAT IS REMOVABLE WITH STANDARD DEGREASING AGENTS, AND MECHANIZED SCRUBBING ACTIONS SO AS TO NOT IMPAIR THE LATER ADDITION OF APPLIED FINISHES. MAY BE USED ON CONCRETE TO RECEIVE SUBSEQENT FLOOR COVERINGS, ADHESIVES AND OTHER FLOOR TREATMENTS AS INDICATED ON DRAWINGS PROVIDED THAT CLEANING OPERATIONS ARE PERFORMED TO REMOVE ALL CURING COMPOUND RESIDUES.

A. BASIS OF DESIGN: EUCLID CHEMICAL

1. CURING COMPOUND: CLEAR, WATERBORNE, MEMBRANE-FORMING: ASTM C 309, TYPE 1, CLASS A OR B. DO NOT USE ON CONCRETE TO RECEIVE SUBSEQUENT TREATMENTS, COVERINGS OR ADHESIVES AS INDICATED ON DRAWINGS.

A. BASIS OF DESIGN: EUCLID CHEMICAL

1. CURING AND SEALING COMPOUND: CLEAR, SOLVENT-BORNE, MEMBRANE-FORMING: ASTM C 1315, TYPE 1, CLASS A. FOR USE ON ALL EXTERIOR CONCRETE TO REMAIN EXPOSED AND NOT SCHEDULED TO RECEIVE SUBSEQUENT TREATMENTS OR COATINGS AS INDICATED ON DRAWINGS.

A. BASIS OF DESIGN: EUCLID CHEMICAL

END OF GENERAL CONCRETE NOTES