



GROUT SPACE REQUIREMENTS PER ACI 530-13 BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES, TABLE 3.2.1			
GROUT TYPE1	MAXIMUM GROUT POUR HEIGHT, FT.	MINIMUM CLEAR WIDTH OF GROUT SPACE, 2, 3 IN.	MINIMUM CLEAR GROUT SPACE DIMENSIONS FOR GROUTING CELLS OF HOLLOW UNITS, 3, 4 IN. X IN.
FINE	1	3/4	1-1/2 X 2
FINE	5, 33	2	2 X 3
FINE	12, 67	2-1/2	2-1/2 X 3
FINE	24	3	3 X 3
COARSE	1	1-1/2	1-1/2 X 3
COARSE	5, 33	2	2-1/2 X 3
COARSE	12, 67	2-1/2	3 X 3
COARSE	24	3	3 X 4

FOOTNOTES:
FINE AND COARSE GROUTS ARE DEFINED IN ASTM C476.
FOR GROUTING BETWEEN MASONRY WYTHES.
MINIMUM CLEAR WIDTH OF GROUT SPACE AND MINIMUM CLEAR
GROUT SPACE DIMENSION ARE THE NET DIMENSION OF THE
SPACE DETERMINED BY SUBTRACTING MASONRY PROTRUSIONS
AND THE DIAMETERS OF HORIZONTAL BARS FROM THE
AS-BUILT CROSS-SECTION OF THE GROUT SPACE. SELECT
THE GROUT TYPE AND MAXIMUM GROUT POUR HEIGHT BASED
ON THE MINIMUM CLEAR SPACE.
AREA OF VERTICAL REINFORCEMENT SHALL NOT EXCEED 6
PERCENT OF THE AREA OF THE GROUT SPACE.

- 3) GROUT LIFT HEIGHT: PLACE GROUT IN LIFTS NOT EXCEEDING 5 FT. 4 IN. A GROUT LIFT IS DEFINED AS AN INCREMENT OF GROUT HEIGHT WITHIN A TOTAL GROUT POUR.
- 4) GROUT CONSOLIDATION: CONSOLIDATE GROUT POURS BY MECHANICAL VIBRATION, AND RECONSOLIDATE BY MECHANICAL VIBRATION AFTER INITIAL WATER LOSS AND SETTLEMENT HAS OCCURRED.
- 5) GROUT KEY: WHEN GROUTING, FORM GROUT KEYS BETWEEN GROUT POURS. FORM GROUT KEYS BETWEEN GROUT LIFTS WHEN THE FIRST LIFT IS PERMITTED TO SET PRIOR TO PLACEMENT OF THE SUBSEQUENT LIFT.
A) FORM A GROUT KEY BY TERMINATING THE GROUT A MINIMUM OF 1-1/2 IN. BELOW A MORTAR JOINT.
B) DO NOT FORM GROUT KEYS WITHIN BOND BEAMS.
C) AT BOND BEAMS OR LINTELS LAID WITH CLOSED BOTTOM UNITS, TERMINATE THE GROUT POUR AT THE BOTTOM OF THE BEAM OR LINTEL WITHOUT FORMING A GROUT KEY.

9. POST-INSTALLED ANCHORS AND DOWELS

A. QUALIFICATION REQUIREMENTS FOR INSTALLERS

- 1) CONTRACTOR SHALL REQUEST, SCHEDULE AND FACILITATE THE ANCHOR AND/OR ADHESIVE MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL THE MANUFACTURER'S SPECIFIED ANCHORING PRODUCTS. THE ENGINEER MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S ANCHOR INSTALLATION PERSONNEL ARE TRAINED PRIOR TO COMMENCEMENT OF ANCHOR INSTALLATION OPERATIONS.
- 2) PER ACI 318-14 SECTION 17.8.2.2, INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY AN APPLICABLE CERTIFICATION PROGRAM. CERTIFICATION SHALL INCLUDE WRITTEN AND PERFORMANCE TESTS IN ACCORDANCE WITH THE ACI/CRSI ADHESIVE ANCHOR INSTALLER (AAI) CERTIFICATION PROGRAM, OR EQUIVALENT.

B. QUALIFICATION REQUIREMENTS FOR PRODUCTS

- 1) POST-INSTALLED EXPANSION AND UNDERCUT ANCHORS SHALL MEET THE ASSESSMENT CRITERIA OF ACI 355.2 "QUALIFICATION OF POST-INSTALLED MECHANICAL ANCHORS IN CONCRETE."
- 2) POST-INSTALLED ADHESIVE ANCHORS SHALL MEET THE ASSESSMENT CRITERIA OF ACI 355.4 "QUALIFICATION OF POST-INSTALLED ADHESIVE ANCHORS IN CONCRETE."

- C. APPROVED ANCHORING PRODUCTS: THE ANCHORING SYSTEMS SHOWN BELOW HAVE BEEN USED IN THE ANCHOR DESIGNS SHOWN IN THE CONSTRUCTION DOCUMENTS. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE ENGINEER OF RECORD PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERFORMANCE VALUES OF THE SPECIFIED PRODUCT. SUBSTITUTIONS WILL BE EVALUATED BY THEIR HAVING AN ICC ESR SHOWING COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN-SERVICE TEMPERATURE AND INSTALLATION TEMPERATURE.

1) ANCHORAGE TO CONCRETE

- A) ADHESIVE ANCHORS:
(1) HILTI HIT-HY 200 SYSTEM WITH HILTI HIT-Z ROD OR HAS-E THREADED ROD [ICC ESR-3187].
- B) MEDIUM DUTY MECHANICAL ANCHORS:
(1) HILTI KWIK BOLT 3 EXPANSION ANCHORS (UNCRACKED CONCRETE ONLY) [ICC ESR-2302]

2) REBAR DOWELING INTO CONCRETE

- A) ADHESIVE ANCHORS:
(1) HILTI HIT-HY 200 SYSTEM WITH CONTINUOUSLY DEFORMED REBAR [ICC ESR-3187].

3) ANCHORAGE TO SOLID GROUTED MASONRY

- A) ADHESIVE ANCHORS:
(1) HILTI HIT-HY 270 MASONRY ADHESIVE ANCHORING SYSTEM WITH HILTI HAS-E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR [ICC ESR-4143].
- B) MECHANICAL ANCHORS:
(1) HILTI KWIK BOLT-3 EXPANSION ANCHORS [ICC ESR-1385].

D. PREPARATION PRIOR TO INSTALLATION

- 1) CURING OF BASE MATERIAL: DO NOT DRILL OR CORE HOLES INTO SUPPORTING CONCRETE OR MASONRY MATERIALS UNTIL THE CONCRETE, MORTAR AND/OR GROUT HAVE BEEN ADEQUATELY CURED TO ACHIEVE FULL DESIGN STRENGTH.
- 2) AVOIDANCE OF EMBEDDED ITEMS: PRIOR TO DRILLING OR CORING OPERATIONS, THE CONTRACTOR SHALL LOCATE AND MARK ALL POTENTIALLY CONFLICTING REINFORCING BARS, UTILITIES AND OTHER EMBEDDED ITEMS BY INDUCTION SCANNING, GROUND PENETRATING RADAR, X-RAY, OR OTHER APPROVED NON-DESTRUCTIVE METHOD. CONTRACTOR SHALL AVOID DRILLING OR CORING HOLES THAT MAY DAMAGE THESE EMBEDDED ITEMS. NOTIFY THE ENGINEER IF CONFLICTING EMBEDDED ITEMS DO NOT ALLOW INSTALLATION OF POST-INSTALLED ANCHORS IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND/OR APPROVED SHOP DRAWINGS.

- 7) CONTROL JOINTS: LOCATION AND DETAILS OF CONTROL JOINTS SHALL BE AS DEFINED ON ARCHITECTURAL DRAWINGS. IF NOT SHOWN ON THE ARCHITECTURAL DRAWINGS, THE LOCATION OF CONTROL JOINTS SHALL BE DETAILED BY THE MASONRY CONTRACTOR AND SUBMITTED FOR REVIEW AND APPROVAL BY THE ARCHITECT AND ENGINEER. THE DISTANCE BETWEEN CONTROL JOINTS SHOULD NOT EXCEED THE LESSER OF 1.5 TIMES THE WALL HEIGHT OR 25 FT. IN ADDITION, CONTROL JOINTS SHOULD TYPICALLY BE PROVIDED AT THE FOLLOWING LOCATIONS:
A) AT CHANGES IN WALL HEIGHT.
B) AT PILASTERS AND CHANGES IN WALL THICKNESS.
C) DIRECTLY OVER EXPANSION JOINTS IN SUPPORTING FOUNDATIONS.
D) AT EXPANSION JOINTS IN ROOFS AND FLOORS THAT BEAR ON THE WALL.
E) NEAR ONE SIDE OF OPENINGS LESS THAN 6 FT. WIDE. REFER TYPICAL MASONRY OPENING DETAILS.
F) NEAR BOTH SIDES OF OPENINGS GREATER THAN 6 FT. WIDE. REFER TYPICAL MASONRY OPENING DETAILS.
G) AT INTERSECTING WALLS.
H) AT MAXIMUM OF ONE-HALF THE TYPICAL CONTROL JOINTS SPACING FROM CORNERS.

- 8) PENETRATIONS: OPENINGS FOR ALL DUCTS AND PIPES PENETRATING MASONRY WALLS SHALL BE VERIFIED AND COORDINATED WITH MECHANICAL AND ELECTRICAL CONTRACTORS REQUIREMENTS. PENETRATIONS THROUGH WALLS SHALL HAVE ADDITIONAL REINFORCING AS SHOWN ON IN THE TYPICAL DETAILS.
- 9) LINTELS: LINTELS SHALL BE PROVIDED WHERE REQUIRED ACCORDING TO TYPICAL LINTEL DETAILS AND SCHEDULE OR AS INDICATED ON PLAN SHEETS. SOLID BOTTOM TROUGH BLOCKS SHALL BE USED AT THE HEADS OF ALL OPENINGS.
- 10) PERMANENT BRACING: UNLESS BRACED BY ATTACHMENT TO A STRUCTURAL SLAB OR METAL DECK, THE TOP OF MASONRY WALLS SHALL BE BRACED IN ACCORDANCE WITH THE TYPICAL DETAILS SHOWN IN THE DRAWINGS.

H. CONCRETE MASONRY REINFORCING:

- 1) MINIMUM HORIZONTAL AND VERTICAL REINFORCING IN CMU WALLS SHALL BE PROVIDED AS FOLLOWS:

MINIMUM REINFORCING IN CMU WALLS					
WALL TYPE	CMU TYPE	GROUTED VERTICAL CELL REINFORCING		HORIZONTAL BOND BEAM REINFORCING	
		SPACING OF BARS	SPACING OF GROUTED CELLS	BARS	SPACING OF BOND BEAMS
EXTERIOR	8"	(1)-# 5	32" O.C.	(2)-# 4	48" O.C.
INTERIOR LOAD-BEARING	8"	(1)-# 5	32" O.C.	(2)-# 4	48" O.C.
INTERIOR PARTITION	8"	(1)-# 5	48" O.C.	(2)-# 4	48" O.C.

NOTES:
ALL SINGLE BAR REINFORCING IN VERTICAL CELLS SHALL BE CENTERED IN CELL UNLESS NOTED OTHERWISE.
FOR DOUBLE BAR REINFORCING IN VERTICAL CELLS:
THE CLEAR DISTANCE BETWEEN PARALLEL BARS SHALL NOT BE LESS THAN THE NOMINAL DIAMETER OF THE BAR, NOR LESS THAN 1 IN.
REINFORCING BARS SHALL HAVE A THICKNESS OF GROUT BETWEEN THE BARS AND MASONRY UNITS NOT LESS THAN 1/4 IN. FOR FINE GROUT OR 1/2 IN. FOR COARSE GROUT.
ADDITIONAL BOND BEAMS SHALL BE PROVIDED FOR ALL LINTELS AND WALL OPENINGS AS SHOWN IN TYPICAL DETAILS.

- 2) AN ADDITIONAL VERTICAL BAR OF THE SAME SIZE AND LENGTH AS THE NORMAL REINFORCING BAR SHALL BE PLACED IN GROUTED CELLS:
A) AT JAMBS OF WALL OPENINGS.
B) ON EACH SIDE OF CONTROL JOINTS OR EXPANSION JOINTS.
C) AT INTERSECTION OF EXTERIOR WALLS.
D) AT INTERSECTION OF INTERIOR WALLS WITH EXTERIOR WALLS.
E) AT INTERSECTION OF INTERIOR WALLS.
- 3) THE MINIMUM LENGTH OF LAP SPLICES OF REINFORCING STEEL IN MASONRY SHALL BE AS SHOWN IN THE CMU REINFORCING LAP SCHEDULE.
- 4) FOUNDATION DOWELS:
A) THERE SHALL BE A FOUNDATION DOWEL FOR EACH VERTICAL WALL REINFORCING BAR.
B) THE MINIMUM REQUIRED EMBEDMENT OF DOWELS IN CONCRETE FOUNDATIONS SHALL BE AS REQUIRED FOR A CLASS B SPICE FOR THE SPECIFIED COMPRESSIVE STRENGTH FOR THE FOUNDATION. REFER TO CONCRETE LAP LENGTH SCHEDULES FOR TYPICAL LAP REQUIREMENTS. ALTERNATIVELY, THE FOUNDATION DOWELS MAY BE DEVELOPED WITH A STANDARD ACI 90 DEGREE HOOK INTO THE FOUNDATION.
C) AT CONTRACTOR'S OPTION, FOUNDATION DOWELS MAY BE DRILLED AND GROUTED WITH EPOXY MATERIAL TO DEVELOP THE TENSILE CAPACITY OF THE BAR.
EPOXY MANUFACTURER INFORMATION SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO PLACEMENT OF WALL FOUNDATIONS.
D) FOUNDATION DOWELS SHALL EXTEND UP INTO THE GROUTED CELLS TO PROVIDE THE MINIMUM LAP SPlice LENGTH SHOWN IN THE CMU REINFORCING LAP SCHEDULE.
E) FOUNDATION DOWELS THAT INTERFERE WITH UNIT WEBS ARE PERMITTED TO BE BENT A MAXIMUM OF 1 IN. HORIZONTALLY FOR EVERY 6 IN. OF VERTICAL HEIGHT. REFER TYPICAL DETAIL FOR PERMITTED BENDING OF FOUNDATION DOWELS.
- 5) NORMAL VERTICAL WALL REINFORCING SHALL EXTEND CONTINUOUSLY FROM THE TOP OF FOUNDATION TO EMBED WITH A STANDARD HOOK INTO THE FLOOR OR ROOF DIAPHRAGM BOND BEAM. THE DIAPHRAGM BOND BEAM SHALL BE DEFINED AS THE BOND BEAM AT THE FLOOR OR ROOF LEVEL OR WHERE KICKER ANGLES OR CLIP ANGLES ARE PROVIDED TO PROVIDE LATERAL SUPPORT.
- 6) BOND BEAM REINFORCING STEEL FOR INTERIOR AND EXTERIOR WALLS SHALL BE CONTINUOUS THROUGHOUT, EXCEPT AT CONTROL JOINTS. AT CONTROL JOINTS, INTERMEDIATE BOND BEAM REINFORCEMENT SHALL BE CUT, BUT SHALL BE CONTINUOUS AT DIAPHRAGM BOND BEAMS. EXTEND REINFORCING BARS NOT LESS THAN THAT SPECIFIED ON LAP SCHEDULE. REFER TO TYPICAL DETAILS AND LAP SCHEDULE FOR ADDITIONAL INFORMATION.

I. GROUT PLACEMENT:

- 1) GROUT PLACING TIME: PLACE GROUT WITHIN 1-1/2 HOURS FROM INTRODUCING WATER IN THE MIXTURE AND PRIOR TO INITIAL SET.
- 2) GROUT POUR HEIGHT: DO NOT EXCEED THE MAXIMUM GROUT POUR HEIGHT GIVEN IN THE TABLE BELOW. THE GROUT POUR HEIGHT IS DEFINED AS THE TOTAL HEIGHT OF MASONRY TO BE GROUTED PRIOR TO ERECTION OF ADDITIONAL MASONRY. A GROUT POUR CONSISTS OF ONE OR MORE GROUT LIFTS.

- 3) MORTAR MIX PROPORTIONS: MORTAR MATERIAL PROPORTIONS BY VOLUME SHALL BE AS FOLLOWS:
A) PORTLAND CEMENT: 1
B) HYDRATED LIME OR LIME PUTTY: OVER 0.25 TO 0.50
C) AGGREGATE RATIO (MEASURED IN DAMP LOOSE CONDITIONS): NOT LESS THAN 2.25 AND NOT MORE THAN 3.0 TIMES THE SUM OF THE VOLUMES OF CEMENT AND LIME MATERIALS.
- 4) MORTAR MIXING: MIX CEMENTITIOUS MATERIALS AND AGGREGATES BETWEEN 3 AND 5 MINUTES IN A MECHANICAL BATCH MIXER WITH A SUFFICIENT AMOUNT OF WATER TO PRODUCE A WORKABLE CONSISTENCY, UNLESS SPECIFICALLY ALLOWED BY THE OWNER'S REPRESENTATIVE. DO NOT HAND MIX MORTAR. MAINTAIN WORKABILITY OF MORTAR BY REMIXING OR RETEMPERING. DISCARD MORTAR WHICH HAS BEGUN TO STIFFEN OR IS NOT USED WITHIN 2.5 HOURS AFTER INITIAL MIXING.
- 5) ADMIXTURES: DO NOT USE ADMIXTURES CONTAINING MORE THAN 0.2 PERCENT CHLORIDE IONS.
- 6) MORTAR QUALITY ASSURANCE: TESTING AGENCY SHALL PERIODICALLY OBSERVE AND CONFIRM THAT THE PROPORTIONS OF SITE-PREPARED MORTAR COMPLY WITH THE PROPORTIONS OUTLINED ABOVE.

D. GROUT:

- 1) GROUT MATERIALS: GROUT USED IN THE CONSTRUCTION OF MASONRY SHALL CONFORM TO THE PROPORTION SPECIFICATION OF ASTM C476.
- 2) GROUT SUBMITTAL REQUIREMENTS: BECAUSE THE PROPORTION SPECIFICATION FOR GROUT IS PRESCRIPTIVE, THERE ARE NO GROUT TESTS REQUIRED. SUBMITTAL INFORMATION SHALL INCLUDE THE PROPORTIONS OF GROUT MATERIALS AND CERTIFICATES OF COMPLIANCE FOR EACH RAW MATERIAL USED.
- 3) GROUT MIX PROPORTIONS: GROUT MATERIAL PROPORTIONS BY VOLUME SHALL BE AS FOLLOWS:

GROUT TYPE	CEMENT	LIME	AGGREGATE (DAMP, LOOSE)	
			FINE	COARSE
FINE	1	0 TO 1/10	2.25 TO 3	-
COARSE	1	0 TO 1/10	2.25 TO 3	1 TO 2

*TIMES THE SUM OF THE VOLUMES OF THE CEMENT & LIME MATERIALS

- 4) GROUT SLUMP: SITE-MIX GROUT TO A CONSISTENCY THAT HAS A SLUMP BETWEEN 8 AND 11 INCHES. DISCARD GROUT THAT DOES NOT MEET THE SPECIFIED SLUMP WITHOUT ADDING WATER AFTER INITIAL MIXING.
- 5) GROUT QUALITY ASSURANCE: TESTING AGENCY SHALL PERIODICALLY OBSERVE AND CONFIRM THAT THE PROPORTIONS AND SLUMP OF SITE-PREPARED GROUT COMPLY WITH THE REQUIREMENTS OUTLINED ABOVE.

E. INSPECTION: PRIOR TO THE START OF MASONRY CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE FOLLOWING:

- 1) VERIFY FOUNDATIONS ARE CONSTRUCTED WITHIN A LEVEL ALIGNMENT TOLERANCE OF PLUS OR MINUS 1/2 IN.
- 2) VERIFY REINFORCING DOWELS ARE POSITIONED IN ACCORDANCE WITH THE PROJECT DRAWINGS.
- 3) IF STATED CONDITIONS ARE NOT MET, NOTIFY THE OWNER'S REPRESENTATIVE PRIOR TO PROCEEDING.

F. PREPARATION:

- 1) CLEANING:
A) CLEAN REINFORCEMENT AND SHANKS OF ANCHOR BOLTS BY REMOVING MUD, OIL, OR OTHER MATERIALS THAT WILL ADVERSELY AFFECT OR REDUCE BOND AT THE TIME MORTAR OUR GROUT IS PLACED.
B) PRIOR TO PLACING MASONRY, REMOVE LAITANCE, LOOSE AGGREGATE, AND ANYTHING ELSE THAT WOULD PREVENT MORTAR FROM BONDING TO THE FOUNDATION.
- 2) WETTING: DO NOT WET CONCRETE MASONRY UNITS BEFORE LAYING. WET CUTTING IS PERMITTED.
- 3) DEBRIS: CONSTRUCT GROUT SPACES FREE OF MORTAR DROPPING, DEBRIS, LOOSE AGGREGATES, AND ANY MATERIAL DELETERIOUS TO MASONRY GROUT.
- 4) REINFORCEMENT: PLACE REINFORCEMENT AND TIES IN GROUT SPACES PRIOR TO GROUTING.
- 5) CLEANOUTS: PROVIDE CLEANOUTS IN THE BOTTOM COURSE OF MASONRY FOR EACH GROUT POUR WHEN THE GROUT POUR HEIGHT EXCEEDS 5 FT 4 IN.
A) CONSTRUCT CLEANOUTS SO THAT THE SPACE TO BE GROUTED CAN BE CLEANED AND INSPECTED. IN SOLID GROUTED MASONRY, SPACE CLEANOUTS HORIZONTALLY A MAXIMUM OF 32 IN. ON CENTER.
B) CONSTRUCT CLEANOUTS WITH AN OPENING OF SUFFICIENT SIZE TO PERMIT REMOVAL OF DEBRIS. THE MINIMUM OPENING DIMENSION SHALL BE 3 IN.
C) AFTER CLEANING, CLOSE CLEANOUTS WITH CLOSURES BRACED TO RESIST GROUT PRESSURE.

G. MASONRY ERECTION:

- 1) BOND PATTERN: UNLESS OTHERWISE INDICATED, LAY MASONRY IN RUNNING BOND.
- 2) PLACING MORTAR UNITS: COMPLY WITH ARTICLE 3.3 B OF ACI 530-1.13 "SPECIFICATION FOR MASONRY STRUCTURES AND COMMENTARY" INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
A) BED JOINTS AT FOUNDATIONS: IN THE STARTING COURSE ON FOUNDATIONS AND OTHER SUPPORTING MEMBERS, CONSTRUCT BED JOINTS SO THAT THE BED JOINT THICKNESS IS AT LEAST 1/4 IN. AND NOT MORE THAN:
(i) 3/4 IN. WHEN THE MASONRY IS UNGROUTED OR PARTIALLY GROUTED
(ii) 1-1/4 IN. WHEN THE FIRST COURSE OF MASONRY IS SOLID GROUTED AND SUPPORTED BY A CONCRETE FOUNDATION.
B) OPENINGS IN TROUGH BLOCKS: AT ALL VERTICAL REINFORCING LOCATIONS, THE BOTTOM OF TROUGH BLOCKS SHALL BE CUT TO PROVIDE A MINIMUM 2-INCH DIAMETER HOLE TO ALLOW PLACEMENT OF VERTICAL REINFORCING AND PLACEMENT OF GROUT THROUGH THE HOLE.

- 3) EMBEDDED ITEMS AND ACCESSORIES: COMPLY WITH ARTICLE 3.3 D OF ACI 530-1.13 "SPECIFICATION FOR MASONRY STRUCTURES AND COMMENTARY."

- 4) TEMPORARY BRACING OF MASONRY: DESIGN, PROVIDE, AND INSTALL TEMPORARY BRACING THAT WILL ASSURE STABILITY OF MASONRY DURING CONSTRUCTION.

- 5) SITE TOLERANCES: ERECT MASONRY WITHIN THE TOLERANCES DEFINED IN ARTICLE 3.3 F OF ACI 530-1.13 "SPECIFICATION FOR MASONRY STRUCTURES AND COMMENTARY."

- 6) PLACING REINFORCING: COMPLY WITH ALL PROVISIONS OF ARTICLE 3.4 OF ACI 530-1.13 "SPECIFICATION FOR MASONRY STRUCTURES AND COMMENTARY" AND AS FURTHER DISCUSSED BELOW.

- B) INTERIOR SLABS-ON-GRADE
1) FREEZING AND THAWING EXPOSURE CATEGORY (F): CLASS FO
2) SULFATE EXPOSURE CATEGORY (S): CLASS SO
3) WATER EXPOSURE CATEGORY (W): CLASS WO
4) CORROSION PROTECTION CATEGORY (C): CLASS CO
5) 28-DAY COMPRESSIVE STRENGTH: 4,000 PSI
6) MAXIMUM WATER/CEMENT RATIO: 0.45
7) MAXIMUM AGGREGATE SIZE: 1 1/2-INCHES
8) TARGET AIR CONTENT: DO NOT ALLOW AIR CONTENT OF TROWEL-FINISHED FLOORS TO EXCEED 3 PERCENT
9) MAXIMUM WATER-SOLUBLE CHLORIDE ION CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT: 1.00

- 6) CONCRETE MIX PROPORTIONS SHALL BE ESTABLISHED IN ACCORDANCE WITH ARTICLE 4.2.3 OF "SPECIFICATIONS FOR STRUCTURAL CONCRETE (ACI 301)." SO THAT THE CONCRETE SATISFIES THE FOLLOWING THREE REQUIREMENTS:

- A) THE CONCRETE CAN BE PLACED READILY WITHOUT SEGREGATION INTO FORMS AND AROUND REINFORCEMENT UNDER ANTICIPATED PLACEMENT CONDITIONS. THE CONCRETE PRODUCER SHALL DETERMINE WHETHER ADMIXTURES ARE NECESSARY FOR WATER REDUCTION, SET TIME, OR SLUMP REQUIREMENTS.
B) THE CONCRETE SHALL MEET REQUIREMENTS FOR THE ASSIGNED EXPOSURE CLASSES OUTLINED HEREIN
C) THE CONCRETE SHALL CONFORM TO STRENGTH TEST REQUIREMENTS FOR STANDARD-CURED SPECIMENS.

- 7) DOCUMENTATION OF CONCRETE MIXTURE CHARACTERISTICS SHALL BE SUBMITTED FOR REVIEW BEFORE THE MIXTURE IS USED. EVIDENCE OF THE ABILITY OF THE PROPOSED MIXTURE TO COMPLY WITH THE CONCRETE MIXTURE REQUIREMENTS IN THE CONSTRUCTION DOCUMENTS SHALL BE INCLUDED IN THE SUBMITTAL. THE EVIDENCE SHALL BE BASED ON FIELD TEST RECORDS OR LABORATORY TRIAL BATCHES.

E. CONCRETE REINFORCING:

- 1) ALL DETAILING, FABRICATION, AND PLACING OF REINFORCING STEEL, UNLESS OTHERWISE NOTED, SHALL FOLLOW ALL SECTIONS OF THE ACI "DETAILING MANUAL-2004" (SP-66 04), THE ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318-14), AND ALL SECTIONS OF THE CONCRETE REINFORCING STEEL INSTITUTE (CRSI) "MANUAL OF STANDARD PRACTICE."

- 2) UNLESS OTHERWISE NOTED, LAP SPLICES OF DEFORMED REINFORCING BARS SHALL CONFORM TO ACI REQUIREMENTS FOR CLASS B TENSION SPLICES. REFER TO LAP LENGTH SCHEDULES FOR TYPICAL LAP REQUIREMENTS.

- 3) PROVIDE CORNER BARS IN BOTH FACES OF ALL CONTINUOUS FOOTINGS. NUMBER, SIZE, AND SPACING OF CORNER BARS SHALL BE EQUAL TO NUMBER, SIZE AND SPACING OF HORIZONTAL REINFORCING WITH WHICH THEY LAP AND SHALL HAVE CLASS B TENSION LAP SPLICES IN EACH DIRECTION. REFER TO TYPICAL DETAILS FOR ADDITIONAL INFORMATION.

- 4) AT INTERSECTING FOUNDATIONS, EXTEND ALL HORIZONTAL REINFORCING OF THE INTERSECTING MEMBERS BEYOND THE POINT OF INTERSECTION TO THE OPPOSITE FACE. BEND TO A STANDARD 90 DEGREE HOOK OR PROVIDE BENT DOWELS OF EQUAL SIZE AND SPACING AND LAP AS REQUIRED FOR A CLASS B TENSION SPLICE (BUT NOT LESS THAN 12") IN EACH DIRECTION. REFER TO TYPICAL DETAILS FOR ADDITIONAL INFORMATION.

- 5) CONCRETE COVER OVER STEEL REINFORCING FOR CAST-IN-PLACE CONSTRUCTION SHALL CONFORM TO THE TABLE PROVIDED IN THE TYPICAL CONCRETE DETAILS.

F. OPENINGS IN CONCRETE STRUCTURES:

- 1) THE SIZE AND LOCATION OF ALL FLOOR PITS, TRENCH DRAINS, AND OPENINGS FOR ALL DUCTS AND PIPES THROUGH FLOORS, AND FOUNDATION WORK SHALL BE VERIFIED WITH THE MECHANICAL, PLUMBING, FIRE PROTECTION AND ELECTRICAL CONTRACTOR'S REQUIREMENTS PRIOR TO THE START OF ANY CONCRETE WORK.

G. JOINTS IN CONCRETE CONSTRUCTION:

- 1) CONCRETE SLABS-ON-GRADE: REFER TO SLAB-ON-GRADE CONSTRUCTION NOTES ABOVE FOR INFORMATION REGARDING JOINTS.
- 2) CONTINUOUS FOOTINGS: A SINGLE CONCRETE POUR SHALL NOT EXCEED 100 FEET IN THE SAME DIRECTION FOR CONTINUOUS SHALLOW.
- 3) CURING AT CONSTRUCTION JOINTS: CONCRETE POURS EITHER SIDE OF CONSTRUCTION JOINTS SHALL NOT BE CONCURRENT. CONCRETE SHALL BE ALLOWED TO CURE A MINIMUM OF 7 DAYS PRIOR TO PLACEMENT OF ADJACENT CONCRETE.

H. CONCRETE MISCELLANEOUS:

- 1) WATERSTOPS AND WATERPROOFING: ALL CONSTRUCTION JOINTS (VERTICAL AND HORIZONTAL) IN BELOW-GRADE CONCRETE WALLS, TRENCHES AND PITS SHALL BE KEYED AND HAVE BENTONITE WATERSTOPS INSTALLED UNLESS NOTED OTHERWISE. ALL BELOW-GRADE CONCRETE WALLS, PITS AND TRENCHES SHALL BE WATERPROOFED AS SHOWN IN ARCHITECTURAL DRAWINGS, UNLESS NOTED OTHERWISE.

- 2) EQUIPMENT PADS: PROVIDE CONCRETE EQUIPMENT PADS OF SIZE REQUIRED FOR EQUIPMENT FURNISHED. SEE MECHANICAL, PLUMBING, FIRE PROTECTION AND ELECTRICAL DRAWINGS FOR NUMBER, SIZE, AND LOCATION OF SUCH PADS. UNLESS OTHERWISE SHOWN, MINIMUM PAD THICKNESS SHALL BE 4" AND SHALL EXTEND A MINIMUM OF 6" BEYOND THE FACE OF THE EQUIPMENT. MINIMUM REINFORCING SHALL BE #4 BARS AT 12" O.C. EACH WAY. TOOLED OR CHAMFERED EDGES SHALL BE PROVIDED AT ALL EQUIPMENT PADS. ANCHORAGE TO SUPPORTING SLAB SHALL BE MADE. REFER TO TYPICAL DETAILS.

- 3) CHAMFERED EDGES: UNLESS NOTED OTHERWISE ON ARCHITECTURAL DRAWINGS, PROVIDE 3/4" CHAMFER ON ALL EXPOSED CONCRETE EDGES.

- 4) SURFACE FINISH: ALL HORIZONTAL CONCRETE SURFACES SHALL HAVE A TROWELED FINISH UNLESS NOTED OTHERWISE IN ARCHITECTURAL DRAWINGS OR FLOORING SPECIFICATIONS.

- 5) MOIST CURING OF SLABS: SLABS ON-GRADE AND SLABS-ON-DECK SHALL BE WATER CURED FOR A MINIMUM OF 7 DAYS BY PONDING, SPRAYING, SPRINKLING OR BY USE OF SATURATED COVERINGS. CURING COMPOUNDS ARE EXPRESSLY PROHIBITED.

B. REINFORCED HOLLOW CONCRETE MASONRY NOTES

- A. MASONRY DIMENSIONS: REFER TO ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS RELEVANT TO ALL CONCRETE MASONRY CONSTRUCTION.

B. CONCRETE MASONRY UNITS:

- 1) ALL CONCRETE MASONRY UNITS SHALL BE 1 OR 2-CELL LIGHTWEIGHT CONCRETE BLOCK WITH AN OVEN DRY WEIGHT OF LESS THAN 105 LBS PER CUBIC FOOT.
- 2) ALL CONCRETE MASONRY UNITS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1900 PSI ON THE NET AREA (INDIVIDUAL STRENGTH PER ASTM C 90).

C. MORTAR:

- 1) MORTAR MATERIALS: CONCRETE MASONRY SHALL BE CONSTRUCTED WITH PORTLAND CEMENT/LIME, TYPE S MORTAR CONFORMING TO THE PROPORTION SPECIFICATION OF ASTM C270.
- 2) MORTAR SUBMITTAL REQUIREMENTS: BECAUSE THE PROPORTION SPECIFICATION FOR MORTAR IS PRESCRIPTIVE, THERE ARE NO MORTAR TESTS REQUIRED. SUBMITTAL INFORMATION SHALL INCLUDE THE PROPORTIONS OF MORTAR MATERIALS AND CERTIFICATES OF COMPLIANCE FOR EACH RAW MATERIAL USED.