

GENERAL

ALL TYPICAL DETAILS AND NOTES SHOWN ON DRAWINGS SHALL APPLY UNLESS NOTED OTHERWISE. TYPICAL DETAILS MAY NOT NECESSARILY BE INDICATED ON THE PLANS BUT SHALL STILL APPLY AS SHOWN OR DESCRIBED IN THE DETAILS. WHERE TYPICAL DETAILS ARE NOTED ON THE DRAWINGS, THE SPECIFIED TYPICAL DETAIL SHALL BE USED. WHERE NO DETAIL IS NOTED, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CHOOSE THE APPROPRIATE TYPICAL DETAIL FROM THOSE PROVIDED. THE CONTRACTOR SHALL SUBMIT ALL PROPOSED ALTERNATE TYPICAL DETAILS TO THOSE PROVIDED WITH RELATED CALCULATIONS TO THE ENGINEER FOR APPROVAL PRIOR TO SHOP DRAWING PRODUCTION AND FIELD USE.

3D VIEWS (INCLUDING AXONOMETRICS, ISOMETRICS, PERSPECTIVES, ETC.) ARE PROVIDED FOR REFERENCE PURPOSES ONLY. IN THE EVENT OF ANY DISCREPANCIES BETWEEN INFORMATION REPRESENTED BY BOTH A 3D VIEW AND BY A NON-3D VIEW WITHIN THE CONSTRUCTION DOCUMENTS, THE NON-3D VIEW SHALL GOVERN IN ALL CASES. INFORMATION REPRESENTED BY 3D VIEWS, BUT NOT REPRESENTED ELSEWHERE IN THE CONSTRUCTION DOCUMENTS IS NOT INTENDED TO BE PART OF THE CONSTRUCTION DOCUMENTS.

BUILDING CODE

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE BUILDING CODE. THE PUBLICATIONS LISTED BELOW ARE THE GOVERNING CODES AND STANDARDS AND ARE REFERENCED BY THEIR BASIC DESIGNATION. IN THE CASE OF CONFLICTING REQUIREMENTS, THE BUILDING CODE SHALL GOVERN.

APPLICABLE CODES AND STANDARDS

BUILDING CODE	INTERNATIONAL BUILDING CODE (IBC), 2018 EDITION (INCLUDING THE STATE OF UTAH BUILDING CODE AMENDMENTS)
ACI 318	AMERICAN CONCRETE INSTITUTE, "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE," 2014 EDITION
TMS 402/602	THE MASONRY SOCIETY, "BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES," 2016 EDITION
RCSC	RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS, "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS," 2014 EDITION
AISC 341	AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS," 2016 EDITION
AISC 360	AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS," 2016 EDITION
ASCE 7	AMERICAN SOCIETY OF CIVIL ENGINEERS, "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES," 2016 EDITION,
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM INTERNATIONAL)
AWS A2.4	AMERICAN WELDING SOCIETY, "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EVALUATION," 2012 EDITION
AWS D1.1	AMERICAN WELDING SOCIETY, "STRUCTURAL WELDING CODE - STEEL," 2015 EDITION
AWS D1.4	AMERICAN WELDING SOCIETY, "STRUCTURAL WELDING CODE - REINFORCING STEEL INCLUDING METAL INSERTS AND CONNECTIONS IN REINFORCED CONCRETE CONSTRUCTION," 2018 EDITION
AWS D1.8	AMERICAN WELDING SOCIETY, "STRUCTURAL WELDING CODE - SEISMIC SUPPLEMENT," 2016 EDITION
ICC	INTERNATIONAL CODE COUNCIL, INTERNATIONAL CODE COUNCIL - EVALUATION SERVICES (ICC-ES)
IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS - UNIFORM EVALUATION SERVICE (IAPMO-UES)

STRUCTURAL DESIGN DATA

LOAD COMBINATIONS: LOAD COMBINATIONS ARE IN ACCORDANCE WITH SECTION 1605 OF THE BUILDING CODE.

LIVE LOADS: LIVE LOADS SHALL BE IN ACCORDANCE WITH THE LOAD DIAGRAMS.

SNOW LOADS: SNOW LOADING AND SNOW DRIFT LOADING SHALL BE IN ACCORDANCE WITH THE BUILDING CODE (SECTION 1609), INCLUDING SITE-SPECIFIC DETERMINATION OF GROUND SNOW LOAD PER UTAH STATE AMENDMENT TO SECTION 1608.2.1.

GROUND SNOW LOAD:	$P_g = 1.94$ PSF
IMPORTANCE FACTOR:	$I_s = 1.0$
SNOW EXPOSURE FACTOR:	$C_e = 1.0$
THERMAL FACTOR:	$C_t = 1.0$
FLAT-ROOF SNOW LOAD:	$P_f = 136$ PSF

WIND LOADS: WIND PRESSURE SHALL BE IN ACCORDANCE WITH THE BUILDING CODE (SECTION 1609).

BASIC WIND SPEED (3-SECOND GUST):	$V_{ult} = 115$ MPH
BASIC WIND SPEED (3-SECOND GUST):	$V_{85d} = 85$ MPH
RISK CATEGORY:	II

EXPOSURE CATEGORY:	B
INTERNAL PRESSURE COEFFICIENT:	$G_{Cp1} = 0.18$

SEISMIC LOADS: SEISMIC LOADING SHALL BE IN ACCORDANCE WITH THE BUILDING CODE.

BUILDING LOCATION:	LATITUDE: 40.615° N LONGITUDE: 111.508° W
RISK CATEGORY:	II
IMPORTANCE FACTOR:	$I_e = 1.0$
MAPPED SPECTRAL ACCELERATION PARAMETERS:	$S_s = 0.60, S_1 = 0.21$
SITE CLASS:	C
SITE COEFFICIENTS:	$F_a = 1.263, F_v = 1.5$
SPECTRAL RESPONSE COEFFICIENTS:	$S_{ds} = 0.50, S_{d1} = 0.21$
SEISMIC DESIGN CATEGORY:	D
LATERAL SYSTEM:	TOWERS A, B & C: SPECIAL REINFORCED CONCRETE SHEAR WALLS TOWER AB CONNECTOR: STEEL SPECIAL CANTILEVER COLUMNS
RESPONSE MODIFICATION COEFFICIENT:	TOWERS A, B & C: R=6 TOWER AB CONNECTOR: R= 2 1/2"

SEISMIC RESPONSE COEFFICIENT:	
TOWER A:	NORTH-SOUTH: $C_s = 0.078$ EAST-WEST: $C_s = 0.046$
TOWER B:	NORTH-SOUTH: $C_s = 0.034$ EAST-WEST: $C_s = 0.049$
AB CONNECTOR:	NORTH-SOUTH: $C_s = 0.202$ EAST-WEST: $C_s = 0.202$
TOWER C:	NORTH-SOUTH: $C_s = 0.061$ EAST-WEST: $C_s = 0.033$
DESIGN BASE SHEAR:	
TOWER A:	NORTH-SOUTH: $V = 1440$ KIPS EAST-WEST: $V = 853$ KIPS
TOWER B:	NORTH-SOUTH: $V = 1071$ KIPS EAST-WEST: $V = 1537$ KIPS
AB CONNECTOR:	NORTH-SOUTH: $V = 115$ KIPS EAST-WEST: $V = 168$ KIPS
TOWER C:	NORTH-SOUTH: $V = 1477$ KIPS EAST-WEST: $V = 796$ KIPS

ANALYSIS PROCEDURE USED: MODAL RESPONSE SPECTRUM ANALYSIS

LOAD PATH FOR LATERAL FORCES: LATERAL FORCES ARE CARRIED BY THE ROOF AND FLOOR DIAPHRAGMS TO THE SHEAR WALLS. MOMENTS, SHEARS, AND ROTATIONAL FORCES ARE DELIVERED TO THE FOUNDATION BY THE SHEAR WALLS IN PROPORTION TO THEIR ABILITY TO RESIST LATERAL DEFORMATION.

STORY DRIFT

THE PRIMARY STRUCTURE WILL EXPERIENCE LATERAL MOVEMENTS BETWEEN ADJACENT FLOORS. THE STORY DRIFTS PERPENDICULAR AND/OR PARALLEL TO THE PRIMARY STRUCTURE ARE AS FOLLOWS:

LEVELS	SERVICE LEVEL STORY DRIFT	DESIGN STORY DRIFT, Δ_{SD}
TOWERS A, B, & C: ALL AB CONNECTOR:	1/2" 1/2"	1 1/2" 3"

WIND DRIFT

LEVELS	SERVICE LEVEL STORY DRIFT	DESIGN STORY DRIFT
TOWERS A, B, & C: ALL AB CONNECTOR:	1/2" 1/2"	1" 1 1/2"

WHERE REQUIRED BY THE BUILDING CODE, NON-STRUCTURAL COMPONENTS INCLUDING EXTERIOR CLADDING, STAIRS, ELEVATORS, AND MISCELLANEOUS METALS, MECHANICAL/ELECTRICAL/PLUMBING SYSTEM SUPPORTS, INTERIOR METAL STUD FRAMING, AND ANY OTHER ELEMENTS REQUIRED BY THE BUILDING CODE SHALL BE DESIGNED TO ACCOMMODATE THE PRIMARY STRUCTURE STORY DRIFTS WITH ANY APPLICABLE ELEMENT-SPECIFIC MODIFICATIONS PER CHAPTER 13 OF ASCE 7.

FOUNDATIONS

THE FOUNDATION DESIGN IS BASED ON THE RECOMMENDATIONS CONTAINED IN THE GEOTECHNICAL ENGINEERING DESIGN REPORT ENTITLED "GEOTECHNICAL INVESTIGATION - CONDOMINIUM DEVELOPMENT LOTS 1 AND 2, 82 EAST PROPERTY - 9300 MARSA C AVENUE - PARK CITY, UTAH" DATED SEPTEMBER 11, 2019, PREPARED BY APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC. REFER TO THIS REPORT FOR ALL GEOTECHNICAL REQUIREMENTS AND ANTICIPATED CONDITIONS BELOW GRADE.

COLUMN DOWELS SHALL BE INSTALLED WITH A TEMPLATE TO HOLD BARS IN THE PROPER POSITION AND SHALL BE PLACED WITH A TOLERANCE OF $\pm 1/4$ INCH.

MAT FOUNDATION AND SPREAD FOOTINGS: DESIGN SOIL BEARING PRESSURE = 3,500 PSF (SPREAD FOOTINGS BEARING ON AT LEAST 4 FEET OF COMPACTED STRUCTURAL FILL, NATURAL CLAYEY GRAVEL OR BEDROCK); 5,000 PSF (SPREAD FOOTINGS BEARING ENTIRELY ON BEDROCK); VARIABLE UP TO 8,500 PSF (MAT FOUNDATIONS). ALL FOOTINGS SHALL BEAR ON SUITABLE UNDISTURBED SOIL, BEDROCK, AND/OR PREPARED BASE MATERIALS APPROVED BY THE GEOTECHNICAL ENGINEER. WHERE SUITABLE UNDISTURBED SOILS ARE NOT FOUND AT THE SPECIFIED FOOTING ELEVATION, OVER-EXCAVATE TO THE DEPTHS REQUIRED BY THE GEOTECHNICAL ENGINEER AND REPLACE MATERIALS WITH STRUCTURAL FILL, LEAN CONCRETE, OR PROVIDE OTHER PREPARATION AS DIRECTED BY THE GEOTECHNICAL ENGINEER TO ACHIEVE THE REQUIRED BEARING CAPACITY.

STRUCTURAL FILL

ALL FILL PLACED TO SUPPORT SLABS ON GRADE, BEHIND PERMANENT WALLS, AND AROUND ALL DRAINS SHALL CONSIST OF WELL GRADED, GRANULAR MATERIAL PER THE SPECIFICATIONS. SOILS FOR STRUCTURAL FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER. STRUCTURAL FILL SHALL BE PLACED ON SOUND NATIVE MATERIAL. PROOF-ROLL CUT AREAS WHICH PROVIDE SUPPORT FOR PERMANENT STRUCTURES. AREAS WHICH ARE EXCESSIVELY YIELDING, AS DETERMINED BY THE CONTINUOUS OBSERVATION OF THE GEOTECHNICAL ENGINEER, SHALL BE OVER-EXCAVATED AND REPLACED WITH STRUCTURAL FILL. STRUCTURAL FILL SHALL BE PLACED PER THE SPECIFICATION.

LATERAL PRESSURE ON SUBGRADE WALLS

THE DESIGN PRESSURES FOR SUBGRADE WALLS ARE BASED ON A "DRAINED" CONDITION. SEE CIVIL AND MECHANICAL DRAWINGS FOR SUBGRADE DRAINAGE SYSTEM. SEE GEOTECHNICAL REPORT FOR COMPACTION REQUIREMENTS AT SUBGRADE WALLS. SUBGRADE WALLS AND SUPPORTING SLABS SHALL HAVE ATTAINED THEIR FULL CONCRETE STRENGTH BEFORE PLACING ANY BACKFILL. THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACES FOR WALLS IF BACKFILL IS PLACED BEFORE WALLS AND SLABS ACHIEVE FULL CONCRETE STRENGTH.

BACKFILLED, RESTRAINED BASEMENT WALLS ARE DESIGNED USING AN "APPARENT" EARTH PRESSURE AS SHOWN IN THE LOAD MAPS.

CONCRETE

MIXING, BATCHING, TRANSPORTING, PLACING, AND CURING OF ALL CONCRETE, AND SELECTION OF CONCRETE MATERIALS, SHALL CONFORM TO ACI 301. SPECIFICATIONS FOR STRUCTURAL CONCRETE, EXCEPT AS NOTED BELOW. PROPORTIONS OF AGGREGATE TO CEMENTITIOUS PASTE SHALL BE SUCH AS TO PRODUCE A DENSE, WORKABLE MIX THAT CAN BE PLACED WITHOUT SEGREGATION OR EXCESS FREE SURFACE WATER.

MIX DESIGNS LISTED BELOW SHALL BE SUBMITTED TO THE ARCHITECT AND APPROVED PRIOR TO USE. SELECTION OF CONCRETE MIX PROPORTIONS SHALL BE IN ACCORDANCE WITH ACI 301. MIX PROPORTIONS SHALL MEET OR EXCEED THE REQUIREMENTS LISTED BELOW FOR THE LOCATIONS NOTED. THE MORE STRINGENT OF THE REQUIREMENTS LISTED SHALL GOVERN.

PROVIDE ASTM C150 (TYPE I OR TYPE II) OR ASTM C595 (TYPE II, IS, IP, OR IT) CEMENT UNLESS NOTED OTHERWISE. THE CEMENTITIOUS MATERIAL CONTENT SHALL BE ADEQUATE FOR THE SPECIFIED REQUIREMENTS FOR STRENGTH, WATER-CEMENT RATIO, DURABILITY, AND FINISH ABILITY.

MAXIMUM COMPLEMENTARY CEMENTING MATERIALS (EX. FLY ASH, SLAG, SILICA FUME) AS A PERCENTAGE OF TOTAL WEIGHT OF CEMENTITIOUS MATERIAL SHALL BE 50 PERCENT. FLY ASH SHALL MEET ASTM C618 REQUIREMENTS, AND SHALL NOT EXCEED 30 PERCENT OF TOTAL CEMENTITIOUS MATERIAL. WATER-CEMENT RATIO SHALL BE BASED ON TOTAL CEMENTITIOUS MATERIAL, INCLUDING COMPLEMENTARY CEMENTING MATERIALS. MAXIMUM SIZE OF AGGREGATE SHALL BE AS LISTED BELOW.

ALL CONCRETE USED IN HORIZONTAL SURFACES EXPOSED TO THE WEATHER SHALL CONTAIN AN ACCEPTABLE ADMIXTURE TO PRODUCE AIR-ENTRAINED CONCRETE WITH TOTAL AIR CONTENT AS NOTED IN THE CONCRETE MIX SPECIFICATION TABLE. TOLERANCE FOR AIR CONTENT SHALL BE ± 1.5 PERCENT. AIR CONTENT SHALL BE MEASURED AT THE DISCHARGE OF THE TRUCK. IF CONCRETE IS PUMPED, AIR CONTENT SHALL BE MEASURED AT THE DISCHARGE END OF THE PUMP LINE. TESTS FOR AIR CONTENT SHALL MEET ASTM C172 REQUIREMENTS.

THE CONTRACTOR SHALL DETERMINE SLUMP. EACH CONCRETE MIX SUBMITTED SHALL HAVE THE SLUMP SPECIFIED. SLUMP SHALL BE MEASURED AT THE DISCHARGE OF THE TRUCK. IF CONCRETE IS PUMPED, SLUMP SHALL BE MEASURED AT THE DISCHARGE END OF THE PUMP LINE. SLUMPS SHALL BE WITHIN ± 1 INCH AND ± 2 INCHES OF THE SPECIFIED SLUMP.

THE USE OF SUPER PLASTICIZERS AND WATER REDUCERS IS ALLOWED, BUT NOT REQUIRED. ALL ADMIXTURES SHALL BE CHLORIDE-FREE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

LOCATION	f_c MIN (PSI)	TEST AGE (DAYS)	MAX W/C RATIO	MAX AGGREGATE SIZE	AIR CONTENT PERCENT
MISCELLANEOUS CONCRETE, CURBS, SIDEWALKS	4,000	28	0.50	1"	4.5
EXTERIOR EXPOSED SLABS ON GRADE	4,000	28	0.45	1"	4.5
INTERIOR SLABS ON GRADE	4,000	28	0.50	1"	-
MAT FOUNDATIONS, SPREAD FOOTINGS	6,000	56	0.44	1"	-
BASEMENT WALLS	6,000	56	0.44	3/4"	-
CONCRETE ON STEEL DECK	4,000	28	0.44	3/4"	-
MILD REINFORCED BEAMS AND SLABS	6,000	28	0.44	3/4"	-
EXTERIOR EXPOSED POST-TENSIONED BEAMS AND SLABS	6,000	28	0.40	3/4"	5.0
INTERIOR POST-TENSIONED BEAMS AND SLABS	6,000	28	0.40	3/4"	-
COLUMNS	PER COL SCHED	56	0.44	3/4"	-
SHEAR WALLS	PER WALL ELEV	56	0.44	3/4"	-

SHOTCRETE

STRUCTURAL SHOTCRETE MAY BE USED FOR WALLS IN LIEU OF CAST-IN-PLACE CONCRETE. SHOTCRETE SHALL CONFORM STRICTLY TO THE REQUIREMENTS OF THE BUILDING CODE, SECTION 1908. NON-CONTRACT LAP SPLICES SHALL BE DETAILED IN ACCORDANCE WITH THE CODE AND SUBMITTED ON SHOP DRAWINGS IN ACCORDANCE WITH THE SPECIFICATIONS. TEST PANELS ARE REQUIRED FOR HEAVILY REINFORCED AREAS SUCH AS PILASTERS, WALL COLUMNS, ETC. THE CONTRACTOR SHALL SUBMIT PROPOSED LOCATIONS FOR SHOTCRETING.

MASSIVE CONCRETE

CONCRETE PLACED IN MONOLITHIC PLACEMENTS WHERE THE MINIMUM OF ALL THREE DIMENSIONS EXCEEDS 4'-0" SHALL BE CONSIDERED "MASSIVE CONCRETE" AND SHALL BE SUBJECT TO THE APPLICABLE REQUIREMENTS OF ACI 301, CHAPTER 8.

ASTM C150 TYPE III CEMENT IS PROHIBITED. UNLESS OTHERWISE SPECIFIED, USE MODERATE OR LOW HEAT OF HYDRATION CEMENT, BLENDED HYDRAULIC CEMENT WITH MODERATE OR LOW HEAT OF HYDRATION PROPERTIES, OR PORTLAND CEMENT WITH FLY ASH, POZZOLAN, OR GROUND-GRANULATED BLAST-FURNACE SLAG. ADDITIVES CONTAINING CALCIUM CHLORIDE ARE PROHIBITED. APPROVED RETARDING, RETARDING HIGH-RANGE WATER REDUCING, OR RETARDING PLASTICIZING ADMIXTURE SHALL BE USED.

THE TEMPERATURE OF CONCRETE AT TIME OF PLACEMENT SHALL NOT EXCEED 95 DEGREES FAHRENHEIT. THE MAXIMUM INTERNAL TEMPERATURE DURING CURING SHALL NOT EXCEED 160 DEGREES FAHRENHEIT. THE MAXIMUM TEMPERATURE DIFFERENCE BETWEEN CENTER AND SURFACE OF PLACEMENT SHALL NOT EXCEED 50 DEGREES FAHRENHEIT. CONFORM TO THE REQUIREMENTS OF ACI 306.1 AND ACI 306.1 FOR HOT-WEATHER AND COLD-WEATHER CONCRETING, RESPECTIVELY. IF COOLING METHODS ARE EMPLOYED, THEY SHALL NOT INCREASE THE WATER-CEMENT RATIO OR SLUMP BEYOND ALLOWABLE LIMITS. THE CONCRETE SHALL BE COOLED GRADUALLY SO THAT THE SURFACE TEMPERATURE DROP DOES NOT EXCEED 20 DEGREES FAHRENHEIT IN ANY 24-HOUR PERIOD AFTER PLACEMENT.

SUBMIT DETAILED PROCEDURES, MATERIALS, MIX DESIGNS, AND TEST RESULTS INCLUDING HEAT OF HYDRATION TEST DATA PER ASTM C1702 TO THE ENGINEER BEFORE CONSTRUCTION OF MASSIVE CONCRETE.

REINFORCING STEEL

ALL REINFORCING SHALL BE NEW BILLET STOCK ASTM A615, GRADE 60, UNLESS NOTED OTHERWISE. REINFORCING REQUIRED TO BE EPOXY COATED SHALL BE ASTM A775, GRADE 60, UNLESS NOTED OTHERWISE. BARS SHALL BE SECURELY TIED IN PLACE WITH #16 GAGE MINIMUM ANNEALED BLACK WIRE. EPOXY COATED REINFORCING BARS SHALL BE FASTENED WITH NYLON-, EPOXY-, OR PLASTIC-COATED TIE WIRE OR OTHER ACCEPTABLE MATERIALS. BARS SHALL BE SUPPORTED ON CHAIRS IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE. THE CONTRACTOR SHALL COORDINATE REINFORCING STEEL PLACEMENT DETAILS AND PROVIDE TEMPLATES FOR PLACING STEEL. IN CONGESTED AREAS AS NECESSARY, SHOP DRAWINGS (INCLUDING PLACING PLANS AND ELEVATIONS) SHALL BE SUBMITTED TO, AND REVIEWED BY, THE ARCHITECT/ENGINEER BEFORE STARTING FABRICATION.

REINFORCING BARS SHALL BE LAP SPLICED FOR TENSION (LSB) UNLESS NOTED OTHERWISE ON THE DRAWINGS. #14 AND #18 BARS SHALL BE SPLICED USING MECHANICAL COUPLINGS INCLUDING SPLICES WITH SMALLER BARS. #14 AND #18 BARS SHALL NOT BE LAP SPLICED. AT THE CONTRACTOR'S OPTION, MECHANICAL COUPLINGS MAY BE USED FOR ANY BAR SIZE, PROVIDED A CURRENT ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT DEMONSTRATES THAT THE PRODUCT CAN ACHIEVE A MINIMUM TENSILE STRENGTH OF 125 PERCENT OF THE SPECIFIED YIELD STRENGTH OF THE BAR. NO REINFORCING BARS SHALL BE SPLICED BY WELDING. FOR REINFORCING WITHIN SHEAR WALLS, AND REINFORCING THAT CONNECTS THE SLABS TO THE SHEAR WALLS, MECHANICAL SPLICES MAY BE USED IF THE MECHANICAL SPLICE STRENGTH IS INCREASED TO DEVELOP 100 PERCENT OF THE SPECIFIED TENSILE STRENGTH OF THE SPLICED BAR. SPLICE DEVICES SHALL HAVE A CURRENT ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT THAT SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. HEADED BARS OR TERMINATORS SHALL BE PROVIDED WHERE INDICATED ON THE DRAWINGS OR AT THE CONTRACTOR'S OPTION FOR CONGESTED AREAS OF REINFORCEMENT ANCHORAGE SUBJECT TO THE ENGINEER'S APPROVAL. HEADED BARS OR TERMINATORS SHALL MEET THE REQUIREMENTS OF ACI 318 AND ASTM A970, AND HAVE A CURRENT ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT.

WELDING OR TACK WELDING OF REINFORCING BARS TO OTHER BARS OR TO PLATES, ANGLES, ETC. IS PROHIBITED, EXCEPT WHERE SPECIFICALLY APPROVED BY THE ENGINEER. WHERE WELDING IS APPROVED, IT SHALL BE DONE BY AWS CERTIFIED WELDERS USING E9018 OR APPROVED ELECTRODES. WELDING PROCEDURES SHALL CONFORM TO THE REQUIREMENTS OF AWS D1.4.

MINIMUM CAST-IN-PLACE CONCRETE COVER OVER REINFORCING STEEL, UNLESS NOTED OTHERWISE, SHALL BE AS FOLLOWS:

- CONCRETE CAST AGAINST EARTH:

ALL BAR SIZES: 3 INCHES
- CONCRETE EXPOSED TO EARTH OR WEATHER:

#6 BAR OR LARGER: 2 INCHES
#6 BAR OR SMALLER: 1 1/2 INCHES
- OTHER CONCRETE:

SLABS:
#14 AND #18 BARS: 1-1/2 INCHES
#11 BARS AND SMALLER:
TOP BARS: 3/4 INCH
BOTTOM BARS: 1 INCH

WALLS:
#14 AND #18 BARS: 1-1/2 INCHES
#11 BARS AND SMALLER: 1 INCH

BEAMS AND COLUMNS - TIES, STIRRUPS, SPIRALS:
ALL BAR SIZES: 1-1/2 INCHES

SPECIFIED CONCRETE COVER SHALL BE MAINTAINED TO ALL REINFORCEMENT AT CONCRETE REVEALS AND INSETS. SHOP DRAWINGS SHOWING CONCRETE REVEALS AND OTHER INSETS SHALL BE SUBMITTED FOR REVIEW.

SPECIAL DUCTILE QUALITY REINFORCING STEEL

VERTICAL REINFORCING IN COLUMNS AND SHEAR WALLS, LONGITUDINAL AND DIAGONAL REINFORCING IN COLUMN BEAMS, AND ALL OTHER REINFORCING MARKED "SDQ" SHALL BE LOW-ALLOY STEEL, DEFORMED ASTM A615, BILLET STEEL, ASTM A615, GRADE 60. REINFORCEMENT MAY BE USED IN THESE MEMBERS IF (1) THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS DOES NOT EXCEED THE SPECIFIED YIELD STRENGTH BY MORE THAN 18,000 PSI AND (2) THE RATIO OF THE ACTUAL ULTIMATE TENSILE STRENGTH TO THE ACTUAL TENSILE YIELD STRENGTH IS NOT LESS THAN 1.25. IF MILL REPORTS ARE NOT AVAILABLE, THE REINFORCING SHALL BE TESTED PER THE SPECIFICATIONS AT THE CONTRACTOR'S EXPENSE. (3) MINIMUM ELONGATION IN 8-INCH SHALL BE AT LEAST 14 PERCENT FOR BAR SIZES NO. 3 THROUGH 6, AT LEAST 12 PERCENT FOR BAR SIZES NO. 7 THROUGH 11, AND AT LEAST 10 PERCENT FOR BAR SIZES NO. 14 AND 18.

WELDED WIRE REINFORCEMENT

WELDED WIRE REINFORCEMENT (WWR) SHALL BE ELECTRICALLY WELDED AND CONFORM TO ASTM A1064. LAP EDGES AND ENDS OF REINFORCEMENT A MINIMUM OF ONE MESH SPACING PLUS 2 INCHES, BUT NOT LESS THAN 6 INCHES. WELDED WIRE REINFORCEMENT SHALL BE SUPPORTED ON CHAIRS IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.

POST-TENSIONED PRESTRESSED CONCRETE

POST-TENSIONING SHOP DRAWINGS, INCLUDING PLANS AND DETAILS, SHALL BE SUBMITTED TO AND REVIEWED BY THE ARCHITECT BEFORE STARTING FABRICATION.

IN ADDITION TO THE REQUIREMENTS IN THE CONCRETE MIX SPECIFICATION TABLE NOTED ABOVE, ALL POST-TENSIONED CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 2,000 PSI AT TIME OF INITIAL STRESSING. THE CONTRACTOR SHALL SUBSTANTIATE CONCRETE STRENGTH BEFORE POST-TENSIONING.

POST-TENSIONING REINFORCEMENT SHALL BE 1/2--INCH-DIAMETER, UNBONDED, LOW RELAXATION, 270--KSI HIGH-TENSILE WIRE STRAND CONFORMING TO ASTM A416.

POST-TENSIONING TENDONS SHALL BE ENCASED IN WATERPROOF POLYETHYLENE PLASTIC SHEATHING OF 50 MILS MINIMUM THICKNESS. SHEATHINGS SHALL BE OF SUFFICIENT STRENGTH TO PREVENT UNREPAIRABLE DAMAGE DURING FABRICATION, TRANSPORTATION, INSTALLATION, STORAGE, CONCRETE PLACEMENT, AND TENSIONING. AN ENCAPSULATED TENDON SYSTEM SHALL BE USED AT ALL LOCATIONS.

THE MINIMUM NUMBER OF TENDONS REQUIRED FOR INSTALLATION IS SHOWN ON THE DRAWINGS AND IS BASED ON AN ANCHOR EFFECTIVE PRESTRESS FORCE OF 26.8 KIPS PER TENDON. IF THE MINIMUM FINAL EFFECTIVE PRESTRESS FORCE, CONSIDERING ALL LOSSES NOTED BELOW, IS LESS THAN 26.8 KIPS AT ANY LOCATION ALONG THE TENDON LENGTH, THE CONTRACTOR SHALL PROVIDE ADDITIONAL TENDONS. TENDONS SHALL BE INSTALLED WITH A PARABOLIC DRAPE UNLESS NOTED OTHERWISE AND HELD IN THEIR DESIGNED POSITIONS AS SHOWN ON THE DRAWINGS. A MINIMUM OF TWO TENDONS SHALL PASS THROUGH EACH COLUMN IN EACH DIRECTION AT SLABS WITHOUT BEAMS. DISTRIBUTED TENDONS MAY BE GROUPED WHILE PROVIDING THE SAME TOTAL COUNT, ALTHOUGH SPACING BETWEEN SUCH GROUPS SHALL NOT EXCEED 5 FEET NOR EIGHT TIMES THE SLAB THICKNESS. TENDON DEAD END AND ANCHOR TENDON ENDS SHALL BE PROVIDED TO REPRESENT POTENTIAL POST-TENSIONING DIRECTION. AT THE CONTRACTOR'S OPTION BUT SUBJECT TO THE ENGINEER'S APPROVAL, LIVE ENDS MAY BE SWITCHED OR ALTERNATED, DOUBLE-END TENSIONING MAY BE USED, AND INTERMEDIATE TENSIONING MAY BE USED. THE FINAL POST-TENSIONING DIRECTION AND SEQUENCE SHALL BE SELECTED BY THE CONTRACTOR TO ACHIEVE THE REQUIRED MINIMUM EFFECTIVE PRESTRESS FORCE, BUT IS SUBJECT TO THE ENGINEER'S FINAL APPROVAL.

THE POST-TENSIONED SLABS ARE DESIGNED BASED ON TENDONS BEING CONTINUOUS BETWEEN EDGES OF SLABS AS SHOWN ON THE DRAWINGS. ANY ADDITIONAL INTERMEDIATE TENSIONING JOINTS OR CLOSURE REQUIRED BY THE CONTRACTOR MAY REQUIRE ADDITIONAL REINFORCEMENT AND SHALL BE SUBMITTED AND REVIEWED BY THE STRUCTURAL ENGINEER BEFORE STARTING CONSTRUCTION.

THE CONTRACTOR SHALL PROVIDE THE FOLLOWING INFORMATION STAMPED BY AN ENGINEER LICENSED TO PERFORM THE WORK IN THE JURISDICTION WHERE THE PROJECT IS LOCATED: (1) THE DETAILED DESIGN OF TENDON END ANCHORAGES; (2) THE CALCULATION OF STRESS LOSSES DUE TO CREEP, SHRINKAGE, TENDON RELAXATION, ANCHORAGE SLIP, WOBBLE FRICTION, AND FRICTION DUE TO VERTICAL AND HORIZONTAL TENDON CURVATURE; (3) POST-TENSIONING SHOP DRAWINGS. THIS INFORMATION SHALL CONFORM TO ACI 318.

NO CONCRETE SHALL BE PLACED UNTIL THE POST-TENSIONING TENDONS AND REINFORCEMENT LOCATION HAVE BEEN INSPECTED AND APPROVED BY THE TESTING AGENCY. CONTINUOUS INSPECTION AND RECORDING OF ELONGATION IS REQUIRED DURING ALL STRESSING OPERATIONS. DO NOT CUT TENDON ENDS UNTIL THE ENTIRE SLAB HAS BEEN SATISFACTORILY STRESSED AND THE ENGINEER HAS REVIEWED ELONGATIONS.

WHERE REQUIRED BY OWNER, THE POSITION OF TENDONS SHALL BE MARKED ON THE FORMS IMMEDIATELY BEFORE NEW CONCRETE IS PLACED WITH A MATERIAL WHICH LEAVES A PHYSICAL IMPRESSION ON THE UNDERSIDE OF THE SLAB.

DRILLED-IN CONCRETE ANCHORS AND POWER-DRIVEN FASTENERS SHALL BE PLACED A MINIMUM DISTANCE EQUAL TO THE SLAB THICKNESS AWAY FROM TENDON LOCATIONS AND FOUR TIMES THE SLAB THICKNESS FROM THE FACE OF ANY COLUMN. WHERE TENDON MARKING IS NOT SUCCESSFUL, TENDONS SHALL BE LOCATED BY SLAB SCANNING PRIOR TO ANCHOR INSTALLATION. EXCEPTION: POWDER ACTUATED FASTENERS WITH EMBEDMENT OF 5/8 INCH OR LESS MAY BE INSTALLED AT ANY LOCATION ON THE SLAB. NO REBAR OR POST-TENSIONING TENDONS SHALL BE DAMAGED BY ANCHORS AND FASTENERS.

FORM CAMBER

IN ADDITION TO ANY CAMBER NOTED IN THE STRUCTURAL DRAWINGS, CONCRETE FORMWORK SHALL BE CAMBERED TO COMPENSATE FOR FORM SAG UNDER WET CONCRETE LOAD. CAMBERS OF LESS THAN 1/8 INCH MAY BE NEGLECTED.

PRECAST CONCRETE

REFER TO ARCHITECTURAL DRAWINGS FOR FINISH REQUIREMENTS, REVEALS, OPENINGS, DETAILS, AND DIMENSIONS NOT SHOWN. HORIZONTAL PRECAST MEMBERS SHALL BE CAST, STRESSED, TRANSPORTED, AND ERECTED IN A HORIZONTAL, UPRIGHT POSITION. SUPPORTS DURING TRANSPORTATION AND ERECTION SHALL APPROXIMATE THOSE IN THE FINAL STRUCTURE. WHERE RECOMMENDED, THE CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL REINFORCING (STEEL STIFFENERS, BRACING, LIFTING INSERTS, ETC.) TO RESIST ERECTION AND TRANSPORTATION STRESSES. LIFTING INSERTS SHALL BE INSTALLED AT LOCATIONS WHERE THEY WILL BE HIDDEN BY CONSTRUCTION OR OTHERWISE COVERED. FINISH ALL PANELS WHICH WILL BE COVERED WITH TOPPING SLABS WITH ROUGH SPEED FINISH TO ENSURE BONDING OF THE APPLIED CONCRETE. SUBMIT DETAILED SHOP DRAWINGS OF ALL PRECAST CONCRETE WORK TO THE ARCHITECT FOR REVIEW BEFORE STARTING FABRICATION.

ALL PRECAST CONCRETE CONNECTIONS (PLATES, ANGLES, ETC) SHALL BE GALVANIZED STEEL. REMOVE GALVANIZING WHERE FIELD WELDING IS REQUIRED, AND PAINT FIELD WELDS WITH ONE COAT OF "GALVA-GON" OR APPROVED EQUAL. SEE SHEAR STUD CONNECTORS NOTE FOR STUDS WELDED TO CONNECTIONS. FIELD WELDING SHALL BE DONE BY AWS-CERTIFIED WELDERS IN ACCORDANCE WITH AWS D1.1.

CONSTRUCTION JOINTS

ALL CONSTRUCTION JOINTS IN SLABS, BEAMS, AND WALLS SHALL BE KEYED IN ACCORDANCE WITH THE TYPICAL DETAILS OR, AT THE CONTRACTOR'S OPTION, SHALL BE INTENTIONALLY ROUGHENED IN ACCORDANCE WITH THE FOLLOWINGS: THE SURFACE OF ROUGHENED JOINTS SHALL BE SAND BLASTED OR ROUGHENED WITH A CHIPPING HAMMER TO EXPOSE THE AGGREGATE EMBEDDED IN THE PREVIOUS POUR. THE EXPOSED AGGREGATE SHALL PROTRUDE A MINIMUM OF 1/4 INCH. ALL SURFACES OF CONSTRUCTION JOINTS SHALL BE CLEANED AND LAITANCE REMOVED. IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED.

VERTICAL CONSTRUCTION JOINTS IN WALLS SHALL BE HELD TO A MAXIMUM SPACING OF 40'-0".

ALL CONSTRUCTION JOINTS FOR BEAMS AND SLABS SHALL BE IN ACCORDANCE WITH THE TYPICAL DETAILS. BEAMS AND SLABS HAVE BEEN DESIGNED ASSUMING ANY CONSTRUCTION JOINTS ARE LOCATED IN THE MIDDLE THIRD OF THE SPAN.

ALL CONSTRUCTION JOINTS IN SLABS ON STEEL DECK SHALL BE IN ACCORDANCE WITH THE TYPICAL DETAILS. STEEL BEAMS AND GIRDERS HAVE BEEN DESIGNED ASSUMING THE CONSTRUCTION JOINTS ARE LOCATED IN THE MIDDLE THIRD OF THE BEAM, GIRDER, OR SLAB SPAN.

ALL CONSTRUCTION JOINTS IN SLABS, BEAMS, AND WALLS SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW BEFORE STARTING CONSTRUCTION. PROVIDE JOINTS AT LOCATIONS SPECIFICALLY NOTED ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.

SLEEVES

EXCEPT AS DETAILED ON STRUCTURAL DRAWINGS, NO CONCRETE FOOTINGS, BEAMS, OR GIRDERS SHALL BE SLEEVED FOR PIPING OR DUCTS, UNLESS APPROVED BY THE ENGINEER.

ANCHORAGE TO HARDENED CONCRETE

ANCHORAGE TO HARDENED CONCRETE SHALL INCLUDE MECHANICAL AND ADHESIVE ANCHORS OF SIZE, NUMBER, AND SPACING AS SHOWN ON THE DRAWINGS. HOLES SHALL BE DRILLED AND CLEANED AND ANCHORS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTRUCTIONS AND AN APPROVED ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT. INSPECTION AND TESTING SHALL BE PROVIDED IN ACCORDANCE WITH THE GENERAL NOTES AND THE APPROVED ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT.

WHERE THE ANCHOR TYPE IS SPECIFIED ON THE DRAWINGS, SUBSTITUTION FOR A DIFFERENT TYPE OF ANCHORAGE (INCLUDING SUBSTITUTING FOR CAST-IN-PLACE ANCHORAGE) SHALL NOT BE PERMITTED WITHOUT PRIOR CONSENT OF THE ENGINEER.

WHEN EMBEDMENT IS NOTED ON THE DRAWINGS, THE ANCHOR EFFECTIVE EMBEDMENT DEPTH SHALL EQUAL OR EXCEED THE NOTED EMBEDMENT DEPTH