

## REINFORCED CONCRETE

CONCRETE DESIGN HAS BEEN PERFORMED IN ACCORDANCE WITH ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.

CONCRETE CONSTRUCTION TECHNIQUES SHALL CONFORM TO THE 'SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS' (ACI 301).

WHEN APPLICABLE, CONTRACTOR SHALL SUBMIT PROPOSED MIX DESIGNS, WITH HISTORICAL STRENGTH DATA FOR EACH SEPARATE MIX PRIOR TO CONCRETE PLACEMENT.

CONCRETE SHALL COMPLY WITH ALL THE REQUIREMENTS OF ACI 301 AND ASTM C-94 FOR MEASURING, MIXING, TRANSPORTING, ETC.

THE OWNER SHALL CONTRACT AN INDEPENDENT TESTING LABORATORY TO PERFORM CONCRETE CYLINDER TESTS AS FOLLOWS. FOUR CYLINDER TESTS FOR ANY 50 CUBIC YARDS OF CONCRETE POURED, OR THREE CYLINDER TEST PER ANY DAYS FOUR LESS THAN 50 CUBIC YARDS. ONE CYLINDER SHALL BE TESTED AT 7 DAYS AND TWO AT 28 DAYS.

CONCRETE TICKETS SHALL BE TIME STAMPED WHEN CONCRETE IS BATCHED. THE MAXIMUM TIME ALLOWED FROM WHEN WATER IS ADDED TO THE MIX UNTIL IT IS DEPOSITED IN ITS FINAL POSITION SHALL NOT EXCEED 90 MINUTES. IF FOR ANY REASON THERE IS A DELAY SUCH THAT A BATCH IS HELD FOR LONGER THAN 90 MINUTES, THE CONCRETE SHALL NOT BE PLACED.

IT SHALL BE THE RESPONSIBILITY OF THE TESTING LABORATORY TO NOTIFY THE OWNERS REPRESENTATIVE AND THE CONTRACTOR OF ANY NONCOMPLIANCE WITH THE ABOVE.

CALCIUM CHLORIDES SHALL NOT BE UTILIZED IN THE WORK.

OTHER ADMIXTURES MAY BE USED ONLY WITH THE APPROVAL OF THE ENGINEER.

NORMAL WEIGHT CONCRETE (145 Pcf) 28-DAY COMPRESSIVE STRENGTH:	3000 PSI
FOUNDATIONS:	3000 PSI
SLAB ON GRADE:	3000 PSI
COLUMNS, BEAMS, AND ELEVATED SLABS:	3000 PSI
CONCRETE IN BRACKISH ENVIRONMENTS:	5000 PSI WITH .40 WC RATIO

CONCRETE SLUMP SHALL BE AS FOLLOWS:

SLUMP IN INCHES	MIN	MAX
MASSIVE SECTIONS, PAVEMENTS, AND SLABS	1 1/2	4
HEAVY SLABS, BEAMS, WALLS	3	5
THIN WALLS, COLUMNS,	3 1/2	6

ADEQUATE VERTICAL AND HORIZONTAL SHORING SHALL BE PROVIDED TO SAFELY SUPPORT ALL CONSTRUCTION LOADS.

CONCRETE BEAM SIZES MAY BE INCREASED AS REQUIRED FOR ARCHITECTURAL DETAILS OR TO FIT BLOCK COURSING

PROVIDE 1/4 IN CHAMFER FOR ALL EXPOSED CORNERS.

## FORMWORK AND SHORING:

NO STRUCTURAL CONCRETE SHALL BE STRIPPED UNTIL IT HAS REACHED AT LEAST TWO-THIRDS OF THE 28 DAY DESIGN STRENGTH.

FORMWORK, SHORING, AND BRACING FOR ALL CONCRETE BEAMS, SLABS, COLUMNS, WALLS, AND FOOTINGS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ACI STANDARDS 347 AND 301 AND STATE AND LOCAL BUILDING CODES AND SHALL BE DESIGNED BY A REGISTERED ENGINEER.

## REINFORCING STEEL:

REBAR SHALL BE ASTM A615 GRADE 60 DEFORMED BARS, FREE FROM OIL, SCALE, AND RUST AND PLACED IN ACCORDANCE WITH THE TYPICAL BENDING DIAGRAM AND PLACING DETAILS OF THE ACI STANDARDS AND SPECIFICATIONS.

CONTRACTOR SHALL SUBMIT REBAR SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION.

REINFORCING SHALL BE ACCURATELY PLACED, RIGIDLY SUPPORTED AND FIRMLY TIED IN PLACE, WITH APPROPRIATE BAR SUPPORTS AND SPACERS.

DETAILS OF CONCRETE REINFORCEMENT SHALL BE IN ACCORDANCE WITH THE MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE CONSTRUCTION AS PUBLISHED BY THE CONCRETE REINFORCING STEEL INSTITUTE UNLESS OTHERWISE INDICATED.

PLACING DRAWINGS AND BAR LISTS SHALL CONFORM TO A.C.I.'S 'MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES.' (ACI 315)

LAP CONTINUOUS REINFORCING 48 BAR DIA.

LAP BOTTOM STEEL OVER SUPPORTS AND TOP STEEL AT MIDSPAN (U.O.N.).

HOOK DISCONTINUOUS ENDS OF TOP BARS AND ALL BARS IN WALLS (U.O.N.).

PROVIDE COVER OVER REINFORCING AS FOLLOWS:

ELEMENTS	BOT	TOP	SIDES
FOOTINGS AND PILE CAPS	3"	2"	3"
GRADE BEAMS WITH SIDES FORMED	3"	2"	2" +
BEAMS ABOVE GRADE	1 1/2"	1 1/2"	1 1/2"
COLUMNS	-	-	1 1/2"
SLABS ON GRADE	2"	1"	2"
SLABS ABOVE GRADE	-	1"	1"
SLABS EXP. TO WEATHER (#5)	1 1/2"	1 1/2"	1 1/2"
SLABS EXP. TO WEATHER (LARGER)	2"	2"	2"
WALLS RETAINING FILL	-	-	2"
WALLS ABOVE GRADE	-	-	1"
CONCRETE CAST AGAINST EARTH	3"	3"	3"

\*IF GRADE BEAM SIDES ARE UNFORMED, EXCAVATE 2" WIDER (1" EACH SIDE) THAN SPECIFIED AND INCREASE COVER TO 3". HORIZONTAL AND VERTICAL BARS SHALL LAP 6 X BAR NO., SEE LAP SPLICE SCHEDULE.

UNSCHEDULED FIELD LAPS ARE SUBJECT TO ENGINEER REVIEW.

TENSION LAP SPLICE SCHEDULE:

BAR NO.	SPACE LENGTH (4000 PSI)	OTHER THAN TOP BARS	TOP BARS
3	--	16"	21"
4	24"	22"	28"
5	30"	27"	33"
6	36"	35"	41"
7	42"	48"	63"

PROVIDE 3 X 3 CORNER BARS LAPPED AND TIED TO EACH BEAM REBAR, TYPICAL AT ALL CORNERS. THESE CORNER BARS SHALL BE THE SAME SIZE AS LONGITUDINAL BEAM BARS. SEE DETAILS FOR ADDITIONAL INFORMATION.

REINFORCEMENT SHALL BE CAREFULLY PLACED, RIGIDLY SUPPORTED AND WELL TIED WITH BAR SUPPORTS AND SPACERS.

REINFORCING STEEL IN FOOTINGS SHALL BE ASSEMBLED AS MATS WITH BARS EQUALLY SPACED AND WIRED TOGETHER AT EACH INTERSECTION BEFORE CONCRETE IS PLACED.

DOWEL COLUMN AND WALL REINFORCING TO FOOTING WITH SAME SIZE AND NUMBER OF DOWELS AS VERTICAL BARS ABOVE.

DOWELS SHALL BE HOOKED 1" AT BOTTOM AND SHALL BE LAPPED 36 BAR DIAMETER WITH THE COLUMN OR WALL REINFORCING ABOVE.

PROVIDE THE FOLLOWING TEMPERATURE REINFORCING FOR ONE-WAY SLABS, U.O.N.

SLAB THICKNESS REINFORCING	
3 1/2" - 4 1/4"	#3 @ 12" O.C.
4 1/2" - 6 1/2"	#4 @ 18" O.C.
7" - 7 1/2"	#4 @ 15" O.C.
8" 9"	#4 @ 12" O.C.

UTILITIES SHALL NOT PENETRATE BEAMS OR COLUMNS BUT MAY PASS THROUGH SLABS AND WALLS INDIVIDUALLY, U.O.N.

FOR OPENINGS 24" WIDE OR LESS, ADD (1) #5 X 6 MID DEPTH DIAGONAL AT ALL FOUR CORNERS.

FOR OPENINGS BETWEEN 12" AND 24" WIDE, CUT REINFORCING AND REPLACE ALONGSIDE OPENING WITH SPLICE BARS OF EQUIVALENT AREA WITH 48 BAR DIA. LAP.

PREPARE AND SUBMIT SHOP DRAWINGS FOR OPENINGS WIDER THAN 24".

WHERE REINFORCING STEEL CONGESTION PERMITS, CONDUIT AND PIPES UP TO 1" DIAMETER MAY BE EMBEDDED IN CONCRETE. PER ACI 318, SECTION 6.3, SPACE AT 3" DIAMETERS O.C. PLACE BETWEEN OUTER LAYERS OF REINFORCING.

IF CONDUITS ARE SIGNIFICANTLY CONGESTED, ADDITIONAL REINFORCING PERPENDICULAR TO PIPING MAY BE REQUIRED. REQUESTS TO EMBED LARGER PIPES SHOULD BE ACCOMPANIED BY A DETAILED DESCRIPTION AND BE SUBMITTED TO THE SEOR FOR EVALUATION.

## WELDED WIRE MESH:

WELDED WIRE MESH SHALL BE ASTM A185, GRADE 65, FREE FROM OIL, SCALE, AND RUST, AND SHALL BE PLACED IN ACCORDANCE WITH THE ACI TYPICAL DETAILS.

MINIMUM LAP SHALL BE ONE SPACE PLUS TWO INCHES

## EXPANSION ANCHORS

USE WEDGE-TYPE EXPANSION ANCHORS SUCH AS THE HILTI KWIK BOLT, ITW RAMSET RED HEAD TRIBULOT WEDGE, POWERS RAWL POWER-STUD, SIMPSON STRONG-TIE WEDGE-AN OR ACCEPTED EQUIVALENT. FOLLOW MANUFACTURERS SPECIFICATIONS FOR USE AND INSTALLATION.

CONFIRM THE ABSENCE OF REINFORCING STEEL BY DRILLING A 1/4" DIAMETER PILOT HOLE FOR EACH ANCHOR. DO NOT CUT REINFORCING STEEL WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.

PROVIDE ANCHOR EMBEDMENT, SPACING AND EDGE DISTANCE AS SHOWN ON THE DRAWINGS.

## CHEMICAL ADHESIVE FOR ANCHORING REINFORCING BARS, THREADED BARS AND ANCHOR BOLTS

THREADED RODS ARE ASTM A193 B7 STEEL, U.O.N.

USE AN EPOXY, ACRYLIC OR POLYESTER RESIN ADHESIVE SYSTEM SUCH AS THE HILTI HIT HY150 2 PART EPOXY INJECTION SYSTEM, OR ACCEPTED EQUIVALENT. FOLLOW MANUFACTURERS SPECIFICATIONS FOR USE AND INSTALLATION.

CONFIRM THE ABSENCE OF REINFORCING STEEL BY DRILLING A 1/4" DIAMETER PILOT HOLE FOR EACH ANCHOR. DO NOT CUT REINFORCING STEEL WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.

REFER TO MANUFACTURERS INSTALLATION INSTRUCTIONS FOR APPROPRIATE DRILL SIZE, THOROUGHLY CLEAN HOLE INCLUDING REMOVAL OF DUST PRIOR TO FILLING WITH EPOXY.

PROVIDE ANCHOR EMBEDMENT, SPACING AND EDGE DISTANCE AS SHOWN ON THE DRAWINGS.

## POWDER ACTUATED FASTENERS

USE POWDER ACTUATED FASTENING SYSTEMS SUCH AS THOSE MANUFACTURED BY HILTI, ITW RAMSET/REDHEAD, RAWL OR AN SEOR APPROVED ALTERNATE.

INSTALL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

PROVIDE A MINIMUM OF TWO FASTENERS PER CONNECTION.

PROVIDE A MINIMUM PENETRATION IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS BUT NOT LESS THAN 1-1/8" IN CONCRETE, U.O.N.

PROVIDE A MINIMUM ANCHOR SPACING AND EDGE DISTANCE OF 3" IN CONCRETE AND A MINIMUM ANCHOR SPACING OF 1" AND EDGE DISTANCE OF 1/2" IN STEEL.

## TIMBER NOTES

ALL WOOD MEMBERS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION AND ITS SUPPLEMENT, (NDS), 2012 EDITION.

ALL WOOD FOR BEAMS, BEARING WALLS, SOLE PLATES, TOP PLATES, BLOCKING, BRACING, LEDGERS, CRIPPLES, SILLS, ETC., SHALL BE SPRUCE-PINE-FIR NO.2 OR BETTER WITH MOISTURE CONTENT OF 19% OR LESS.

FLOOR JOISTS SHALL BE SOUTHERN PINE NO.1.

MICROLAM BEAMS SHALL BE MANUFACTURED BY TRUSS-JOIST CORP. OR AN APPROVED EQUAL AND SHALL PROVIDE A MODULUS OF ELASTICITY OF 1,900,000 PSI, A MINIMUM FLEXURAL STRENGTH OF 2600 PSI, AND A MINIMUM HORIZONTAL SHEAR STRESS OF 285 PSI.

ALL WOOD IN CONTACT WITH CONCRETE OR CONCRETE BLOCK SHALL BE PRESSURE TREATED. ACCEPTABLE TREATMENTS INCLUDE ACQ (AMINE COPPER QUAT) COPPER BORON AZOLE, ACID COPPER CHROMATE AND COPPER CITRATE.

BORATE BASED TREATMENTS SUCH AS ZINC BORATE AND SODIUM BORATE ARE ALSO ACCEPTABLE FOR INDOOR USES.

FOR STRUCTURAL USES, AVOID BUYING TREATED LUMBER THAT CONTAINS MORE THAN 1/2" OF HEARTWOOD.

AVOID INHALATION OF SAWDUST PRODUCED BY PRESSURE TREATED WOOD. WEAR A DUST MASK AND WORK OUTDOORS. DISPOSE OF DUST AND SCRAP BY ORDINARY TRASH COLLECTION. DO NOT BURN. PRESSURE TREATED WOOD MAY PRODUCE TOXIC F.

LIGHT GAUGE STRAPS SHALL BE INSTALLED ACCORDING TO MANUFACTURERS INSTRUCTIONS. HANGERS OR STRAPS THAT DO NOT MATCH EXACTLY THE ONES SPECIFIED ON THE DRAWINGS IN STEEL YIELD OR ULTIMATE STRENGTH, STEEL DIMENSIONS (LENGTH AND WIDTH, NUMBER AND DIAMETER OF HOLES FOR THE SAME SIZES OF NAILS OR BOLTS, AND/OR DO NOT HAVE THE SAME GENERAL SHAPE WILL NOT BE ACCEPTABLE UNLESS APPROVED BY THE SEOR.

NO POCKETS WILL BE ALLOWED IN CONCRETE OR STEEL MEMBERS FOR CONNECTION OF WOOD MEMBERS UNLESS THE CONNECTION DETAIL IS IN WRITING PRIOR TO INSTALLATION.

ALL NAILS, SCREWS AND BOLTS SHALL BE HOT-DIPPED GALVANIZED.

ALL TJI JOISTS AND PARALLAM BEAMS AND COLUMNS SHALL BE AS MANUFACTURED BY TRUSS-JOIST INC OR AN APPROVED EQUAL. SUBMIT MANUFACTURER SPECIFICATIONS TO SEOR FOR REVIEW AND APPROVAL (AS REQUIRED BY THE DESIGN CONTRACT).

## PRE-ENGINEERED TIMBER TRUSS NOTES

WOOD TRUSSES TO BE DESIGNED AND FABRICATED IN ACCORDANCE WITH THE 'NATIONAL DESIGN SPECIFICATIONS FOR STRESS-GRADE LUMBER AND ITS FASTENINGS' BY THE NFPA.

TRUSS DESIGN SHALL COMPLY WITH TRITWICA BCSS 1-2013 'BUILDING COMPONENT SAFETY INFORMATION GUIDE TO GOOD PRACTICE FOR HANDLING, INSTALLING & BRACING OF METAL PLATE CONNECTED WOOD TRUSSES' AND TPI 1-2014 'NATIONAL DESIGN STANDARD FOR METAL-PLATE CONNECTED WOOD CONSTRUCTION'.

CONNECTOR PLATES SHALL BE A MINIMUM THICKNESS OF 0.036" AND BE MANUFACTURED FROM STEEL MEETING THE REQUIREMENTS OF ASTM A446, GRADE A, AND SHALL BE HOT-DIPPED GALVANIZED.

IN HIGHLY CORROSIVE ENVIRONMENTS, CONNECTOR PLATES AS WELL AS THE LIGHT GAUGE STRAPS AND ALL THE NAILS, SHALL BE HOT DIPPED GALVANIZED, TRIPLE ZINC G-185 COATED OR MADE WITH STAINLESS STEEL.

THE STRUCTURAL FRAMING SHOWN IS SCHEMATIC IN NATURE. HOWEVER THE SUPPORTING STRUCTURE HAS BEEN DESIGNED UNDER THE ASSUMPTION THAT THE FRAMING SCHEME SHOWN WILL CLOSELY PARALLEL FINAL TRUSS DESIGNERS LAYOUT. THE LOCATIONS OF GIRDER AND TRUSSES SHOWN ON THE ROOF FRAMING PLAN WERE USED TO FACILITATE DESIGN OF FOUNDATIONS, WALLS, AND BEAMS.

PROVIDE SIGNED AND SEALED SHOP DRAWINGS AND CALCULATIONS FOR APPROVAL PRIOR TO FABRICATION. RELEASE OF TRUSSES FOR FABRICATION PRIOR TO ENGINEER APPROVAL WILL BE AT THE SOLE RISK OF THE RELEASER.

REVIEW OF SHOP DRAWINGS IS REQUIRED AS THE ENGINEER CHECKS BEAM, WALL, COLUMN AND FOOTING CAPACITIES AGAINST KNOWN LOADS. FAILURE TO PROVIDE SHOP DRAWINGS MAY RESULT IN ADDITIONAL ENGINEERING COSTS DURING CONSTRUCTION.

THE TRUSS FABRICATOR SHALL PROVIDE ENGINEERED SHOP DRAWINGS OF EACH INDIVIDUAL TRUSS AND A FULLY DIMENSIONED ERECTION PLAN SHOWING COMPONENT LAYOUT.

TRUSS DESIGNS SHALL BE SIGNED AND SEALED BY A QUALIFIED STATE LICENSED PROFESSIONAL ENGINEER.

CONTRACTOR SHALL SUBMIT SIGNED AND SEALED DRAWINGS OF ALTERNATE CONNECTION DETAILS AT TRUSSES/GIRDERS TO COLUMNS AND WALLS FOR APPROVAL.

HANDLING, ERECTION AND BRACING OF TRUSSES SHALL BE IN ACCORDANCE WITH TRUSS PLATE INSTITUTE RECOMMENDATIONS.

THE CONTRACTOR WILL BE RESPONSIBLE FOR KEEPING THE ROOF SAFELY IN PLACE IN THE EVENT OF HIGH WINDS OR OTHER TRANSIENT LOADING CONDITIONS DURING CONSTRUCTION. FAILURE TO COMPLY WITH THESE PARAMETERS WILL MAKE THE CONTRACTOR SOLELY RESPONSIBLE FOR ANY AND ALL CONSEQUENTIAL DAMAGES CAUSED BY THE HORIZONTAL THRUST DEVELOPED BY THE ROOF FRAMING DUE TO SUPERIMPOSED LOADING AND TRANSFERRED INTO HE BEAMS, WALLS AND COLUMNS.

THE ARCHITECT AND ITS CONSULTANTS OR DESIGN PROFESSIONALS WILL NOT BE RESPONSIBLE FOR ANY DAMAGE CAUSED AS A CONSEQUENCE OF TERMITE INFESTATION.

THE LIGHT GAUGE STRAPS SPECIFIED ON THE WALL SECTIONS AND PLANS ARE PROVIDED TO FACILITATE THE CONSTRUCTION SCHEDULE, AND MAY CHANGE PRECIPATED ON THE TRUSS AND GIRDER REACTIONS PROVIDED BY THE TRUSS ENGINEER.

## STRUCTURAL STEEL

THE MATERIAL, FABRICATION, AND ERECTION OF STRUCTURAL STEEL SHALL COMPLY WITH THE SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS, 14TH EDITION BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION.

STRUCTURAL STEEL SHAPES SHALL BE FABRICATED FROM THE FOLLOWING MATERIALS:

ROLLED W AND WT SHAPES: ASTM A992, GRADE 50.

ROLLED M, S, C AND MC SHAPES AND ANGLES: ASTM A36, FY=36 KSI.

ANGLES, PLATES AND BARS: ASTM A36, FY=36 KSI.

COLD-FORMED HOLLOW STRUCTURAL SECTIONS (HSS):

ROUND SECTIONS: ASTM A500, GRADE C, FY=46 KSI.

SQUARE AND RECTANGULAR SECTIONS: ASTM A500, GRADE B, FY=46 KSI.

STEEL PIPE: ASTM A53, TYPE E OR S, GRADE B, FY=35 KSI.

SPACE FILLER BEAMS EQUALLY BETWEEN SUPPORTS, U.O.N.

DO NOT SPLICE STRUCTURAL STEEL MEMBERS EXCEPT WHERE INDICATED ON THE DRAWINGS.

SEE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR MISCELLANEOUS STEEL NOT SHOWN ON THE STRUCTURAL DRAWINGS.

REFER TO ARCHITECTURAL DRAWINGS AND PROJECT SPECIFICATIONS FOR PAINTING AND FIREPROOFING.

ALL STEEL SHALL RECEIVE SHOP AND FIELD TOUCH-UP COATS OF PAINT IN ACCORDANCE WITH SSPC SPECIFICATIONS.

## COMPOSITE CONSTRUCTION

ALL STEEL BEAMS INCLUDING CHANNELS, STEEL TUBES, WIDE FLANGE SECTIONS, TRUSSES, ETC) SUPPORTING CONCRETE FLOORS ON STEEL DECK ARE TO BE CONSTRUCTED AS COMPOSITE WITH THE SLAB AND SHALL BE CONSTRUCTED UNSHORED, U.O.N.

WELD 1/4" DIAMETER HEADED STEEL STUDS TO ALL COMPOSITE BEAMS - UNLESS BASE MATERIAL IS THINNER THAN 0.3H. (THEN, USE 0/8" DIAMETER STUDS.) WELD STUDS THROUGH DECK.

STUDS SHALL CONFORM TO AWS D1.1. STUD LENGTH SHALL EXTEND 1 1/2" ABOVE TOP FLUTE OF DECK.

SPACE STUDS AT 12" O.C. FOR GIRDERS SUPPORTING BEAMS AND AT 24" O.C. FOR BEAMS SUPPORTING STEEL DECK ONLY, U.O.N.

## SHEAR STUDS

SHEAR STUDS CONNECTORS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH AWS D1.1. STRUCTURAL WELDING CODE; SECTION 7-STUD WELDING.

STUDS SHALL BE TYPE B, HEADED STUDS HAVING A MINIMUM TENSILE STRENGTH OF 60,000 PSI, AND SHALL BE OF LENGTH AND DIAMETER SHOWN ON STRUCTURAL DRAWINGS.

## BOLTS CONNECTIONS

A325 AND A490 BOLTS SHALL COMPLY WITH 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS' INCLUDING COMMENTARY.

USE A-307 BOLTS FOR ALL ERECTION BOLTS AND BOLTS LESS THAN 3/4" DIAMETER, U.O.N.

USE A-325 BOLTS FOR ALL TYPICAL BOLTS.

ANCHOR RODS SHALL BE ASTM F1554 GRADE 85 WITH SUPPLEMENTARY REQUIREMENT S1, HOOKED AND 1 1/2 ASTM F1554 GRADE 105 WITH SUPPLEMENTARY REQUIREMENTS, STRAIGHT WITH NUTS AND WASHERS EACH END.

TIGHTEN BEARING-TYPE BOLTS (A-325N, A-325X, A-325X, A-490N, AND A-490X) TO THE SNUG TIGHT CONDITION AS FOLLOWS:

BOLTS SHALL BE PLACED IN ALL HOLES, WITH WASHERS POSITIONED AS REQUIRED AND NUTS THREADED TO COMPLETE THE ASSEMBLY.

COMPACTING THE JOINT TO THE SNUG-TIGHT CONDITION SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT.

THE SNUG-TIGHTENED CONDITION IS THE TIGHTNESS THAT IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRON WORKER USING AN ORDINARY SPUD WRENCH.

MORE THAN ONE CYCLE THROUGH THE BOLT PATTERN MAY BE REQUIRED TO ACHIEVE THE SNUG-TIGHTENED JOINT.

TIGHTEN SLIP-CRITICAL BOLTS (A-325SC AND A-490SC) TO THE MINIMUM FASTENER TENSION INDICATED IN TABLE 8.1 OF THE 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A-325 OR ASTM A-490 BOLTS' AS FOLLOWS:

BEGIN FINAL TIGHTENING OF SLIP-CRITICAL BOLTS ONLY AFTER A SNUG-TIGHT JOINT AS DESCRIBED ABOVE IS ACHIEVED.

IF SPLINED END OF TENSION-CONTROL BOLTS IS SEVERED PRIOR TO ACHIEVING SNUG-TIGHT JOINT, REMOVE AND REPLACE THE FASTENER ASSEMBLY.

PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT.

DETERMINE TENSION USING EITHER LOAD INDICATOR WASHERS OR TENSION-CONTROL BOLTS.

AT THE CONTRACTORS OPTION, SLIP-CRITICAL BOLTS MAY BE INSTALLED IN EITHER STANDARD, OVERSIZE, OR SHORT SLOTTED HOLES. DESIGN OF CONNECTIONS USING SLIP CRITICAL BOLTS IS BASED ON A CLASS A FAILING SURFACE AND OVERSIZED HOLES.

PROVIDE HARDENED WASHERS CONFORMING TO ASTM F436 AND PLACE UNDER THE PART BEING TURNED.

DO NOT REUSE OR RETIGHTEN BOLTS WHICH HAVE BEEN FULLY TIGHTENED. USE ONLY NON-GALVANIZED NUTS AND BOLTS THAT ARE CLEAN, RUST FREE, AND WELL LUBRICATED. BOLTS AND NUTS SHALL BE WAX DIPPED BY THE BOLT SUPPLIER OR LUBRICATED WITH JOHNSONS STICK WAX 140. CLEANING AND LUBRICATION OF ASTM F1882 TWIST-OFF-TYPE TENSION-CONTROL BOLTS IS NOT PERMITTED.

WHERE SLOTTED HOLES ARE USED TO ACCOMMODATE THERMAL MOVEMENT, NOTIFY THE ENGINEER IF BOLT IS EXPECTED TO HIT THE END OF SLOT, BASED ON TEMPERATURE AT TIME OF INSTALLATION.

STORE FASTENER COMPONENTS IN SEALED CONTAINERS UNTIL READY FOR USE. RESEAL OPEN CONTAINERS TO PREVENT CONTAMINATION BY MOISTURE OR OTHER DELETERIOUS SUBSTANCES. STORE CLOSED CONTAINERS FROM DIRT AND MOISTURE IN A PROTECTIVE SHELTER, TAKE FROM PROTECTIVE STORAGE ONLY AS MANY FASTENER COMPONENTS AS ARE ANTICIPATED TO BE INSTALLED DURING THE WORK SHIFT. FASTENER COMPONENTS THAT ARE NOT INCORPORATED INTO THE WORK SHALL BE RETURNED TO PROTECTIVE STORAGE AT THE END OF THE WORK SHIFT. FASTENERS FROM OPEN CONTAINERS AND FASTENERS THAT ACCUMULATE RUST OR DIRT SHALL NOT BE USED AND SHALL BE IMMEDIATELY AND PERMANENTLY REMOVED FROM THE PROJECT SITE.

SETTING BASE AND BEARING PLATES

CLEAN CONCRETE AND MASONRY BEARING SURFACE OF BOND-REDUCING MATERIALS AND CLEAN BOTTOM OF BASE AND BEARING PLATE.

SET BASE OR BEARING PLATE ON WEDGES OR OTHER ADJUSTING DEVICES.

TIGHTEN ANCHOR RODS AFTER STRUCTURAL STEEL FRAME HAS BEEN PLUMBED. DO NOT REMOVE WEDGES OR SHIMS BUT, IF PROTRUDING, CUT OFF FLUSH WITH EDGE OF BASE OR BEARING PLATE PRIOR TO PACKING WITH GROUT.

PACK OR POUR NON-SHRINK, NON-METALLIC GROUT SOULIY BETWEEN BEARING SURFACE AND BASE OR BEARING PLATE. ENSURE THAT NO VOIDS REMAIN. FINISH EXPOSED SURFACES, PROTECT GROUT AND ALLOW TO CURE.

FOR PROPRIETARY GROUT MATERIALS, COMPLY WITH MANUFACTURERS INSTRUCTIONS.

BASE PLATES MUST BE GROUTED A MINIMUM OF 72 HOURS PRIOR TO PLACING CONCRETE SLABS ON SUPPORTING STEEL STRUCTURE.

CUT, DRILL, OR PUNCH HOLES PERPENDICULAR TO METAL SURFACES. REAM HOLES THAT MUST BE ENLARGED TO ADAPT BOLTS AS PERMITTED BY THE EOR. DO NOT ENLARGE UNFAIR HOLES BY BURNING OR USING DRIFT PINS.

## WELDED CONNECTIONS

WELDING SHALL BE DONE BY AWS CERTIFIED WELDERS USING THE MOST RECENT AWS APPROVED TECHNIQUES. SHIELDED METAL ARC WELDING (SMAW) SHALL USE E70XX LOW HYDROGEN ELECTRODES.

ALL SHOP AND FIELD WELDING SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE BY THE AMERICAN WELDING SOCIETY.

WHERE NECESSARY, REMOVE GALVANIZING OR PRIMER PRIOR TO WELDING.

## COLD FORMED STEEL STUDS

ALL LIGHT GAGE METAL FRAMING AND CONNECTIONS SHALL BE DESIGNED, FABRICATED, AND ERECTED IN ACCORDANCE WITH AISI 'SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS' AND NAAMM ML/SFA 540 'LIGHT-WEIGHT STEEL FRAMING SYSTEMS MANUAL'.

ALL LIGHT GAGE METAL FRAMING SHOWN IN THESE DOCUMENTS IS IN ACCORDANCE WITH THE STEEL STUD MANUFACTURERS ASSOCIATION (SSMA).

ALL STRUCTURAL MEMBERS SHALL BE FORMED FROM STEEL HAVING A GALVANIZED COATING MEETING THE REQUIREMENTS OF ASTM A-653. STEEL MATERIAL SHALL HAVE A MINIMUM YIELD STRESS OF 50 KSI U.O.N.

ALL CONNECTIONS SHALL BE MADE WITH A MINIMUM OF (4) #12-14 SCREWS OR EQUIVALENT WELDS, (UNLESS NOTED OTHERWISE ON THE DRAWINGS)

ALL SCREWS SHALL BE OF THE DIAMETER AND SIZE INDICATED ON THE DRAWINGS, AND SHALL BE THOSE MANUFACTURED AND TESTED BY ITW BULDEX. A MINIMUM OF 1/2 INCH EDGE DISTANCE AND SCREW SPACING IS REQUIRED, UNLESS NOTED OTHERWISE ON THE DRAWINGS. SCREW PENETRATION THROUGH JOINED MATERIALS SHALL NOT BE LESS THAN THREE EXPOSED THREADS. SELECT SCREWS WITH AN ADEQUATE CUTTING TIP TO ACCOMMODATE THE TOTAL THICKNESS TO BE DRILLED. DRILLING MUST BE COMPLETED BEFORE THE THREADS ENGAGE THE MATERIAL. WHERE SCREW ATTACHMENTS ARE MADE TO FRAMING COMPONENTS OF DIFFERENT THICKNESSES, THE THINNEST COMPONENT MUST BE PENETRATED FIRST. (UNLESS NOTED OTHERWISE). ALL SCREWS ARE TYPE T1.

DIAGONAL STRAP BRACING (WHEN USED) SHALL BE ATTACHED AT ALL INTERSECTIONS WITH VERTICAL MEMBERS WITH A #12-14 SCREW OR EQUIVALENT WELDS UNLESS NOTED OTHERWISE.

WELDING SHALL BE DONE IN ACCORDANCE WITH AWS D1.3 - LATEST EDITION, STRUCTURAL WELDING CODE.

SUGGESTED WELD METAL AND PROCESS FOR SHOP WELDING ARE: 70 KSI WELD METAL, STRENGTH (MINIMUM), SUGGESTED METHODS FOR FIELD WELDING: 1/8" (UNLESS NOTED OTHERWISE) E70XX (MINIMUM) ELECTRODE - SMAW, OR GASLESS MIG.

MINIMUM WELD THROAT THICKNESS (T) MUST MATCH OR EXCEED THE BASE STEEL THICKNESS OF THE THINNEST CONNECTED PART UNLESS NOTED OTHERWISE.

WEB STIFFENERS FOR STUD JOISTS SHALL BE PROVIDED AT ALL REACTION POINTS, INTERMEDIATE CONCENTRATED LOADS, AND WHERE