

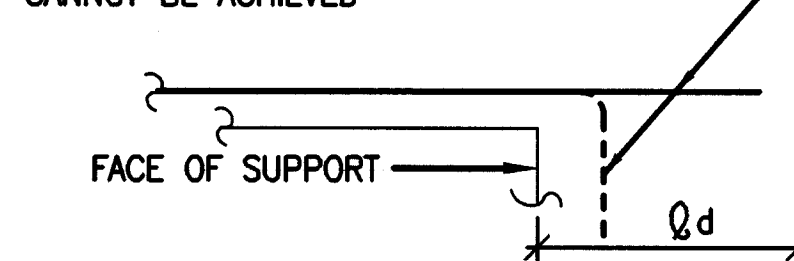
BAR SIZE	$f'_c = 3000$ psi				$f'_c = 4000$ psi			
	TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2
#3	22	32	17	25	19	28	15	22
#4	29	43	22	33	25	37	19	29
#5	36	54	28	41	31	47	24	36
#6	43	64	33	50	37	56	29	43
#7	63	94	48	72	54	81	42	63
#8	72	107	55	82	62	93	48	71
#9	81	121	62	93	70	105	54	81
#10	91	136	70	105	79	118	61	91
#11	101	151	78	116	87	131	67	101
#14	121	181	93	139	105	157	81	121
#18	161	241	124	186	139	209	107	161

NOTES:

- THIS TABLE FOR USE WITH NORMAL WEIGHT HARDBLOCK CONCRETE & GRADE 60 UNCOATED REINFORCING BARS. FOR LIGHTWEIGHT AGGREGATE USE 1.3 ϕ .
- TOP BARS ARE HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE CAST IN THE MEMBER BELOW THE BAR.
- FOR BARS ENCLOSED IN STANDARD COLUMN SPIRALS, USE 0.75 ϕ OR 12" MIN.
- DEVELOPMENT LENGTH OF INDIVIDUAL BARS WITHIN A BUNDLE SHALL BE 1.2 ϕ FOR THAT BAR IN A 3-BAR BUNDLE AND 1.33 ϕ FOR A 4-BAR BUNDLE.
- COMPRESSION DEVELOPMENT LENGTH (ONLY WHERE INDICATED ON DRAWINGS) FOR GRADE 60 BARS USE 22 BAR DIAMETERS.

- CASE SELECTION
 -FOR FOUNDATION REINFORCEMENT USE CASE 1 UNO.
 -FOR COLUMN REINFORCEMENT AND DOWELS USE CASE 1 UNO.
 -FOR BEAM REINFORCEMENT USE CASE 1 UNO.
 -FOR STRUCTURAL SLAB REINFORCEMENT USE CASE 2 UNO.
 -FOR SLAB ON GRADE REINFORCEMENT USE CASE 1 UNO.
 -FOR WALL REINFORCEMENT AND DOWELS USE CASE 1 (EXCEPT AS NOTED BELOW) UNO.
 -FOR WALLS WITH A SINGLE MAT OF STEEL CENTERED IN THE WALL, USE CASE 1 FOR WALL REINFORCEMENT AND DOWELS UNO.
 -FOR CHORD STEEL REINFORCEMENT USE CASE 2 UNO.

EXTEND BAR AS FAR AS POSSIBLE AND BEND WITH SP 90° STANDARD HOOK WHERE ϕ CANNOT BE ACHIEVED



1

TENSION DEVELOPMENT
NO SCALE

BAR SIZE	LAP CLASS	$f'_c = 3000$ psi				$f'_c = 4000$ psi			
		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
		CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2
#3	A	22	32	17	25	19	28	15	22
#4	A	29	43	22	33	25	37	19	29
#5	A	37	56	29	43	32	48	25	37
#6	A	45	70	36	51	40	60	34	45
#7	A	63	94	48	72	54	81	42	63
#8	A	72	107	55	82	62	93	48	71
#9	A	81	121	62	93	70	105	54	81
#10	A	91	136	70	105	79	118	61	91
#11	A	101	151	78	116	87	131	67	101
#14	A	121	181	93	139	105	157	81	121
#18	A	161	241	124	186	139	209	107	161

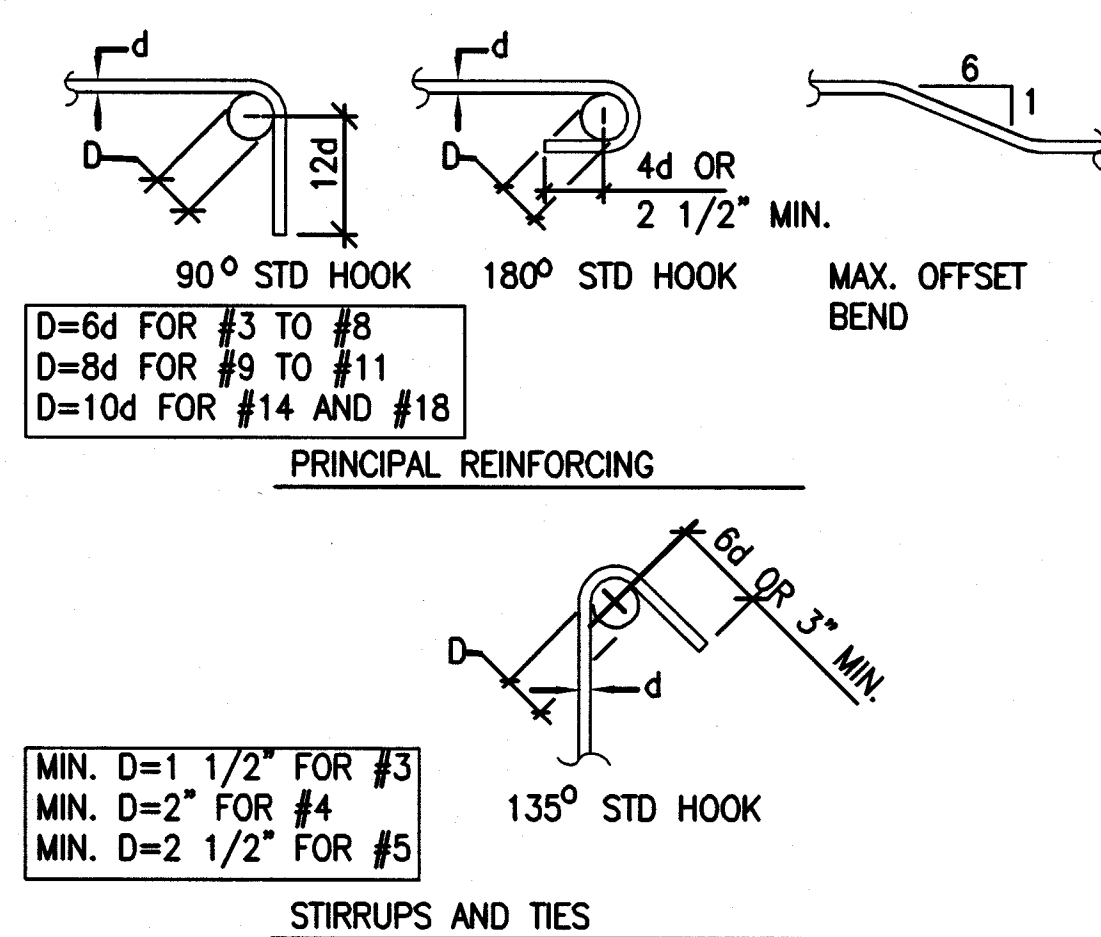
NOTES:

- TABLE FOR USE WITH NORMAL WEIGHT HARDBLOCK CONCRETE AND GRADE 60 UNCOATED REINFORCING BARS. FOR LIGHTWEIGHT AGGREGATE USE 1.3 ϕ .
- CLASS A - HALF OR LESS OF THE BARS ARE SPLICED WITHIN A REQUIRED LAP LENGTH.
CLASS B - MORE THAN HALF OF THE BARS ARE SPLICED WITHIN A REQUIRED LAP LENGTH.
- TOP BARS ARE HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE CAST IN THE MEMBER BELOW THE BAR.
- FOR BARS ENCLOSED IN STANDARD COLUMN SPIRALS, USE 0.75 ϕ OR 12" MIN.
- LAP SPLICES OF INDIVIDUAL BARS WITHIN A BUNDLE SHALL BE 1.2 ϕ FOR THAT BAR IN A 3-BAR BUNDLE AND 1.33 ϕ FOR A 4-BAR BUNDLE. ENTIRE BUNDLES SHALL NOT BE LAP SPLICED AT THE SAME LOCATION. SPLICES FOR INDIVIDUAL BARS WITHIN A BUNDLE SHALL BE STAGGERED SUCH THAT THEY DO NOT OVERLAP.
- ϕ - BASIC LAP LENGTH, SHOWN AT LEFT.

- CASE SELECTION
 -FOR FOUNDATION REINFORCEMENT USE CASE 1 UNO.
 -FOR COLUMN REINFORCEMENT AND DOWELS USE CASE 1 UNO.
 -FOR BEAM REINFORCEMENT USE CASE 1 UNO.
 -FOR STRUCTURAL SLAB REINFORCEMENT USE CASE 2 UNO.
 -FOR SLAB ON GRADE REINFORCEMENT USE CASE 1 UNO.
 -FOR WALL REINFORCEMENT AND DOWELS USE CASE 1 (EXCEPT AS NOTED BELOW) UNO.
 -FOR WALLS WITH A SINGLE MAT OF STEEL CENTERED IN THE WALL, USE CASE 1 FOR WALL REINFORCEMENT AND DOWELS UNO.
 -FOR CHORD STEEL REINFORCEMENT USE CASE 2 UNO.

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TENSION LAP SPLICE LENGTHS, ϕ (IN INCHES) FOR GRADE 60 UNCOATED BARS
NO SCALE



- NOTES:
- ALL BENDS SHALL BE MADE COLD.
 - #14 AND #18 BARS SHALL BE BEND TESTED AND LAB APPROVED PRIOR TO BENDING.

BAR BENDS
NO SCALE

3

CONCRETE CURB
NO SCALE

NO SCALE



- NOTES:
- SIZE AND LOCATE CURBS AS REQ'D.
 - PROVIDE INSERTS IN CURBS AS PER ARCH & MECH. DWGS.

4

PLAN DETAIL OF REINFORCING AT FOOTING INTERSECTIONS
NO SCALE

NO SCALE



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CONCRETE

- All aspects of work pertaining to the concrete construction shall be in accordance with ACI 318-95, 'Building Code Requirements for Reinforced Concrete' and the latest edition of 'Specifications for Structural Concrete for Buildings', ACI 301, with modifications as noted on the project drawings and specifications.
- Concrete mix designs shall be submitted to the Structural Engineer for review. All mix designs shall be designed by a qualified testing laboratory and shall be wet stamped by a Civil Engineer licensed in the State of Nevada.
- Portland cement shall conform to ASTM C150 Type V where the concrete is in contact with soil. For UBC Table 19-4.4.4 Severe to Very Severe sulfate exposures as identified in the project (geotechnical data report) the water cement ratio shall not exceed 0.45 and shall not exceed 0.50 for other sulfate exposures. Type II cement shall be used at all other locations in the structure.
- Fly ash may be used in concrete mixes. The fly ash shall conform to ASTM C618 Class F. The loss of ignition shall be limited to 2%. The addition rate for fly ash shall be limited to 15% of the cement weight. The contractor shall submit all certificates showing the fly ash is in accordance with the above criteria.
- Hard rock concrete aggregate shall conform to all requirements and tests of ASTM C33 and project specifications. Exceptions may be used only with approval of the Structural Engineer.
- Lightweight concrete aggregate shall be in accordance with ASTM C330 and project specifications. Lightweight concrete mix designs shall be tested prior to approval, for shrinkage in accordance with ASTM C157. Shrinkage shall not exceed 0.0005 inches / inch.
- Structural concrete 28-day strengths & types are as follows:

LOCATION OF CONCRETE	STRENGTH, PSI	TYPE
LEAN MIX	1500	HARD ROCK
FOOTINGS	4000	HARD ROCK
SLAB ON GRADE	4000	HARD ROCK

- The modulus of elasticity of concrete, when tested in accordance with ASTM C469, shall be at least the value given by the equations in section 8.5.1 of ACI 318 for the specified concrete 28-day strength.
 - Concrete mixing operations, etc., shall be in accordance with ASTM C94.
 - Dry pack or grout under baseplates, sill plates, etc., see specifications. Strength requirements are as required for concrete.
 - Concrete placement shall be in accordance with ACI standard 304 and project specifications. All concrete surfaces against which concrete is to be placed shall be sandblasted.
 - Clear coverage of concrete over reinforcing bars shall be as follows:
- | | MINIMUM COVER INCHES |
|--|-----------------------|
| A) Concrete cast against and permanently exposed to earth | 3 |
| B) Concrete exposed to earth or weather:
No. 6 through No. 18 bar
No. 5 bar and smaller | 2
1 1/2 |
| C) Concrete not exposed to weather or in contact with ground, U.N.O.:
Slabs, walls, joists:
No. 14 and No. 18 bar
No. 11 bar and smaller
Beams, columns:
Primary reinforcement, ties
Stirrups, spirals | 1 1/2
3/4
1 1/2 |
| D) Slab on grade, 2 inches clear from top | |

- Prior to concrete placement, all reinforcing bars, anchor bolts and other concrete inserts shall be well secured in position.
- Unless otherwise indicated in the mechanical or electrical drawings or project specifications, mechanical pipes and electrical conduits which pass through slab on grade, concrete on steel deck, framed concrete floors and walls do not require sleeves. If sleeves are required, the sleeves shall be installed prior to placing concrete. Do not cut any reinforcing which may interfere with sleeve placement. Coring openings in concrete is not permitted. Notify the Structural Engineer in advance of conditions not shown on the structural drawings.
- For slabs on grade no pipes or conduits shall be placed within the indicated concrete slab thickness and shall be located below the slab unless specifically detailed otherwise.
- Any curing compounds used on concrete that is to receive a resilient tile finish shall be approved by the Finish Applicator before use.

REINFORCING STEEL (FOR CONCRETE AND MASONRY)

- All reinforcing steel shall be detailed and placed in accordance with the 'Building Code Requirements for Reinforced Concrete' (ACI 318-95) and the 'Manual of Standard Practice for Reinforced Concrete Construction' by CRSI and WCRSI as modified by the project drawings and specifications.
- Deformed reinforcing bars shall conform to the requirements of ASTM A615 grade 60 with the following exceptions in which grade 40 bars may be used, unless noted otherwise in the drawings:
A) Reinforcing in non-structural concrete which includes the slab on grade.
- Welding of reinforcing is permitted only where shown on the drawings or when approved by the Structural Engineer. Welding of reinforcing bars shall be with low hydrogen electrodes in accordance with the 'Recommended Practices for Welding Reinforcing Steel, Etc.', American Welding Society, AWS D1.4 and UBC Standard 19-2.
- All reinforcing bar bends shall be made cold.
- Reinforcing dowels between footings and walls or columns shall be the same number, size, spacing and grade as the specified vertical reinforcing, u.n.o.
- All reinforcing bars shall be marked so their identification can be made when the final in-place inspection occurs.
- Welded wire fabric shall conform to ASTM A185.
- Minimum lap of welded wire fabric shall be 6 inches or one full mesh and one half, whichever is greater.

EPOXY INSTRUCTIONS FOR ANCHORING REBAR AND BOLTS

- Epoxy may not be used unless specifically detailed on the drawings or without prior approval of the Structural Engineer.
- Bars must be deformed or threaded for the full embedment depth in epoxy.
- Over-drill bar diameter by 1/4 in., unless indicated otherwise by the Epoxy Manufacturer, and to the depth indicated on the structural drawings.
- Remove all dirt, dust, water, and ice by vacuum from the drilled holes.
- Any dirt, rust, and oil on the bars shall be removed.
- During the epoxy mixing and application process, follow the Epoxy Manufacturer's specifications exactly.
- Fill the holes drilled for the bars partially with epoxy and then insert the bars. Work the bars in and out to compact the epoxy, then fill the remainder of the holes.
- Vertical holes to be filled from the bottom are to use an epoxy gel.
- The following epoxy systems are acceptable:
 RAWL POWER-FAST ICBO # 4514
 EPOCON SYSTEM BY ITW RAMSET ICBO # 4285
 HILTI HIT HY-150 ICBO # 5193
 SIMPSON ET ICBO # 4945

The use of any other epoxy system must be submitted for approval to the Structural Engineer.

REVISIONS
 05-05-03
 RECORD DRAWINGS
 06-15-04

LVMIPD
 DOWNTOWN
 AREA COMMAND

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PROJECT:
 LVMIPD
 DOWNTOWN
 AREA COMMAND

SHEET CONTENTS:
 CONCRETE NOTES
 AND
 TYPICAL DETAILS

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