# REBAR TENSION DEVELOPMENT LENGTH

| BAR SIZE | MIN BAR CLEAR COVER (IN) | MIN BAR CLEAR SPACING (IN) | 3000 PSI | | 4000 PSI | | 5000 PSI OR MORE | |
|---|---|---|---|---|---|---|---|---|
| | | | TOP BARS NOTE 4 | OTHER BARS | TOP BARS NOTE 4 | OTHER BARS | TOP BARS NOTE 4 | OTHER BARS |
| 3 | ¾ | 1 | 13 | 12 (9.9) | 12 (11.1) | 12 (8.6) | 12 (10) | 12 (7.7) |
| 4 | ¾ | 1 | 29 | 22 | 25 | 19 | 22 | 17 |
| | ¾ | 1 ½ | 22 | 17 | 19 | 15 | 17 | 13 |
| | 1 | 2 | 17 | 14 | 15 | 12 (11.4) | 14 | 12 (10.2) |
| 5 | ¾ | 1 | 41 | 32 | 36 | 28 | 32 | 25 |
| | ¾ | 1 ¼ | 36 | 28 | 31 | 24 | 28 | 22 |
| | 1 | 1 ⅞ | 27 | 21 | 24 | 18 | 21 | 16 |
| | 1 ¼ | 2 ½ | 22 | 17 | 19 | 15 | 17 | 13 |
| 6 | ¾ | 1 | 55 | 43 | 48 | 37 | 43 | 33 |
| | ¾ | 1 ½ | 43 | 33 | 37 | 29 | 33 | 26 |
| | 1 ⅛ | 2 ¼ | 32 | 25 | 28 | 22 | 25 | 19 |
| | 1 ½ | 3 | 26 | 20 | 23 | 17 | 20 | 16 |
| 7 | ¾ | 1 | 88 | 67 | 76 | 59 | 68 | 52 |
| | ⅞ | 1 ¾ | 63 | 48 | 54 | 42 | 49 | 38 |
| | 1 ⅜ | 2 ⅝ | 47 | 36 | 41 | 32 | 37 | 28 |
| | 1 ¾ | 3 ½ | 38 | 29 | 33 | 25 | 29 | 23 |

**NOTES:**

1. LENGTHS SHOWN CONFORM TO ACI 318-14 (SECTION 25.4.2) FOR NORMAL WT CONCRETE AND UNCOATED BARS WITH Fy=60 KSI (YIELD STRENGTH OF REBARS).
2. LENGTHS SHOWN IN PARENTHESIS ARE ONLY FOR ACCURATE VALUES TO BE USE IN CALCULATION.
3. ALL LENGTHS ARE IN INCHES.
4. TOP BARS ARE BARS SO PLACED THAT 12" OR MORE OF FRESH CONCRETE IS CAST IN MEMBER BELOW REINFORCEMENT.
5. MULTIPLY THE ABOVE LENGTHS BY 1.33 FOR CONCRETE WITH LIGHTWEIGHT AGGREGATE AND MULTIPLY THE ABOVE LENGTHS BY 1.5 FOR EPOXY COATED REINFORCING. IN ALL CASES THE LENGTH SHALL BE AT LEAST 12".
6. FOR LAP SPLICE IN TENSION MULTIPLY THE TENSION DEVELOPMENT LENGTH BY 1.3. LAP SPLICE SHALL BE AT LEAST 12" AND SHALL BE STAGGERED MINIMUM OF 24" O.C.

# DEVELOPMENT LENGTH COMPRESSION

| BAR SIZE | 3000 PSI | 4000 PSI | 5000 PSI OR MORE |
|---|---|---|---|
| 3 | 8.5 | 8 | 8 |
| 4 | 11 | 9.5 | 9 |
| 5 | 14 | 12 | 11.5 |
| 6 | 16.5 | 14.5 | 13.5 |
| 7 | 20 | 17 | 16 |

# STD. HOOK

| BAR SIZE | 3000 PSI | 4000 PSI | 5000 PSI OR MORE |
|---|---|---|---|
| 3 | 8.5 | 7.5 | 6.5 |
| 4 | 11 | 9.5 | 8.5 |
| 5 | 14 | 12 | 11 |
| 6 | 16.5 | 14.5 | 13 |
| 7 | 20 | 17 | 15 |

**NOTES:**

1. LENGTHS SHOWN CONFORM TO ACI 318-14 (SECTION 25.4.2) FOR NORMAL WT CONCRETE AND UNCOATED BARS WITH Fy=60 KSI (YIELD STRENGTH OF REBARS).
2. ALL LENGTHS ARE IN INCHES.
3. MULTIPLY THE ABOVE LENGTHS BY 1.33 FOR CONCRETE WITH LIGHTWEIGHT AGGREGATE.
4. (STD. HOOKS) MULTIPLY THE ABOVE LENGTHS BY 1.2 FOR EPOXY COATED REINFORCING.
5. COMPRESSION DEVELOPMENT LENGTH OF REBARS ENCLOSED WITHIN #3 SPIRAL REINFORCEMENT W/ NO MORE THAN @4" PITCH OR #4 TIES @4" O.C. MAY BE MULTIPLIED BY 0.75. IN ALL CASES THE TOTAL LENGTH SHALL BE AT LEAST 8".
6. STD. HOOKS WITH SIDE COVER (NORMAL TO PLAN OF HOOK) EQUAL TO 2.5" OR MORE AND WITH COVER ON BAR EXTENSION BEYOND HOOK EQUAL TO 2" OR MORE MAY BE MULTIPLY THE ABOVE LENGTH BY 0.7. IN ALL CASES THE TOTAL LENGTH SHALL BE AT LEAST THE MAXIMUM OF 8 BAR DIAM. AND 6".
7. LAP SPLICE IN COMPRESSION SHALL BE 30 TIMES BAR DIAMETER.

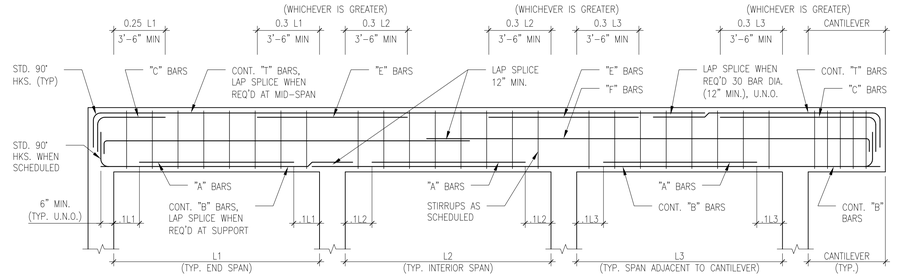
# REBAR IN MASONRY

| BAR SIZE | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| DEVELOPMENT LENGTH | 15 | 20 | 25 | 35 | 48 | 72 |
| HOOKS | 10 | 13.5 | 17 | 25 | 36 | 59 |

**NOTES:**

1. LENGTHS SHOWN CONFORM TO NON-SEISMIC PROVISIONS OF TMS 402-13/ACI 530-13/ FOR NORMAL WT MASONRY BLOCK (f'm=1500 PSI OR BETTER) AND UNCOATED BARS W/ Fy=60 KSI (YIELD STRENGTH OF REBARS). ALSO CONFORM WITH FBC 2017 CHAPTER 21.
2. ALL LENGTHS ARE IN INCHES.
3. MULTIPLY THE ABOVE LENGTHS BY 1.5 FOR EPOXY COATED REINFORCING.
4. FOR LAP SPLICES TAKE THE SAME VALUE OF DEVELOPMENT LENGTH.

# TYPICAL CONCRETE BEAM DIAGRAM



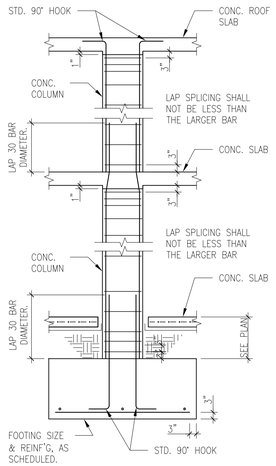

**BAR PLACEMENT NOTES:**

1. THE CLEAR SPACING BETWEEN PARALLEL BARS IN A LAYER SHALL BE AT LEAST THE GREATEST OF 1", HE NOMINAL DIAMETER OF THE BARS, AND ⅓ TIMES THE MAXIMUM SIZE OF THE COARSE AGGREGATE.
2. WHEN REINFORCEMENT IS PLACED IN TWO OR MORE LAYERS, THE CLEAR DISTANCE BETWEEN LAYERS SHALL BE AT LEAST 1", AND THE BARS IN THE UPPER LAYERS SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.
3. "B" BARS ARE BOTTOM BARS. "B" BARS OF INTERIOR BEAMS SHALL BE CONTINUOUS AND SHALL BE SPLICED (IF REQUIRED) AT OR NEAR THE SUPPORT WITH CLASS "B" TENSION SPLICE.
4. "A" BARS ARE BOTTOM BARS. "A" BARS DO NOT EXTEND OVER SUPPORTS. "A" BARS SHALL BE PLACED IN THE SAME LAYER AS "B" BARS (U.O.N.).
5. "T" BARS ARE CONTINUOUS TOP BARS. "T" BARS SHALL BE LAP SPLICED WHEN REQUIRED AT MID-SPAN WITH A CLASS "B" TENSION SPLICE.
6. "C" BARS ARE TOP BARS AT THE DISCONTINUOUS END OF END SPANS. "C" BARS SHALL BE PLACED IN THE SAME LAYER AS "T" BARS (U.O.N.)
7. "E" BARS ARE TOP BARS OVER INTERIOR SUPPORTS. "E" BARS SHALL BE PLACED IN THE SAME LAYER AS "T" BARS (U.O.N.)
8. "F" BARS SHALL BE EQUALLY SPACED BETWEEN "B" AND "T" BARS, HALF ON EACH VERTICAL FACE. "F" BARS MAY BE CONTINUOUS. SEE BEAM INTERMEDIATE REINFORCEMENT TABLE UNLESS SCHEDULE NOTE.
9. STIRRUPS SPACING IS FROM FACE OF SUPPORT. STIRRUPS SHALL HAVE "B" OR "T" BARS TIED IN EACH CORNER.
10. WHERE CONC. LINTELS NOT USED DROP TIE-BEAM ABOVE OPENING, USE #3 STIRRUPS @ 12" (U.O.N.)

# CONCRETE BEAM SCHEDULE

| MARK | TOP OF BEAM ELEV. | SIZE (IN) BxD | LONGITUDINAL REINFORCEMENT | | | | | | STIRRUPS | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | B | A | T | C | E | F | No. | TYPE | SPACING EA. END | |
| RB-1 | +9'-0" | 8"x12" | 2 #5 | | 2 #5 | | | | #3 | [ ] | (9)@4.5" E.E., BAL @12" | |
| RB-2 | +10'-0" | 8"x12" | 2 #5 | | 2 #5 | | | | #3 | [ ] | (4)@4.5" E.E., BAL @12" | |
| RTB-1 | +9'-0" | 8"x12" | 2 #5 | | 2 #5 | | | | #3 | [ ] | (4)@12" E.E., BAL @48" | |
| RTB-2 | +10'-0" | 8"x24" | 2 #5 | | 2 #5 | | | 2 #5 | #3 | [ ] | (4)@12" E.E., BAL @48" | |
| | | | | | | | | | | | | |

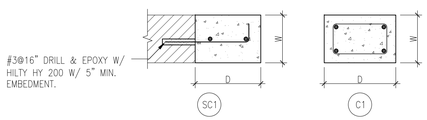
# TYPICAL CONCRETE COLUMN DETAIL




# CONCRETE COLUMN

| MARK | SIZE (WxD) | VERTICAL REINFORCEMENT | TIE REINFORCEMENT | REMARKS |
|---|---|---|---|---|
| SC1 | 8" X 8" | 2 #5 | – | STARTED COLUMN |
| C1 | 14" X 14" | 4 #6 | #3@12" O.C. | CONCRETE COLUMN |
| | | | | |

# COLUMN BAR ARRANGEMENT




# FOOTING SCHEDULE

| MARK | SIZE (WxL) | DEPTH | SHORT BAR | LONG BAR | REMARKS |
|---|---|---|---|---|---|
| WF-16 | 16" x CONT. | 12" | #5@12" B | 2 #5 CONT. B | WALL FOOTING |
| | | | | | |
| F3.0 | 3'-0" x 3'-0" | 12" | 3 #5 B | 3 #5 B | ISOLATE FOOTING |

**NOTES:**

1. CONTRACTOR TO PROVIDE NUMBER OF CORNER BARS AS FOOTING LONGITUDINAL REINF. LAPPED MIN. 48" BAR DIAMETERS. WHEN FOOTING HAS MORE BARS, THE TOTAL OF CORNER BARS SHALL BE THE SAME AS THE NUMBER OF BARS IN THE LARGER FOOTING.
2. PROVIDE 2 # 5 CONTINUOUS WALL FOOTING TOP BARS (TYP) AT EACH OPENING GREATER THAN 6'-0". EXTEND 2'-0" (MIN) BEYOND EACH OPENING.

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revisions

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date: 02-10-23
drawn by: YP
designed by: YP

SCHEDULES

S-2.0

Construction Documents | 2023