GENERAL STRUCTURAL NOTES

(THE FOLLOWING APPLY UNLESS SHOWN OTHERWISE ON THE DRAWINGS.)

CRITERIA:

1. ALL MATERIALS, WORKMANSHIP, DESIGN, AND CONSTRUCTION SHALL CONFORM TO THE DRAWINGS, SPECIFICATIONS, AND THE SEATTLE BUILDING CODE (IBC), 2018 EDITION.

2. DESIGN LOADING CRITERIA:

   RISK CATEGORY IBC TABLE 1604.5 II
   H20 TRUCK LOADING . . . . 32 kip AXLE LOAD OR TANDEM AT 4ft oc

   SEE DRAWINGS FOR ADDITIONAL LOADING CRITERIA.

3. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS AND ALL OTHER CONTRACT DOCUMENTS FOR BIDDING AND CONSTRUCTION. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS FOR COMPATIBILITY AND SHALL NOTIFY ARCHITECT OF ALL DISCREPANCIES PRIOR TO CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE BUILDING LAYOUT DIMENSIONS (GRID LAYOUTS, SITE COORDINATES, ETC.) AMONGST ALL TRADES, INCLUDING SHOP FABRICATED ITEMS.

4. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS, MEMBER SIZES AND CONDITIONS PRIOR TO COMMENCING ANY WORK AND PRIOR TO SUBMITTING SHOP DRAWINGS. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS ARE INTENDED AS GUIDELINES ONLY AND MUST BE VERIFIED. THE EXISTING CONDITIONS SHOWN ON THE DRAWINGS ARE BASED EITHER ON SITE OBSERVATION, ORIGINAL DRAWINGS OR WERE ASSUMED BASED ON EXPECTED CONDITIONS. IF THE EXISTING CONDITIONS DO NOT CLOSELY MATCH THE CONDITIONS SHOWN ON THE DRAWINGS, OR IF THE EXISTING MATERIALS ARE OF QUESTIONABLE OR SUBSTANDARD QUALITY, NOTIFY THE ENGINEER PRIOR TO COMMENCING ANY WORK.

5. CONTRACTOR SHALL PROVIDE TEMPORARY BRACING, BOTH FOR VERTICAL LOADS AND LATERAL STABILITY, FOR THE STRUCTURE AND STRUCTURAL COMPONENTS UNTIL ALL FINAL CONNECTIONS HAVE BEEN COMPLETED IN ACCORDANCE WITH THE DRAWINGS.

6. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SAFETY PRECAUTIONS AND THE METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES REQUIRED TO PERFORM THE WORK.

7. CONTRACTOR-INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT AND STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO FABRICATION OR CONSTRUCTION. CHANGES SHOWN ON SHOP DRAWINGS ONLY WILL NOT SATISFY THIS REQUIREMENT.

8. DRAWINGS INDICATE GENERAL AND TYPICAL DETAILS OF CONSTRUCTION. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED BUT ARE OF SIMILAR CHARACTER TO DETAILS SHOWN, SIMILAR DETAILS OF CONSTRUCTION SHALL BE USED, SUBJECT TO REVIEW AND APPROVAL BY THE ARCHITECT AND THE STRUCTURAL ENGINEER.

9. ALL STRUCTURAL SYSTEMS COMPOSED OF COMPONENTS TO BE FIELD ERECTED SHALL BE SUPERVISED BY THE SUPPLIER DURING MANUFACTURING, DELIVERY, HANDLING, STORAGE AND ERECTION IN ACCORDANCE WITH INSTRUCTIONS PREPARED BY THE SUPPLIER.

10. SEISMIC BRACING AND/OR GRAVITY SUPPORT AND ANCHORAGE OF ALL MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF WASHINGTON, EXCEPT FOR ELEMENTS SPECIFICALLY SHOWN AND DETAILED ON THE STRUCTURAL DRAWINGS. THE MECHANICAL/ELECTRICAL CONTRACTOR MUST HIRE THE ENGINEER AND IS RESPONSIBLE FOR ALL COSTS RELATED TO THE PURCHASE AND INSTALLATION OF NECESSARY SUPPORTS, BRACING AND ANCHORAGE. SEISMIC BRACING AND ANCHORAGE DESIGN AND CONSTRUCTION SHALL COMPLY WITH CHAPTER 13 OF ASCE 7-16. SEE GENERAL STRUCTURAL NOTE 14 FOR ADDITIONAL INFORMATION.

11. SHOP DRAWINGS FOR REINFORCING STEEL FOR CONCRETE, CONNECTOR PLATE WOOD ROOF TRUSSES, AND ENGINEERED WOOD I-JOISTS SHALL BE SUBMITTED TO THE ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW PRIOR TO FABRICATION OF THESE ITEMS.

    CONTRACTOR SHALL SUBMIT WALL ELEVATION DRAWINGS OF AT LEAST 1/8" = 1'-0" SCALE INDICATING LOCATIONS OF CONNECTION EMBEDMENTS AND WALL OPENINGS FOR REVIEW PRIOR TO CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH REINFORCEMENT SHOP DRAWINGS.

12. SHOP DRAWING REVIEW: DIMENSIONS AND QUANTITIES ARE NOT REVIEWED BY THE ENGINEER OF RECORD, AND THEREFORE MUST BE VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL REVIEW AND STAMP DRAWINGS PRIOR TO REVIEW BY ENGINEER OF RECORD. SUBMITTALS SHALL INCLUDE A REPRODUCIBLE AND ONE COPY. THE REPRODUCIBLE SHALL BE MARKED AND RETURNED.

    SHOP DRAWING SUBMITTALS PROCESSED BY THE ENGINEER ARE NOT CHANGE ORDERS. THE PURPOSE OF SHOP DRAWING SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE ENGINEER THAT THE CONTRACTOR UNDERSTANDS THE DESIGN CONCEPT BY INDICATING WHICH MATERIAL IS INTENDED TO BE FURNISHED AND INSTALLED AND BY DETAILING THE INTENDED FABRICATION AND INSTALLATION METHODS. IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SHOP DRAWING SUBMITTALS AND THE CONTRACT DOCUMENTS ARE DISCOVERED EITHER PRIOR TO OR AFTER SHOP DRAWING SUBMITTALS ARE PROCESSED BY THE ENGINEER, THE DESIGN DRAWINGS AND SPECIFICATIONS SHALL CONTROL AND SHALL BE FOLLOWED.

STATEMENT OF SPECIAL INSPECTION (STRUCTURAL):

13. STATEMENT OF SPECIAL INSPECTIONS – STRUCTURAL ITEMS (SEISMIC DESIGN CATEGORY D***):***

    DEFINITIONS:
    THE SEISMIC FORCE RESISTING SYSTEM FOR THIS STRUCTURE CONSISTS PRIMARILY OF CONCRETE AND WOOD SHEAR WALLS, FLOOR/ROOF DIAPHRAGMS, AND STRUT MEMBERS AS SPECIFIED ON THE DRAWINGS. SEE THE LEGEND OF PLAN SHEETS FOR ADDITIONAL INFORMATION DEFINING MEMBER LOCATIONS.

    SPECIAL INSPECTIONS AND TESTING SHALL BE PERFORMED BY THE OWNER APPOINTED INSPECTION AGENCY IN ACCORDANCE WITH CHAPTER 17 OF THE IBC WITH REPORTS PER IBC SECTION 1704.2.4 SUBMITTED TO THE OWNER, ARCHITECT, STRUCTURAL ENGINEER, CONTRACTOR, AND BUILDING OFFICIAL FOR EACH DAY SPECIAL INSPECTIONS OR TESTING IS PERFORMED. THESE INSPECTIONS ARE IN ADDITION TO THE INSPECTIONS SPECIFIED IN IBC SECTION 108. SEE TABLES BELOW FOR ADDITIONAL INFORMATION.

STRUCTURAL ITEMS	SPECIAL INSPECTION FREQUENCY	IBC REFERENCE
STRUCTURAL STEEL FABRICATION,ERECTION, AND NONDESTRUCTIVE TESTING*		
SPECIAL INSPECTION AND NONDESTRUCTIVE TESTING FOR STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE QUALITY ASSURANCE (QA) INSPECTION REQUIREMENTS OF AISC 360-16 CHAPTER N. CONTINUOUS INSPECTION SHALL BE PERFORMED AT "P" TASKS DEFINED IN AISC 360-16; PERIODIC INSPECTION SHALL BE PERFORMED AT "O" TASKS DEFINED IN AISC 360-16. ADDITIONAL SPECIAL INSPECTION AND TESTING REQUIREMENTS FOR THE STRUCTURAL STEEL SEISMIC SYSTEM SHALL BE PER AISC 341-16 CHAPTER J AS INDICATED BELOW.		
METAL DECKING	PERIODIC	1705.2.2
MATERIAL VERIFICATION (IDENTIFICATION MARKS AND MANUFACTURER'S TEST REPORTS)	PERIODIC	1705.2.1
CONCRETE (SEE GENERAL STRUCTURAL NOTE 22 FOR ADDITIONAL REQUIREMENTS)**		
REINFORCING PLACEMENT	PERIODIC AND PRIOR TO ALL CONCRETE POURS	TABLE 1705.3 ITEM 1
REINFORCING WELDING	PERIODIC (CONTINUOUS FOR SHEAR WALL, MOMENT FRAME, OR OTHER SHEAR REINFORCING AND ALL WELDS GREATER THAN 5/16")	TABLE 1705.3 ITEM 2c
ANCHOR BOLT PLACEMENT	PERIODIC AND PRIOR TO ALL CONCRETE POURS	TABLE 1705.3 ITEM 3
CONCRETE PLACEMENT***	CONTINUOUS	TABLE 1705.3 ITEM 5,6&7
CURING & FORMWORK	PERIODIC	TABLE 1705.3 ITEM 8,11&12
EXPANSION BOLTS & INSERTS	PERIODIC INCLUDING TORQUE TESTS IN ACCORDANCE WITH APPROVED ICC-ES REPORTS	TABLE 1705.3 ITEM 4
EPOXY GROUTED RODS OR REBAR	PERIODIC INCLUDING INSPECTION OF EMBEDMENT DEPTH AND HOLE CLEANLINESS PRIOR TO ALL INSTALLATIONS (CONTINUOUS FOR UPWARDLY INCLINED ANCHORS)	TABLE 1705.3 ITEM 4, ACI 318-14 SECTION 17.8
SOIL COMPACTION	CONTINUOUS	1705.6

    * STRUCTURAL STEEL QUALITY ASSURANCE INSPECTIONS, EXCEPT NONDESTRUCTIVE TESTING, MAY BE WAIVED IF APPROVED BY THE OWNER AND BUILDING OFFICIAL FOR WORK PERFORMED ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION IN ACCORDANCE WITH IBC SECTION 1704.2.5.1.
    ** EXCEPTIONS 1 THRU 5 PER IBC SECTION 1705.3 SHALL NOT APPLY TO CONCRETE WORK ON THIS PROJECT.
    *** FREQUENCY OF CONCRETE LABORATORY TESTING SHALL BE IN ACCORDANCE WITH ACI 318-14 SECTION 26.12.2 UNLESS OTHERWISE NOTED IN THE PROJECT SPECIFICATIONS.

    STRUCTURAL OBSERVATION IN ACCORDANCE WITH IBC SECTION 1704.6 WILL BE PERFORMED BY THE STRUCTURAL ENGINEER OF RECORD DURING CONSTRUCTION AT SIGNIFICANT CONSTRUCTION STAGES AND AT COMPLETION OF THE STRUCTURAL SYSTEM. STRUCTURAL OBSERVATION CONSISTS OF VISUAL OBSERVATION FOR GENERAL CONFORMANCE TO THE CONSTRUCTION DOCUMENTS AND DOES NOT INCLUDE OR WAIVE THE RESPONSIBILITY FOR THE INSPECTIONS REQUIRED BY SECTIONS 110, 1704, OR OTHER SECTIONS OF THE IBC.

    CONTRACTOR STATEMENT OF RESPONSIBILITY: CONTRACTOR SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY IN ACCORDANCE WITH IBC SECTION 1704.4 TO THE BUILDING OFFICIAL AND OWNER PRIOR TO CONSTRUCTION ACKNOWLEDGING THE SPECIAL REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS.

GEOTECHNICAL:

15. FOUNDATION NOTES: SUBGRADE PREPARATION INCLUDING DRAINAGE, EXCAVATION, COMPACTION, AND FILLING REQUIREMENTS, SHALL CONFORM STRICTLY WITH RECOMMENDATIONS GIVEN IN THE SOILS REPORT OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER. FOOTINGS SHALL BEAR ON FIRM SOIL AT LEAST 18" BELOW LOWEST ADJACENT FINISHED GRADE. FOOTING DEPTHS/ ELEVATIONS SHOWN ON THE DRAWINGS ARE MINIMUM AND FOR GUIDANCE ONLY; THE ACTUAL ELEVATIONS SHALL BE ESTABLISHED BY THE CONTRACTOR IN THE FIELD WORKING WITH THE TESTING LAB AND GEOTECHNICAL ENGINEER. BACKFILL BEHIND ALL RETAINING WALLS WITH FREE DRAINING, GRANULAR FILL AND PROVIDE FOR SUBSURFACE DRAINAGE AS NOTED IN THE GEOTECHNICAL REPORT.

    ALLOWABLE SOIL PRESSURE . . . . 1,500 PSF (2,000 PSF FOR TEMPORARY LOADING)
    LATERAL EARTH PRESSURE (RESTRAINED/SEISMIC). 60 PCF/8H
    COEFFICIENT OF FRICTION 0.35

ANCHORAGE:

16. EXPANSION BOLTS INTO CONCRETE SHALL BE ONE OF THE FOLLOWING INSTALLED IN STRICT ACCORDANCE WITH THE ICC-ES REPORTS INDICATED AND MANUFACTURER'S INSTRUCTIONS: "KWIK BOLT TZ" AS MANUFACTURED BY HILTI, INC. (ICC-ES NO. 1917); OR "STRONG-BOLT 2" AS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, INC. (ICC-ES NO. 3037); OR "POWERS-STUD+ SD2" AS MANUFACTURED BY DEWALT (ICC-ES NO. 2502). SUBSTITUTES PROPOSED BY CONTRACTOR SHALL BE SUBMITTED FOR REVIEW WITH ICC-ES REPORTS INDICATING EQUIVALENT OR GREATER LOAD CAPACITIES. IN ADDITION, SUBSTITUTIONS SHALL MEET ICC-ES ACCEPTANCE CRITERIA AC193. SPECIAL INSPECTION IS REQUIRED FOR ALL EXPANSION BOLT INSTALLATION. EXPANSION BOLTS SHALL NOT BE USED AS SUBSTITUTES FOR EMBEDDED ANCHOR BOLTS UNLESS SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER. NOTIFY ENGINEER IF BOLT LOCATIONS CONFLICT WITH REINFORCING STEEL – DO NOT CUT REINFORCING OR REDUCE EMBEDMENT DEPTHS WITHOUT PRIOR APPROVAL.

    UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING NOMINAL EMBEDMENT DEPTHS FOR EXPANSION BOLTS INTO CONCRETE:

    HILTI KWIK BOLT TZ:
    3/8"Ø EXPANSION BOLTS . . . . 2 5/16"
    1/2"Ø EXPANSION BOLTS . . . . 3 5/8"
    5/8"Ø EXPANSION BOLTS . . . . 4 7/16"
    3/4"Ø EXPANSION BOLTS . . . . 5 5/16"

    SIMPSON STRONG-BOLT 2:
    3/8"Ø EXPANSION BOLTS . . . . 2 7/8"
    1/2"Ø EXPANSION BOLTS . . . . 3 7/8"
    5/8"Ø EXPANSION BOLTS . . . . 5 1/8"
    3/4"Ø EXPANSION BOLTS . . . . 5 3/4"

    DEWALT/POWERS POWER-STUD+SD2:
    3/8"Ø EXPANSION BOLTS . . . . 2 3/8"
    1/2"Ø EXPANSION BOLTS . . . . 3 3/4"
    5/8"Ø EXPANSION BOLTS . . . . 4 7/8"
    3/4"Ø EXPANSION BOLTS . . . . 5 3/4"

17. EXPANSION BOLTS INTO GROUTED MASONRY SHALL BE ONE OF THE FOLLOWING INSTALLED IN STRICT ACCORDANCE WITH THE ICC REPORTS INDICATED AND MANUFACTURER'S INSTRUCTIONS: "KWIK BOLT 3", AS MANUFACTURED BY HILTI, INC. (ICC-ES REPORT NO. 1385); OR "WEDGE-ALL" AS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, INC. (ICC-ES REPORT NO. 1396); OR "POWER-STUDSD1" AS MANUFACTURED BY DEWALT (ICC-ES NO. 2966). SUBSTITUTES PROPOSED BY CONTRACTOR SHALL BE SUBMITTED FOR REVIEW WITH ICC-ES REPORTS INDICATING EQUIVALENT OR GREATER LOAD CAPACITIES. IN ADDITION, SUBSTITUTIONS SHALL MEET ICC-ES ACCEPTANCE CRITERIA AC01. SPECIAL INSPECTION IS REQUIRED FOR ALL EXPANSION BOLT INSTALLATION. EXPANSION BOLTSSHALL NOT BE USED AS SUBSTITUTES FOR EMBEDDED ANCHOR BOLTS UNLESS SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER. A MINIMUM OF 6" OF SOLID GROUT SHALL BE IN PLACE AND CURED TO A MINIMUM STRENGTH OF 2,000 PSI ON ALL SIDES OF EXPANSION BOLTS AT MASONRY WALLS PRIOR TO BOLT INSTALLATION. BOLTS IN MASONRY WALL SHALL COMPLY WITH RESTRICTIONS SHOWN IN DETAIL 3/S4.1 AT HEAD JOINTS. NOTIFY ENGINEER IF BOLT LOCATIONS CONFLICT WITH REINFORCING STEEL – DO NOT CUT REINFORCING OR REDUCE EMBEDMENT DEPTHS WITHOUT PRIOR APPROVAL.

18. DRIVE PINS AND OTHER POWDER-ACTUATED FASTENERS SHALL BE ONE OF THE FOLLOWING INSTALLED IN STRICT ACCORDANCE WITH THE ICC-ES REPORTS INDICATED AND MANUFACTURER'S INSTRUCTIONS INCLUDING MINIMUM EMBED REQUIREMENTS: "TE SERIES" (0.157" DIAMETER) AS MANUFACTURED BY ITW RAMSET (ICC-ES NO. 1799); OR "X-U" (0.157" DIAMETER) AS MANUFACTURED BY HILTI, INC. (ICC-ES NO. 2269); OR "STRONG-TIE PDPA" (0.157" DIAMETER) AS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, INC. (ICC-ES NO. 2138); OR "CSI PIN" (0.157" DIAMETER) AS MANUFACTURED BY DEWALT (ICC-ES NO. 2024); OR AN APPROVED EQUIVALENT IN STRENGTH AND EMBEDMENT. MINIMUM EMBEDMENT IN CONCRETE SHALL BE 1" UNLESS OTHERWISE NOTED. MAINTAIN AT LEAST 3-1/2" TO NEAREST CONCRETE EDGE.

19. EPOXY-GROUTED RODS OR REBAR TO CONCRETE SPECIFIED ON THE DRAWINGS SHALL BE ONE OF THE FOLLOWING INSTALLED IN STRICT ACCORDANCE WITH THE ICC-ES REPORTS INDICATED AND MANUFACTURER'S INSTRUCTIONS INCLUDING MINIMUM EMBED REQUIREMENTS: "SET-XP" AS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, INC. (ICC-ES NO. 2508); OR "HIT-HY 200" AS MANUFACTURED BY HILTI, INC. (ICC-ES NO. 3187), "SAFE-SET" INSTALLATION WITH HOLLOW CARBIDE DRILL BIT IS PERMITTED; OR "PURE110+" AS MANUFACTURED BY DEWALT (ICC-ES NO. 3298), OR "AC200+" AS MANUFACTURED BY DEWALT (ICC-ES NO. 4027). SUBSTITUTES PROPOSED BY CONTRACTOR SHALL BE SUBMITTED FOR REVIEW WITH ICC-ES REPORTS INDICATING EQUIVALENT OR GREATER LOAD CAPACITIES. IN ADDITION, SUBSTITUTIONS SHALL MEET ICC-ES ACCEPTANCE CRITERIA AC308. SPECIAL INSPECTION OF EPOXY-GROUTED ANCHOR INSTALLATION IS REQUIRED. NOTIFY ENGINEER IF ANCHOR LOCATIONS CONFLICT WITH REINFORCING STEEL – DO NOT CUT REINFORCING OR REDUCE EMBEDMENT DEPTHS WITHOUT PRIOR APPROVAL. INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED TO SUPPORT SUSTAINED TENSION LOADS SHALL BE PERFORMED BY CERTIFIED PERSONNEL IN CONFORMANCE TO ACI 318-14 SECTION 17.8.2.2. HOLES SHALL BE HAMMER DRILLED AND DRY.

    EPOXY GROUTED RODS OR REBAR SHALL NOT BE USED AS SUBSTITUTES FOR CAST-IN-PLACE ANCHOR BOLTS, THREADED RODS, OR REINFORCING STEEL UNLESS SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER. FIELD FIXES OR OTHER CONDITIONS NOT ADDRESSED IN THE DOCUMENTS MUST BE SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER, INCLUDING EMBEDMENT DEPTHS.

    UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING EMBEDMENT DEPTHS FOR ANCHORS AT CONCRETE:
    3/8"Ø ROD OR #3 BAR . . . . 4"
    1/2"Ø ROD OR #4 BAR . . . . 5"
    5/8"Ø ROD OR #5 BAR . . . . 7"
    3/4"Ø ROD OR #6 BAR . . . . 9"
    7/8"Ø ROD OR #7 BAR . . . . 12"
    1"Ø ROD OR #8 BAR . . . . 15"

20. HELICAL TIES THROUGH BRICK/HOLLOW CLAY TILE/TERRA COTTA MASONRY SHALL BE ONE OF THE FOLLOWING: "DRYFIX" MANUFACTURED BY HELIFIX, A DIVISION OF HALFEN USA; "HELI-TIE" BY SIMPSON STRONG-TIE COMPANY, INC.; OR "CTP STITCH-TIE" BY CONSTRUCTION TIE PRODCUTS, INC.; OR "HELI-PIN" MANUFACTURED BY DEWALT. TIES SHALL BE MANUFACTURED OF GRADE 304 STAINLESS STEEL. PROVIDE SIZE AND LENGTHS AS INDICATED ON THE DRAWINGS. TIES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND WITH MANUFACTURER'S EQUIPMENT. PERIODIC SPECIAL INSPECTION OF TIES IS REQUIRED. PATCH BUILDING SURFACE AFTER HELICAL WALL TIE INSTALLATION WITH A COLOR-APPROVED CEMENTITIOUS MORTAR.

    (2) TEST INSTALLATIONS SHALL BE PERFORMED FOR EACH TYPE OF HELICAL WALL TIE INSTALLATION, INCLUDING EXTERIOR PATCHING WORK, AND TEST INSTALLATIONS SHALL BE REVIEWED BY THE OWNER'S REPRESENTATIVE AND ARCHITECT PRIOR TO THE INSTALLATION OF THE REMAINDER OF HELICAL WALL TIES.

21. CONCRETE SCREW ANCHORS SHALL BE ONE OF THE FOLLOWING INSTALLED IN STRICT ACCORDANCE WITH THE ICC-ES REPORTS INDICATED AND MANUFACTURER'S INSTRUCTIONS INCLUDING MINIMUM EMBED REQUIREMENTS: "TITEN HD" AS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY (ICC-ES NO. 2713); OR "KWIK HUS-EZ" AS MANUFACTURED BY HILTI, INC. (ICC-ES NO. 3027); OR "SCREW-BOLT+" AS MANUFACTURED BY DEWALT (ICC-ES NO. 3889). SUBSTITUTES PROPOSED BY CONTRACTOR SHALL BE SUBMITTED FOR REVIEW WITH ICC-ES REPORTS INDICATING EQUIVALENT OR GREATER LOAD CAPACITIES. IN ADDITION, SUBSTITUTIONS SHALL MEET ICC-ES ACCEPTANCE CRITERIA AC193. SPECIAL INSPECTION IS REQUIRED FOR ALL CONCRETE SCREW ANCHOR INSTALLATION. CONCRETE SCREW ANCHORS SHALL NOT BE USED AS SUBSTITUTES FOR EMBEDDED ANCHOR BOLTS OR EXPANSION BOLTS UNLESS SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER. NOTIFY ENGINEER IF SCREW ANCHOR LOCATIONS CONFLICT WITH REINFORCING STEEL – DO NOT CUT REINFORCING OR REDUCE EMBEDMENT DEPTHS WITHOUT PRIOR APPROVAL.

CONCRETE:

22. CONCRETE SHALL BE MIXED, PROPORTIONED, CONVEYED AND PLACED IN ACCORDANCE WITH ACI 318-14 CHAPTER 26 AND ACI 301. SPECIAL INSPECTION IS REQUIRED FOR THE LISTED MIXTURES (SEE NOTE 14). STRENGTHS AT 28 DAYS AND MIX CRITERIA SHALL BE AS FOLLOWS:

TYPE OF CONSTRUCTION	MIN. 28 DAY STRENGTH (U.O.N.) (f'c)	EXPOSURE CLASSES (ACI 318-14 TABLES 19.3.1.1 AND 19.3.2.1)
A. CONCRETE EXPOSED TO WEATHER	3,000 PSI	(F1, S0, W0, C1)
B. CONCRETE EXPOSED TO EARTH (FOUNDATIONS, BASEMENT WALLS, ETC.)	3,000 PSI	(F0, S0, W0, C1)

    * WATER-CEMENTITIOUS MATERIAL RATIO FOR INTERIOR SLABS SHALL BE BETWEEN 0.40 AND 0.44.

    ** SHRINKAGE CRITERIA: MIX SHALL BE PROPORTIONED SUCH THAT THE SLAB DRYING SHRINKAGE SHALL NOT EXCEED 0.035% AT 28 DAYS (LABORATORY CONDITIONS). SUBMIT STRENGTH AND SHRINKAGE TEST DATA AND MIX DESIGN TO THE STRUCTURAL ENGINEER FOR REVIEW A MINIMUM OF TWO WEEKS PRIOR TO PLACING ANY CONCRETE.

    CONCRETE MIXES SHALL MEET OR EXCEED THE REQUIREMENTS SPECIFIED ABOVE. MIXES SHALL BE SUBMITTED TO THE ENGINEER AND BUILDING OFFICIAL FOR APPROVAL TWO WEEKS PRIOR TO PLACING ANY CONCRETE AND SHALL INCLUDE THE AMOUNTS OF CEMENT, CEMENTITOUS MATERIAL, FINE AND COARSE AGGREGATE, WATER AND ADMIXTURES, AS WELL AS THE WATER-CEMENT RATIO, SLUMP, CONCRETE YIELD AND SUBSTANTIATING STRENGTH DATA IN ACCORDANCE WITH ACI 318-14, CHAPTER 26 AND 27. REVIEW OF MIX SUBMITTALS BY THE ENGINEER OF RECORD INDICATES ONLY THAT INFORMATION PRESENTED CONFORMS GENERALLY WITH CONTRACT DOCUMENTS. CONTRACTOR OR SUPPLIER MAINTAINS FULL RESPONSIBILITY FOR SPECIFIED PERFORMANCE.

    CONCRETE MAY BE PLACED BY THE "SHOTCRETE" METHOD, PROVIDED THE APPROVALS, TESTS, AND INSPECTIONS REQUIRED BY THE BUILDING DEPARTMENT ARE OBTAINED. SHOTCRETE MATERIALS, EQUIPMENT, PROCEDURES, PROPORTIONS, BATCHING AND MIXING, AND PLACEMENT SHALL BE IN ACCORDANCE WITH ACI 506.2 AND SBCSECTION 1908. IF WALLS ARE EXPOSED COORDINATE FINISH REQUIREMENTS WITH ARCHITECT.

23. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, fy = 60,000 PSI. GRADE 60 REINFORCING BARS WHICH ARE TO BE WELDED SHALL CONFORM TO ASTM A706. REINFORCEMENT COMPLYING WITH ASTM A615(S1) MAY BE WELDED ONLY IF MATERIAL PROPERTY REPORTS INDICATING CONFORMANCE WITH WELDING PROCEDURES SPECIFIED IN A.W.S. D1.4 ARE SUBMITTED.

    LONGITUDINAL REINFORCEMENT IN ALL COLUMNS, PILES, DUCTILE FRAME MEMBERS, STRUT MEMBERS, COUPLING BEAMS, AND VERTICAL REINFORCMENT IN SHEAR WALLS SHALL COMPLY WITH ASTM A706. ASTM A615 GRADE 60 REINFORCEMENT ARE ALLOWED IN THESE MEMBERS IF: (A) THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS DOES NOT EXCEED THE SPECIFIED YIELD STRENGTH BY MORE THAN 18,000 PSI (RETESTS SHALL NOT EXCEED THIS VALUE BY MORE THAN AN ADDITIONAL 3,000 PSI), (B) THE RATIO OF THE ACTUAL ULTIMATE TENSILE STRESS TO THE ACTUAL TENSILE YIELD STRENGTH IS NOT LESS THAN 1.25, AND (C) MINIMUM ELONGATION IN 8 IN. SHALL BE AT LEAST 14 PERCENT FOR BAR SIZES NO. 3 THROUGH NO. 6, AT LEAST 12 PERCENT FOR BAR SIZES NO. 7 THROUGH NO. 11, AND AT LEAST 10 PERCENT FOR BAR SIZES NO. 14 AND NO. 18. CERTIFIED MILL TEST REPORTS FOR EACH SHIPMENT OF REINFORCING SHALL BE SUBMITTED FOR REVIEW.

    WELDED WIRE FABRIC SHALL CONFORM TO ASTM A1064.

    SPIRAL REINFORCEMENT SHALL BE PLAIN WIRE CONFORMING TO ASTM A615, GRADE 60, fy = 60,000 PSI.

24. REINFORCING STEEL SHALL BE DETAILED (INCLUDING HOOKS AND BENDS) IN ACCORDANCE WITH ACI 315-99 AND 318-14. LAP ALL CONTINUOUS REINFORCEMENT (#5 AND SMALLER) 40 BAR DIAMETERS OR 2'-0" MINIMUM. PROVIDE CORNER BARS AT ALL WALL AND FOOTING INTERSECTIONS. LAP CORNER BARS (#5 AND SMALLER) 40 BAR DIAMETERS OR 2'-0" MINIMUM. LAPS OF LARGER BARS SHALL BE MADE IN ACCORDANCE WITH ACI 318-14 SECTION 25.5, CLASS B. LAP ADJACENT MATS OF WELDED WIRE FABRIC A MINIMUM OF 12" AT SIDES AND ENDS.

    NO BARS PARTIALLY EMBEDDED IN HARDENED CONCRETE SHALL BE FIELD BENT UNLESS OTHERWISE NOTED ON THE DRAWINGS OR APPROVED BY THE STRUCTURAL ENGINEER.

25. REINFORCING STEEL SHALL BE DETAILED (INCLUDING HOOKS AND BENDS) IN ACCORDANCE WITH ACI 315-99 AND 318-14. LAP ALL CONTINUOUS REINFORCEMENT IN ACCORDANCE WITH "REINFORCEMENT SPLICE AND DEVELOPMENT LENGTH SCHEDULE" OF 20/S3.1. PROVIDE CORNER BARS AT ALL WALL AND FOOTING INTERSECTIONS. LAP ADJACENT MATS OF WELDED WIRE FABRIC A MINIMUM OF 12" AT SIDES AND ENDS.

    NO BARS PARTIALLY EMBEDDED IN HARDENED CONCRETE SHALL BE FIELD BENT UNLESS OTHERWISE NOTED ON THE DRAWINGS OR APPROVED BY THE STRUCTURAL ENGINEER.

26. CONCRETE PROTECTION (COVER) FOR REINFORCING STEEL SHALL BE AS FOLLOWS:

    FOOTINGS AND OTHER UNFORMED SURFACES CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH . . . . 3"
    FORMED SURFACES EXPOSED TO EARTH (i.e. WALLS BELOW GROUND) OR WEATHER (#6 BARS OR LARGER). . . . . 2"
    (#5 BARS OR SMALLER). . . . . 1 1/2"
    SLAB-ON-GRADE BOTTOM REINFORCING (WITH VAPOR BARRIER BELOW) . . . . 1 1/2"
    COLUMN TIES OR SPIRALS AND BEAM STIRRUPS . . . . 1 1/2"
    SLABS AND WALLS (INTERIOR FACE) . . . . (#11 BARS OR SMALLER) . . . . 1"
    (#14 OR #18 BARS) . . . . 1 1/2"

27. CAST-IN-PLACE CONCRETE: SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND DIMENSIONS OF DOOR AND WINDOW OPENINGS IN ALL CONCRETE WALLS. SEE MECHANICAL DRAWINGS FOR SIZE AND LOCATION OF MISCELLANEOUS MECHANICAL OPENINGS THROUGH CONCRETE WALLS. SEE ARCHITECTURAL DRAWINGS FOR ALL GROOVES, NOTCHES, CHAMFERS, FEATURE STRIPS, COLOR, TEXTURE, AND OTHER FINISH DETAILS AT ALL EXPOSED CONCRETE SURFACES.

28. BONDING AGENT SHALL BE "MASTEREMACO ADH 326" BY BASF CORPORATION. OR EQUIVALENT, AND SHALL BE USED WHERE NEW CONCRETE IS PLACED AGAINST HARDENED CONCRETE. PLACE IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, INCLUDING PREPARATION OF EXISTING SURFACES. CONCRETE SHALL BE CONSIDERED HARDENED AFTER 56 DAYS.

29. NON-SHRINK GROUT SHALL BE FURNISHED BY AN APPROVED MANUFACTURER AND SHALL BE MIXED AND PLACED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. GROUT STRENGTH SHALL BE AT LEAST EQUAL TO THE MATERIAL ON WHICH IT IS PLACED (6,000 PSI MINIMUM).

30. MECHANICAL SPLICING OF REINFORCING BARS, WHERE INDICATED ON THE DRAWINGS, SHALL BE BY AN ICC-ES APPROVED SYSTEM (SUCH AS LENTON, DAYTON SUPERIOR, ETC.) AND SHALL DEVELOP 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS. SPLICE LOCATIONS OF ALTERNATE BARS SHALL BE OFFSET BY A DISTANCE WHICH CONFORMS TO THE ICC-ES REPORT OF THE SPLICE USED AND TO ACI 318-14 SECTION 18.2.7.1.

SHEET INDEX

S1.1 GENERAL STRUCTURAL NOTES
S2.0 GROUND LEVEL PLAN
S3.1 TYPICAL CONCRETE DETAILS

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DATE:
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DRAINAGE PLAN
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MINGQIN LI AND SUN YONG
P032

GENERAL STRUCTURAL NOTES

S1.1

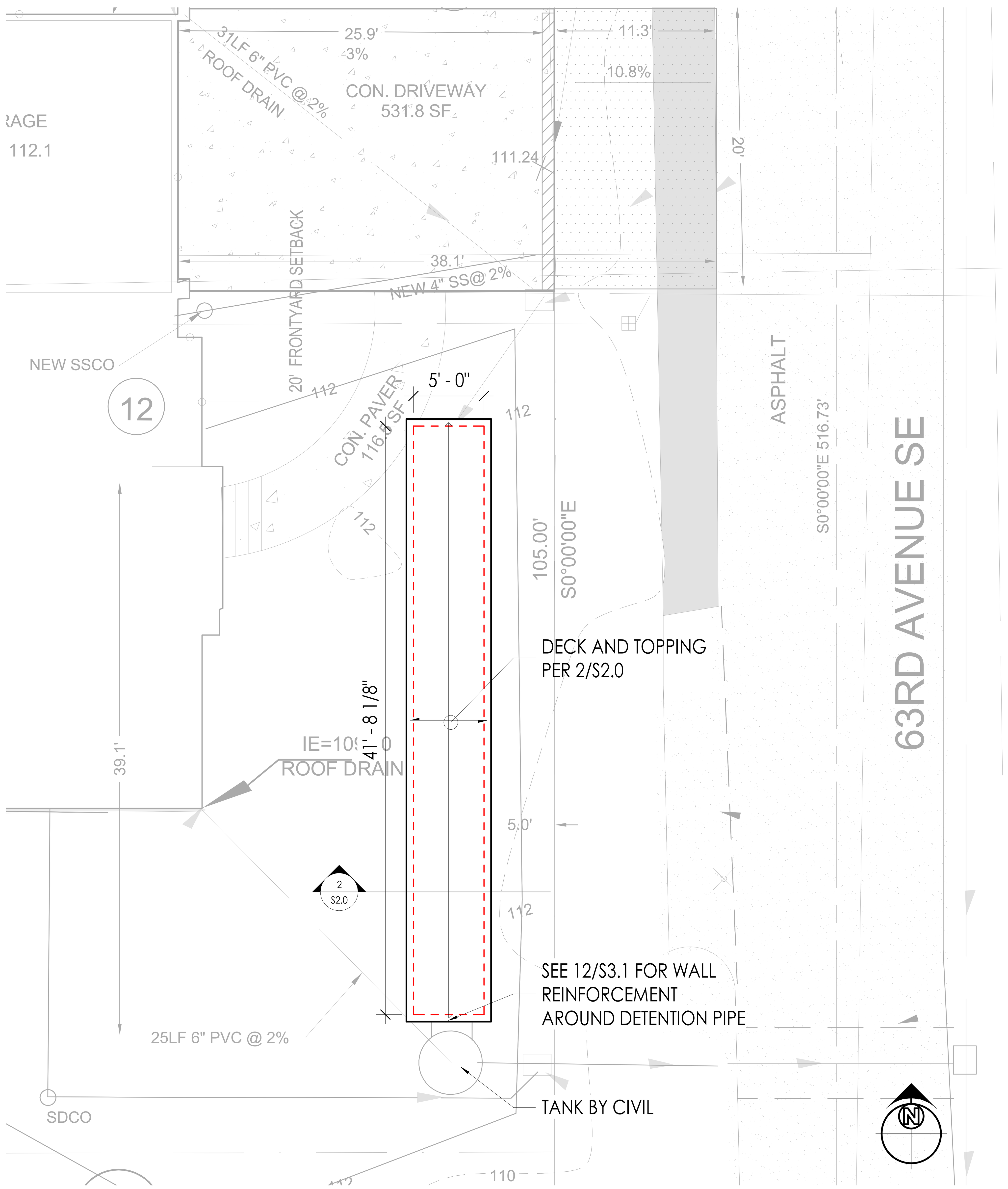
FOUNDATION PLAN NOTES:

1. PROVIDE CONSTRUCTION/CONTROL JOINTS IN SLABS ON GRADE TO DIVIDE SLAB INTO RECTANGULAR AREAS 225 SQUARE FEET OR LESS. AREAS SHALL BE APPROXIMATELY SQUARE AND HAVE NO ACUTE ANGLES. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. JOINT LOCATIONS MUST BE APPROVED BY THE ARCHITECT. SEE 10/S3.1.
2. TOPS OF ALL FOOTINGS ELEVATIONS ARE PER PLAN. OVER EXCAVATE AND PLACE SUITABLE COMPACTED FILL AS DIRECTED BY OWNER APPROVED GEOTECHNICAL ENGINEER WHERE REQUIRED. CONTRACTOR SHALL COORDINATE WITH FINAL SITE GREADES AND MAINTAIN MINIMUM DEPTH OF FOOTINGS SHOWN ON THE DRAWINGS.
3. SEE ARCHITECTURAL/MECHANICAL/CIVIL/UTILITIES DRAWINGS FOR UNDERSLAB PIPING. COORDINATE FOUNDATION DEPTHS AND PIPING IN ACCORDANCE WITH 7/S3.1.

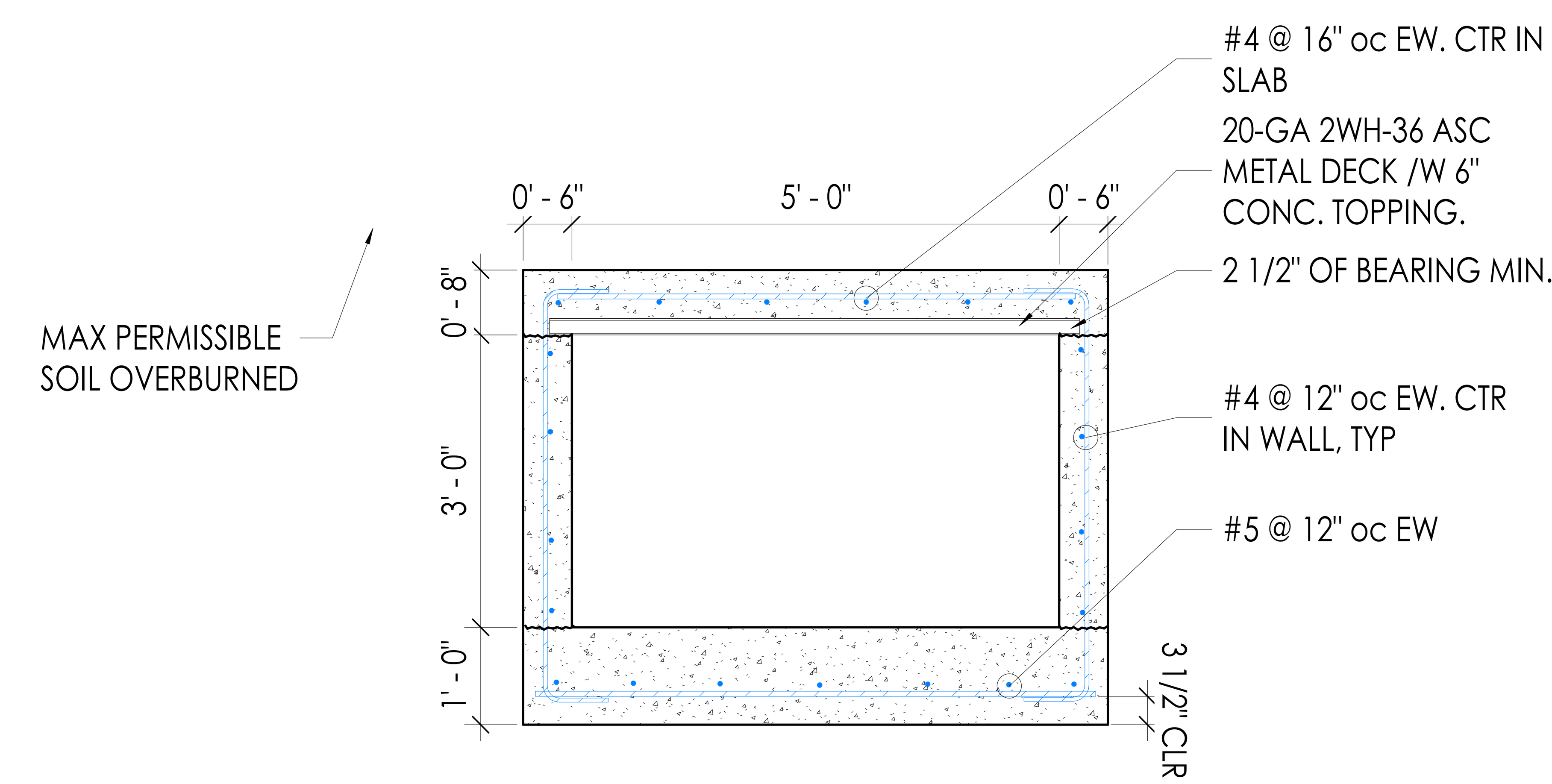
Bar Legend:

QUANTITY (WHERE SPECIFIED)
BAR SIZE
"T" TOP, "M" MIDDLE, or "B" BOTTOM
@ SPACING oc (EQ. SPACE IF NOT SPECIFIED)

(8) 5 B 15



1 PLAN
3/16" = 1'-0"



2 TANK SECTION
3/4" = 1'-0"

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GROUND LEVEL PLAN

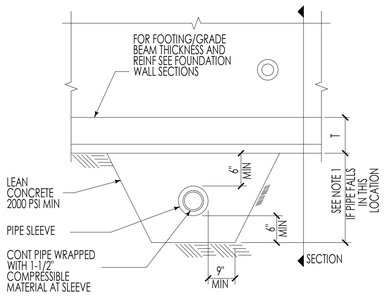
S2.0

2

3

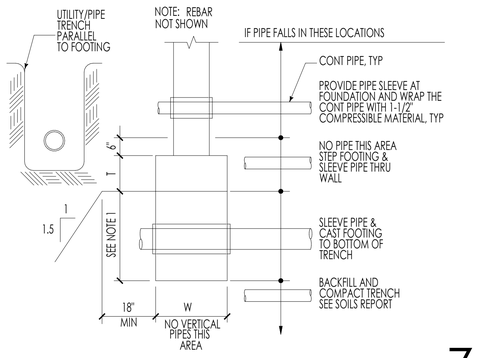
4

5

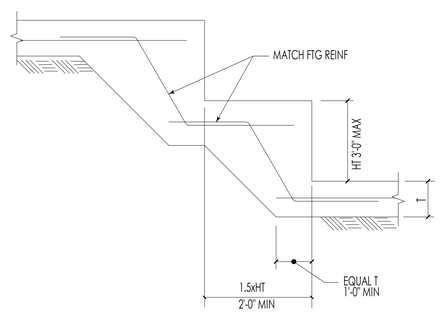


NOTES:

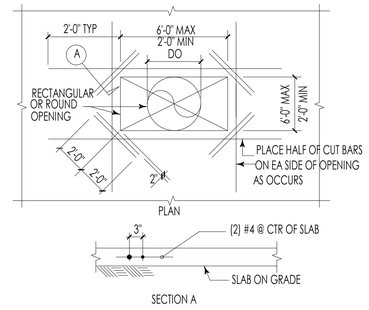
1. SINGLE PIPES 8'Ø OR LESS PERPENDICULAR TO AND GREATER THAN 24" CLEAR BELOW FOOTINGS DO NOT REQUIRE CONCRETE ENCASEMENT. (PIPE GROUPINGS BELOW 24" SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER).
2. PIPES LARGER THAN 8'Ø SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER.



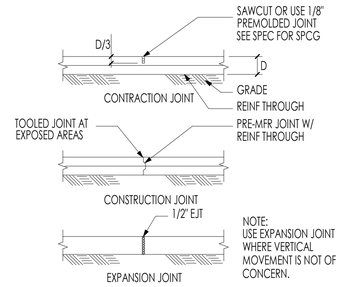
PIPE CLEARANCE AT STRIP FTG/GRADE BEAM 7



STEPPED FOOTING 8



OPENING IN CONCRETE SLAB 9



10

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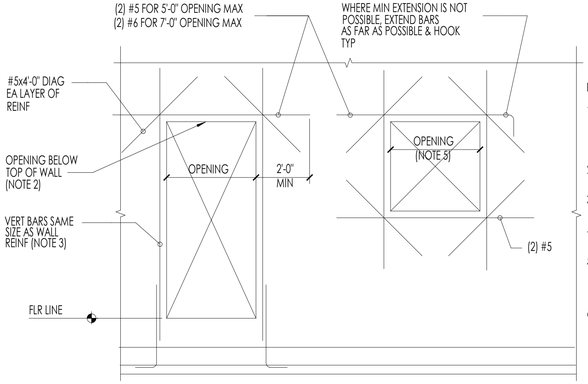
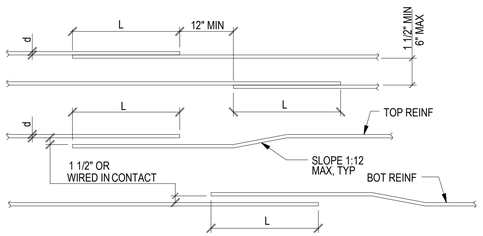


NOTES:

1. REINFORCEMENT SHOWN IS IN ADDITION TO ANY OTHER WALL REINFORCEMENT SPECIFIED FOR THIS PROJECT. SUCH WALL REINFORCEMENT IF ANY, IS NOT SHOWN FOR CLARITY. SEE DETAILS FOR TYPICAL CONCRETE WALL REINFORCING.
2. PROVIDE #3 STIRRUPS @ 8" OC ABOVE ALL OPENINGS LESS THAN 12" BELOW TOP OF WALL.
3. EXTEND JAMB BARS FLR TO FLR OR FLR TO ROOF, WHERE OPENING EXCEEDS 5'-0" IN WIDTH.
4. THE ABOVE REINFORCING DOES NOT APPLY TO OPENINGS GREATER THAN 7'-0".
5. OPENINGS LESS THAN 8" DO NOT REQUIRE ADDITIONAL TRIM BARS. AT OPENINGS MORE THAN 8", BUT LESS THAN 2'-0" PROVIDE (1) #5 BAR T&B, NO DIAGONAL BARS ARE NECESSARY.
6. ALL REINFORCEMENT LAP LENGTHS SHALL BE SUFFICIENT TO DEVELOP A CLASS "B" TENSION LAP SPLICE.

REINF OF CONC WALL OPNG 12

REINFORCEMENT OF CONC WALLS AT CORNERS 17



1. SCHEDULE APPLIES TO UNCOATED GRADE 60 BARS IN NORMAL WEIGHT CONCRETE.
2. FOR LIGHTWEIGHT CONCRETE MULTIPLY LENGTH IN SCHEDULE BY 1.3.
3. ALL SPLICES SHALL BE CLASS B SPLICES UNLESS INDICATED OTHERWISE.
4. TOP BARS (INDICATED WITH "T" IN SCHEDULE) ARE HORIZONTAL TOP BARS WITH MORE THAN 12" OF CONC CAST BLW THE BARS.
5. BOTTOM BARS (INDICATED WITH "B" IN SCHEDULE) ARE ALL VERTICAL BARS AND HORIZONTAL BARS WITH LESS THAN 12" OF CONCRETE CAST BELOW HORIZONTAL BARS.
6. ANY PORTION OF A STRAIGHT BAR EMBEDMENT LENGTH NOT WITHIN THE CONFINED CORE SHALL BE INCREASED BY A FACTOR OF 1.6.
7. ALL HORIZONTAL SPLICES SHALL BE STAGGERED AS SHOWN. IF MORE THAN 50% OF VERTICAL REINFORCING IS LAP SPLICED WITHIN THE REQUIRED LAP SPLICE LENGTH. THE LAP SPLICE LENGTH SHALL BE INCREASED BY 33%.
8. LAP SPLICES LISTED IN THE SCHEDULE ARE CLASS B LAPS, FOR CLASS A LAPS REDUCE LENGTH BY 25%.
9. FOR f'c=4500psi USE VALUES FOR 4000psi.
10. AT HOOKS, SIDE COVER MUST BE EQUAL TO OR GREATER THAN 2 1/2".
11. END COVER FOR 90 DEGREE HOOKS MUST BE EQUAL TO OR GREATER THAN 2".

SPLICE OR DEVELOPMENT LENGTH (INCHES)

NORMAL WT. CONCRETE f'c (psi)	I) MINIMUM "CLASS B" TENSION LAP SPLICE (ls) SCHEDULE																	
	0.375"		0.500"		0.625"		0.750"		0.875"		1.000"		1.128"		1.270"		1.410"	
	#3		#4		#5		#6		#7		#8		#9		#10		#11	
	T	B	T	B	T	B	T	B	T	B	T	B	T	B	T	B	T	B
3000	28	22	38	29	47	36	56	43	81	63	93	72	105	81	116	90	128	98
4000	25	19	33	25	41	31	49	37	71	54	81	62	91	70	101	78	111	85
5000	22	17	29	23	36	28	44	34	63	49	72	56	81	63	90	69	99	76
6000	20	16	27	21	33	26	40	31	58	45	66	51	74	57	82	63	90	70
-	II) MINIMUM STRAIGHT DEVELOPMENT LENGTH (ld) SCHEDULE																	
3000	22	17	29	22	36	28	43	33	63	48	72	55	81	62	90	69	98	76
4000	19	15	25	19	31	24	37	29	54	42	62	48	70	54	78	60	85	66
5000	17	13	23	17	28	22	34	26	49	38	56	43	63	48	69	54	76	59
6000	16	12	21	16	26	20	31	24	45	34	51	39	57	44	63	49	70	54
-	III) MINIMUM EMBEDMENT LENGTHS (ldh) FOR STANDARD END HOOKS																	
4000	6	-	7	-	9	-	10	-	12	-	14	-	15	-	17	-	19	-
5000	6	-	6	-	8	-	9	-	11	-	12	-	14	-	16	-	17	-
6000	6	-	6	-	7	-	9	-	10	-	11	-	13	-	14	-	16	-
-	IV) MINIMUM LAB SPLICE LENGTH (lsc) FOR BARS IN COMPRESSION																	
>3000	-	-	-	-	-	-	23	-	33	-	37	-	46	-	57	-	68	-
-	V) MINIMUM STRAIGHT DEVELOPMENT LENGTH (ldc) FOR BARS IN COMPRESSION																	
>3000	-	-	-	-	-	-	17	-	20	-	22	-	25	-	28	-	32	-
-	VI) SHEAR WALL VERTICAL LAP SPLICE LENGTH (ls)																	
5000	-	-	17	-	21	-	29	-	47	-	60	-	73	-	88	-	98	-

REINFORCING SPLICE AND DEVELOPMENT SCHEDULE 20

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TYPICAL CONCRETE DETAILS

S3.1