

GENERAL STRUCTURAL NOTES

A. DESIGN CRITERIA

1. BUILDING CODE: INTERNATIONAL BUILDING CODE (IBC), 20012 EDITION, INCLUDING LOCAL SUPPLEMENTS.
2. GRAVITY LOADS:

LOCATION	LIVE LOAD	DEAD LOAD*
VAULT COVER	HS20-44 (VEHICLE LOAD)	75 PSF

*DEAD LOAD WHICH IS SUPERIMPOSED ONTO ACTUAL STRUCTURAL WEIGHTS DOES NOT INCLUDE SOIL SURCHARGE.
3. SOIL LOADS

SOIL WEIGHT:	120 PCF
EXTERNAL SOIL PRESSURE	90 PCF (SATURATED)

B. DELEGATED ENGINEERING OF STRUCTURAL COMPONENTS & SYSTEMS

1. ALL STRUCTURAL COMPONENTS & SYSTEMS DESIGNED AND SEALED BY A SPECIALTY STRUCTURAL ENGINEER (SSE) SHALL MEET THE GUIDELINES PUBLISHED BY THE COUNCIL OF AMERICAN STRUCTURAL ENGINEERS (CASE) FOR DELEGATED SPECIALTY STRUCTURAL ENGINEERING.
2. WHEN COMPONENTS & SYSTEMS SPECIFIED ARE DELEGATED, THE SHOP DRAWINGS SHALL HAVE THE FOLLOWING:
 - A. PROVIDE A FULL DESIGN ANALYSIS INCLUDING CALCULATIONS WITH A SEALED COVER SHEET IDENTIFYING THE PROJECT NAME AND ADDRESS.
 - B. THE ENGINEER THAT SEALED THE CALCULATIONS SHALL ALSO SEAL THE FABRICATION, PLACING, AND ERECTION PLANS. EACH PLAN SHALL IDENTIFY THE PROJECT NAME/ADDRESS.
 - C. THE ENGINEER THAT SEALED THE PLANS SHALL STATE THAT HE HAS COMPLETED A DETAILED REVIEW OF THE CONTRACT DOCUMENTS AND HAS INCORPORATED THE PERFORMANCE CRITERIA INTO THE SUBMITTAL.
3. THE CONTRACTOR SHALL REVIEW THE SUBMITTAL FOR QUANTITIES AND DIMENSIONS AND VERIFY THAT THE ABOVE INFORMATION HAS BEEN INCLUDED IN THE SUBMITTAL.

PRECAST CONCRETE

1. AT THE CONTRACTORS OPTION A PRECAST STRUCTURE MAY BE USED IN PLACE OF THE CAST IN PLACE STRUCTURE. ALL EARTHWORK AND QUALITY ASSURANCE MEASURES SHALL BE AS NOTED IN THE STRUCTURAL GENERAL NOTES AND DETAILS.
2. REF. DELEGATED ENGINEERED STRUCTURAL COMPONENTS & SYSTEM FOR SUBMITTAL REQUIREMENTS.
3. REF. DESIGN CRITERIA FOR BUILDING CODE, SERVICE CRITERIA AND LOADS TO BE USED IN DESIGN.
4. ADDITIONAL DETAILED CRITERIA
 - A. PRECAST COMPONENTS & CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH THE PCI DESIGN HANDBOOK, ASTM C913 (RECTANGULAR), OR ASTM C478 (ROUND). NON-STANDARD MEMBER CROSS-SECTIONS SHALL BE APPROVED BY THE ENGINEER IN ADVANCE OF SHOP DRAWINGS.
 - B. ALL OPENINGS GREATER THAN 6" ON A SIDE SHALL BE NEATLY FORMED TO DIMENSIONS. OPENINGS 6" OR SMALLER MAY BE CORE DRILLED IN THE FIELD.
 - C. CONCRETE SHALL MEET THE REQUIREMENTS OF THE MIX DESIGN SECTION UNDER CONCRETE. SELF-CONSOLIDATION CONCRETE MAY BE USED WITH APPROVAL PRIOR TO USE.
 - D. DO NOT REMOVE CONCRETE FROM FORMS UNTIL THE CONCRETE HAS ATTAINED SUFFICIENT STRENGTH NOT TO BE DAMAGED BY FORM REMOVAL OPERATION. ALL EXPOSED FORM TIES MUST BE REMOVED SO THAT NONE ARE VISIBLE.
 - E. GROUT UNDER PIECES WITH NON-SHRINK NON-METALLIC GROUT THAT HAS THE SAME STRENGTH AS THE PRECAST.

C. SOIL PREPARATION AND FOUNDATIONS

1. SOIL SUPPORTED FOUNDATIONS:
 - A. DESIGN BEARING PRESSURE (NET) IS 1500 PSF FOR FOUNDATIONS BEARING ON UNDISTURBED SOIL OR APPROVED ENGINEERED FILL MATERIAL.
 - B. ALL FOUNDATIONS ARE DESIGNED WITH EARTH FORMED SIDES; THE TOP 7/8" OF THE FOUNDATION SHALL BE FORMED TO THE DESIGN DIMENSION WHEN VISIBLE AFTER CONSTRUCTION IS COMPLETE. THE CONSTRUCTED FOUNDATION DIMENSION SHALL BE NO LESS THAN THE DESIGN DIMENSION, AND NO MORE THAN 6" GREATER THAN THE DESIGN DIMENSION.
2. DO NOT BACKFILL FOUNDATION WALLS UNTIL THE RESTRAINING COVER SLAB OR ADEQUATE BRACING ARE IN PLACE AND CONCRETE STRENGTH HAS REACHED 75% OF DESIGN STRENGTH. ALL BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION.

D. CONCRETE

1. ALL STRUCTURAL CONCRETE HAS BEEN DESIGNED IN ACCORDANCE WITH THE ACI 318 AND THE BUILDING CODE, AND IN CONFORMANCE WITH THE CURRENT "ACI MANUAL OF CONCRETE PRACTICE."
2. THE CONCRETE REQUIREMENTS ARE:
 - A. CEMENT SHALL BE TYPE I OR II CONFORMING TO ASTM C150. FLY ASH CONFORMING TO ASTM C618 TYPE C OR F MAY BE USED TO REPLACE A MAXIMUM OF 20% OF THE CEMENT BY WEIGHT.

B. FINE AGGREGATE FOR NORMAL WEIGHT CONCRETE SHALL MEET ASTM C33.

C. COARSE AGGREGATES FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33, GRADE 67 OR LARGER. COARSE AGGREGATES SHALL BE NO LESS THAN 50% OF THE TOTAL AGGREGATE BY WEIGHT, UNLESS APPROVED BY THE ENGINEER PRIOR TO MIX DESIGN SUBMITTAL.

D. MIX REQUIREMENTS ARE:

LOCATION	MIN. F _c (PSI)	MIN. CEM.(PCY)	MAX. W/C RATIO	AIR CONTENT	SLUMP§ INCHES
CAST-IN-PLACE	4500	560	0.42	5%±1%	3-5
PRECAST	5000	---	---	---	---

§ PRIOR TO THE ADDITION OF HIGH RANGE WATER REDUCERS, IF APPROVED BY ENGINEER, AFTER ADDITION THE SLUMP MAY NOT EXCEED 8".

F_c SPECIFIED IS BASED ON THE 28 DAY COMPRESSIVE STRENGTH IN ACCORDANCE WITH ACI 318 ACCEPTANCE CRITERIA

3. ADMIXTURES, HARDENERS, & CURING COMPOUNDS

- A. ALL CONCRETE ADMIXTURES SHALL, WHEN MIXED INTO CONCRETE, BE NON-CHLORIDE AND NON-CHLORIDE FORMING.
- B. ALL ADMIXTURES MUST CONFORM TO ASTM C-494 AND C-260.
- C. CONCRETE CURING COMPOUND AND SEALERS SHALL MEET ASTM C-309 TYPE 1 OR 1D.
- D. THE CONTRACTOR SHALL VERIFY THAT ALL ADMIXTURES, HARDENERS, CURING COMPOUNDS, AND FLOOR COVERING ADHESIVES ARE COMPATIBLE WITH EACH OTHER.

4. MISCELLANEOUS CONCRETE DETAILS:

- A. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4" INSIDE FORMS OR TOOLED TO 3/4" RADIUS UNLESS NOTED OTHERWISE.
- B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ALL FORMING AND SHORING. SHORING FOR ELEVATED SLABS SHALL BE SET SO THAT ANY LOAD DUE TO THE CONCRETE OPERATIONS DOES NOT CAUSE THE FORMS TO SETTLE (SLACK, TAKE-UP, ETC.).
- C. NO ALUMINUM SHALL BE EMBEDDED IN CONCRETE. CONDUITS AND PIPING EMBEDDED IN CONCRETE WALLS, SLABS, OR BEAMS SHALL BE SPACED A MINIMUM OF FOUR DIAMETERS AND THE OUTSIDE DIAMETER SHALL BE LESS THAN 30% OF THE MEMBER THICKNESS AND PLACED BETWEEN LAYERS OF REINFORCING.
- D. NO CONDUIT MAY BE EMBEDDED IN TOPPING SLABS ON PRECAST CONCRETE UNLESS SPECIFICALLY DETAILED OR NOTED OTHERWISE ON STRUCTURAL PLANS.
- E. WATERSTOP AT PRECAST JOINTS, OPENINGS, AND PENETRATIONS SHALL BE "SWELLSTOP" (3/4"x1") BY GREENSTREAK OR APPROVED EQUAL. WATERSTOP AT CAST IN PLACE JOINTS SHALL BE PVC WATERSTOP MODEL NO. 702 BY GREENSTREAK OR APPROVED EQUAL.
- F. PROVIDE EXTERIOR WATERPROOFING AT ALL CONCRETE SURFACES BELOW GRADE. USE 2 COATS OF SEAL MASTIC BY W.R. MEADOWS OR APPROVED EQUAL. APPLY PER MANUFACTURER'S RECOMMENDATIONS.

E. CONCRETE REINFORCING (CAST-IN-PLACE & PRECAST)

1. MATERIALS:

	ASTM	GRADE
PLATE & ANGLE	A36	---
REINFORCING BARS:	A615	60
WELDED WIRE FABRIC-WWF (PRECAST ONLY):	A185	60 (MIN.)
HEADED STUDS:	A108	---
DEFORMED BAR ANCHORS:	A706	60

2. DETAILS:

- A. WELDING OF REINFORCING BARS IS PROHIBITED.

3. EMBEDMENTS

- A. ALL EMBEDDED PLATES AND ANCHOR RODS SHALL BY HOT DIP GALVANIZED. COATINGS IN THE WELD AREA SHALL BE REPAIRED.

4. PLACEMENT

- A. ALL REINFORCING (BARS, ANCHOR RODS, EMBEDMENTS, WWF, ETC.) SHALL BE SUPPORTED ON CHAIRS/BOLSTERS TO THE DESIGN DIMENSIONS. SPACING SHALL BE SUFFICIENTLY CLOSE TO PREVENT DISPLACEMENT OR PERMANENT DEFORMATION DUE TO CONCRETE PLACEMENT, FOOT TRAFFIC, OR VIBRATION. "PUDDLING IN" OR "PULLING UP" REINFORCING IS NOT AN ACCEPTABLE METHOD FOR PLACING REINFORCING. CHAIRS/BOLSTERS SHALL HAVE PLASTIC COATED FEET OR BE MADE OF STAINLESS STEEL. CHAIRS/BOLSTERS IN CONTACT WITH EARTH SHALL HAVE BOTTOM PLATES AND BE COATED TO PREVENT CORROSION. ANCHOR RODS SHALL BE HELD IN PLACE WITH TEMPLATES SUFFICIENTLY STRONG TO PREVENT DISPLACEMENT OR TILTING.

B. MAINTAIN ACI CLEAR COVER ON REINFORCING AS LISTED BELOW UNLESS NOTED OTHERWISE.

CAST AGAINST EARTH (BOTTOM OR SIDES):	3"
FORMED - EXPOSED TO SOIL, WEATHER OR LIQUIDS:	2"
PRECAST:	1/2"

C. PROVIDE CORNER BARS OF THE SAME SIZE AND SPACING AS ADJACENT REINFORCING. REFERENCE DETAILS. CONTINUOUS WALL FOOTING REINFORCING NEED ONLY TO OVERLAP.

D. OPENINGS IN WALLS OR STRUCTURAL SLABS SHALL BE REINFORCED PER DETAIL.

E. ALL REINFORCING BARS ARE TO BE MADE CONTINUOUS OR LAPPED 40 BAR DIAMETERS.

F. WWF SHALL BE MADE CONTINUOUS BY LAPPING ONE FULL SQUARE PLUS 2". (PRECAST ONLY)

F. POST INSTALLED ANCHORING SYSTEMS

1. ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS (MPII) AND THE EVALUATION REPORT (ER/ESR) SPECIFIED INCLUDING HOLE PREPARATION, TEMPERATURE AND MOISTURE CONDITIONS.

2. ADHESIVE ANCHORS:

A. THE CONTRACTOR SHALL ARRANGE AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL ANCHOR PRODUCTS SPECIFIED. THE CONTRACTOR MUST MAINTAIN TRAINING RECORDS OF ALL CONTRACTOR PERSONNEL INSTALLING ANCHORS AND SUBMIT TO THE ENGINEER OF RECORD PRIOR TO INSTALLING ANCHORS UPON REQUEST.

B. ADHESIVE ANCHORS SHALL BE USED IN CONJUNCTION WITH THE APPROPRIATE ADHESIVE SYSTEM. STANDARD REINFORCING STEEL ANCHORED IN CONCRETE SHALL BE IN ACCORDANCE WITH ASTM A615 GRADE 60 UNLESS NOTED OTHERWISE.

C. APPROVED ADHESIVE ANCHORS FOR PREVIOUSLY CAST CONCRETE:

MANUFACTURER/PRODUCT	REPORT NUMBER
HILTI HIT-HY200 SSS* WITH HIT-Z ROD	ICC-ES ESR-3187
HILTI HIT-HY200 SSS* WITH HOLLOW BIT & HAS-E ROD	ICC-ES ESR-3187
HILTI HIT-HY200 SSS* WITH HOLLOW BIT & STEEL REINFORCING	ICC-ES ESR-3187
*SAFE SET SYSTEM	

G. CONTRACT/CONSTRUCTION DOCUMENTS

1. THE CONTRACT DOCUMENTS SHALL INCLUDE ALL PLANS, SPECIFICATIONS, ADDENDAS, AND SUPPLEMENTAL INSTRUCTIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN A FULL SET OF THE MOST RECENT REVISIONS OF EACH DOCUMENT.
3. THE CONTRACTOR SHALL REVIEW THE DOCUMENTS PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY MATERIALS FOR CONFLICTS. IF CONFLICTS OCCUR THE CONTRACTOR SHALL USE THE MOST STRINGENT REQUIREMENT. ALTERNATELY, THE CONTRACTOR MAY REQUEST A CLARIFICATION THROUGH A REQUEST FOR INFORMATION (RFI).
4. THE DOCUMENTS MAY NOT BE REPRODUCED IN WHOLE OR IN PART FOR USE ON PROJECTS OTHER THAN IDENTIFIED IN THE TITLE BLOCK. SHOULD THE CONTRACTOR USE THE DOCUMENTS AS A PORTION OF A SHOP DRAWING SUBMITTAL, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CONSEQUENCES RESULTING FROM ERRORS IN THE REPRODUCED DOCUMENTS.
5. DETAILS LABELED TYPICAL ARE INTENDED TO REPRESENT A CONDITION THAT OCCURS AT SEVERAL LOCATIONS IN THE PLANS WHETHER OR NOT THE DETAIL IS REFERENCED.
6. DO NOT SCALE THE PLANS AND DETAILS FOR THE PURPOSE OF ESTABLISHING DIMENSIONS.

H. CONTRACTOR'S RESPONSIBILITY

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL SUB-CONTRACTOR SUBMITTALS AND NOTING ALL CONFLICTS WITH THE CONSTRUCTION DOCUMENTS PRIOR TO SUBMITTING TO THE STRUCTURAL ENGINEER FOR REVIEW.
2. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR SITE SAFETY.

I. CONSTRUCTION MEANS AND METHODS ISSUES

1. SLABS ON GRADE AND ELEVATED SLABS ARE NOT DESIGNED TO SUPPORT CRANES, FORKLIFTS, TRUCKS, MANLIFTS, OR OTHER CONSTRUCTION RELATED EQUIPMENT UNLESS NOTED AS SUCH. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE IF CONSTRUCTION EQUIPMENT CAN BE SAFELY OPERATED ON THESE SLABS AND TO REPAIR ANY DAMAGE THE EQUIPMENT MAY CAUSE.
2. THE CONTRACTOR SHALL PROVIDE ANY TEMPORARY BRACING AND/OR SHORES TO SAFELY CONSTRUCT THE STRUCTURE AND PREVENT DAMAGE DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION THAT MAY AFFECT THE PROJECT AND REPORT DISCREPANCIES TO THE ENGINEER. EXISTING BUILDING ELEMENTS THAT ARE TO BE ABANDONED THAT INTERFERE WITH NEW CONSTRUCTION SHALL BE REMOVED.
4. WHEN A PIECE OF EQUIPMENT IS PROVIDED THAT IS DIFFERENT THAN THE EQUIPMENT THAT THE STRUCTURE WAS DESIGNED FOR EITHER BY SIZE, WEIGHT OR CONFIGURATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE REMEDY OF THE SITUATION.

J. STRUCTURAL TESTS, INSPECTIONS, AND QUALITY ASSURANCE

1. ALL STRUCTURAL TESTS AND INSPECTIONS SHALL BE PERFORMED PER CHAPTER 17 OF THE BUILDING CODE WITH LOCAL SUPPLEMENTS, UNLESS MORE STRINGENT REQUIREMENTS ARE SPECIFIED.

	Revision		By	Date
	WATERLINE MODIFICATIONS VALVE VAULT AND WATERLINE RECONNECTIONS AT MCLEAN AND EXPOSITION STRUCTURAL GENERAL NOTES-VALVE VAULTS			
	GARY JANZEN, P.E. - CITY ENGINEER CITY OF WICHITA PROJECT NO. 448-			
	PROFESSIONAL ENGINEERING CONSULTANTS, P.A. 303 SOUTH TOPEKA WICHITA, KS 67202 316-262-2691 www.pec1.com			
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