

GENERAL STRUCTURAL NOTES

A. DESIGN CRITERIA

1. BUILDING CODE: INTERNATIONAL BUILDING CODE (IBC), 2006 EDITION, INCLUDING LOCAL SUPPLEMENTS.

2. GRAVITY LOADS:

LOCATION	UNIFORM LIVE LOAD	CONCENTRATED LIVE LOAD	UNIFORM DEAD LOAD
ROOF	20 PSF	-----	20 PSF
SLAB ON GRADE	125 PSF	2000 LB	145 PSF

GROUND SNOW LOAD: 15 PSF  
 FLAT ROOF SNOW LOAD: 12.6 PSF  
 SNOW EXPOSURE FACTOR: 1.0  
 SNOW IMPORTANCE FACTOR: 1.0  
 THERMAL FACTOR: 1.2

ROOF LIVE LOADS ON SUPPORTING ELEMENTS SHALL NOT BE REDUCED IN ACCORDANCE WITH THE BUILDING CODE. DRIFTING OF SNOW SHALL BE IN ACCORDANCE WITH CODE.

3. LATERAL LOADS (PER ASCE 7):

A. WIND:

BASIC WIND SPEED:	90 MPH (3 SECOND GUST)
WIND EXPOSURE:	C
WIND IMPORTANCE FACTOR:	1.0
COMPONENTS AND CLADDING:	25 PSF, UNLESS NOTED OTHERWISE

COMPONENTS AND CLADDING PRESSURE SHALL BE USED FOR DESIGN OF EXTERIOR WALLS, WINDOWS, DOORS, AND MISCELLANEOUS MATERIALS NOT SPECIFICALLY SHOWN ON THE PLANS.

B. SEISMIC:

SEISMIC IMPORTANCE FACTOR:	1.0
SEISMIC DESIGN CATEGORY:	B
SEISMIC USE GROUP:	I
SITE CLASS:	D
Ss:	0.137
S1:	0.051
Sds:	0.146
Sd1:	0.082
LATERAL SYSTEM:	ORD. REIN. MASONRY SHEAR WALLS (R=2.5)
METHOD OF ANALYSIS:	EQUIVALENT LATERAL FORCE
Cs:	0.058

B. SOIL PREPARATION AND FOUNDATIONS

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENGAGE A LICENSED GEOTECHNICAL ENGINEER TO PERFORM A SUBSURFACE GEOTECHNICAL INVESTIGATION. THE RESULTS OF THE GEOTECHNICAL INVESTIGATION SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE GEOTECHNICAL INVESTIGATION MUST, AT THE MINIMUM, PROVIDE THE FOLLOWING MATERIAL:

- A. SUFFICIENT SOIL BORINGS SHALL BE MADE TO VERIFY THAT THE PRESUMPTIVE SOIL BEARING PRESSURE OF 1,500 PSF IN UNDISTURBED SOILS AND ENGINEERED FILLS USED FOR DESIGN IS SAFE.
- B. LABORATORY TESTS SHALL BE MADE AS NECESSARY TO VERIFY THAT THE TOTAL SETTLEMENT IS LESS THAN 1" AND THE DIFFERENTIAL SETTLEMENT IS LESS THAN 1/2", NO SHRINK/SWELL POTENTIAL EXISTS, AND THE DEPTH IS ADEQUATE FOR THE SITE.

2. REMOVE TOP SOIL CONTAINING ORGANIC MATERIAL AND PREPARE THE BUILDING PAD IN ACCORDANCE WITH THE GEOTECHNICAL INVESTIGATION.

3. FILL TO SUBGRADE ELEVATION SHOWN ON THE DRAWINGS WITH NON-EXPANSIVE FILL OR STABILIZED SOIL PER SPECIFICATION.

4. SOIL SUPPORTED FOUNDATIONS:

A. DESIGN BEARING PRESSURE (NET) IS 1500 PSF FOR FOUNDATIONS BEARING ON UNDISTURBED SOIL OR APPROVED ENGINEERED FILL MATERIAL. BEARING MATERIALS SHALL BE VERIFIED BY A LICENSED GEOTECHNICAL ENGINEER.

5. DO NOT BACKFILL FOUNDATION/BASEMENT WALLS UNTIL THE RESTRAINING SLABS OR ADEQUATE BRACING ARE IN PLACE. ALL BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION.

6. EXTERIOR SLABS SHALL SLOPE AWAY FROM THE STRUCTURE A MINIMUM OF 1/4" PER FOOT UNLESS NOTED OTHERWISE.

C. CAST-IN-PLACE 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.

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

C. COARSE AGGREGATES FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33 AND MEET #67, #56 OR #5 GRADATION REQUIREMENTS. 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	MIN. F'ci	MIN. CEM. PSI	MAX. W/C RATIO	AIR ENT.	SLUMP INCHES
ELEVATED SLAB	4000	3000	470	0.45	NR	2-5

3. 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.). ELEVATED SLABS SHALL NOT HAVE THE FORMS REMOVED WITHOUT PLACING RESHORES.
- C. NO ALUMINUM SHALL BE EMBEDDED IN CONCRETE. CONDUITS AND PIPING EMBEDDED IN CONCRETE WALLS SHALL BE SPACED A MINIMUM OF FOUR DIAMETERS AND THE OUTSIDE DIAMETER SHALL BE LESS THAN 30% OF THE MEMBER THICKNESS PLACED BETWEEN LAYERS OF REINFORCING.

D. CONCRETE REINFORCING (CAST-IN-PLACE)

1. MATERIALS:

REINFORCING BARS:	ASTM A615	GRADE 60
ANCHOR RODS (BOLTS):	F1554	36

2. DETAILS:

A. WELDING OF REINFORCING BARS IS PROHIBITED UNLESS NOTED OTHERWISE. WHEN WELDING IS APPROVED, WELDING SHALL BE IN ACCORDANCE WITH AWS D1.4 "WELDING REINFORCING STEEL, ETC."

B. SHOP DRAWINGS SHALL BE SUBMITTED WITH REINFORCING STEEL IN ACCORDANCE WITH ACI 315.

3. PLACEMENT

A. ALL REINFORCING (BARS, 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. ANCHOR BOLTS 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"

C. OPENINGS IN WALLS OR STRUCTURAL SLABS SHALL BE REINFORCED PER DETAIL 4/11 & 5/11.

D. ALL REINFORCING BARS ARE TO BE MADE CONTINUOUS OR LAPPED PER TABLE A.

E. MASONRY

1. MASONRY HAS BEEN DESIGNED IN ACCORDANCE WITH THE BUILDING CODE.

2. MATERIALS:

A. ALL CONCRETE MASONRY UNITS (CMU) SHALL BE TWO-CELL, LIGHTWEIGHT AGGREGATE UNITS WITH A SPECIFIED MINIMUM COMPRESSIVE STRENGTH OF 1900 PSI ON NET AREA (1500 PSI ON GROSS AREA) AT 28 DAYS CONFORMING TO ASTM C90. CMU LOCATED BELOW GRADE, SHALL BE NORMAL-WEIGHT AGGREGATE UNITS.

B. ALL MORTAR SHALL BE TYPE "S" WITH A MINIMUM MORTAR COMPRESSIVE STRENGTH OF 1800 PSI AT 28 DAYS CONFORMING TO ASTM C270. THE MINIMUM COMPRESSIVE STRENGTH (f'm) OF A PRISM ASSEMBLED OF CMU AND MORTAR SHALL BE 1500 PSI AT 28 DAYS ON THE NET AREA.

C. GROUT SHALL CONFORM TO ASTM C476 WITH 3/8" AGGREGATE WITH TYPE I CEMENT, A MAXIMUM WATER/CEMENT RATIO OF 0.65, AND A SLUMP OF 5 TO 9 INCHES. THE MINIMUM GROUT COMPRESSIVE STRENGTH (f'c) SHALL BE 2500 PSI.

D. REINFORCING STEEL SHALL MEET THE REQUIREMENTS OF ASTM A615, GR. 60.

3. HORIZONTAL WALL REINFORCING:

A. PROVIDE HORIZONTAL REINFORCING IN LOAD BEARING WALLS AT THE WINDOW/DOOR HEAD ELEVATION, TOP OF THE WALL AND AT A MAXIMUM OF 4'-0" ON CENTER. MINIMUM HORIZONTAL REINFORCING SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

WALL THICKNESS	REINFORCING
8"	(2)-#5

B. HORIZONTAL REINFORCING SHALL BE IN KNOCK-OUT BOND BEAMS UNLESS AT THE WINDOW/DOOR HEAD OR AT BEAM BEARING. AT THE WINDOW/DOOR HEAD AND AT THE BEAM BEARING, THE REINFORCING SHALL BE PLACED IN SOLID BOTTOM LINTEL BEAM. CUT OFF THE BOTTOM SHELL OF LINTEL BLOCKS AT VERTICAL REINFORCING LOCATIONS.

C. HORIZONTAL REINFORCING SHALL BE CONTINUOUS. REINFORCING BARS SHALL LAP 40 BAR DIAMETERS BUT NOT LESS THAN 24". DISCONTINUE THE REINFORCING AT ISOLATION JOINTS. PLACE BOND BEAMS BELOW ALL OPENINGS AND LINTEL BEAMS ABOVE ALL OPENINGS UNLESS NOTED OTHERWISE.

4. VERTICAL REINFORCING:

A. PROVIDE VERTICAL REINFORCING (NORMAL REINFORCING) IN FULLY GROUTED CELLS, CENTERED AND HELD IN PLACE BY REBAR POSITIONERS, IN ALL WALLS AS FOLLOWS, UNLESS NOTED OTHERWISE:

THICKNESS	EXTERIOR & LOAD BRG. WALLS
8"	#5 AT 48" O.C.

B. PROVIDE A VERTICAL REINFORCING BAR IN FULLY GROUTED CELLS, WITH SAME SIZE AS THE NORMAL REINFORCING BAR, AT EACH SIDE OF AN ISOLATION JOINT, AT INTERSECTIONS OF WALLS, EACH SIDE OF A WALL OPENING, AT EACH BEAM BEARING, AND AT THE END OF A WALL.

C. VERTICAL REINFORCING SHALL EXTEND CONTINUOUSLY FROM THE TOP OF THE SUPPORTING MEMBER TO THE TOP BOND BEAM. THERE SHALL BE A DOWEL, CAST INTEGRAL WITH THE SUPPORTING MEMBER, FOR EACH VERTICAL REINFORCING BAR EXCEPT AS NOTED. HOOK VERTICAL BARS INTO TOP BOND BEAM. ALL HOOKS AND STRAIGHT EMBEDMENTS SHALL BE ACI STANDARD. ALL BARS SHALL LAP 50 BAR DIAMETERS BUT NOT LESS THAN 24".

5. LOCATION AND DETAILS OF CONTROL AND ISOLATION JOINTS IN REINFORCED MASONRY SHALL BE PER THE ARCHITECTURAL DRAWINGS. IF NOT SHOWN OR NOTED ON THE ARCHITECTURAL DRAWINGS, THE MAXIMUM SPACING OF CONTROL OR ISOLATION JOINTS SHALL BE AT A LENGTH TO HEIGHT RATIO OF 2:1 OR 30'-0" O.C., WHICHEVER IS LESS. REINFORCING IN TOP BOND BEAMS SHALL BE DISCONTINUOUS AT CONTROL AND ISOLATION JOINTS. CONTRACTOR SHALL SUBMIT A JOINT LAYOUT PLAN FOR APPROVAL PRIOR TO CONSTRUCTION.

6. LINTELS SUPPORTING CMU WALLS OVER OPENINGS, UNLESS NOTED OTHERWISE, SHALL BE:

OPENING WIDTH	LINTEL
< 4'-0"	CMU: 8"x8" CMU BOND BEAM W/2-#5 & 8" BEARING

F. STRUCTURAL WOOD

1. ALL WOOD STRUCTURES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE BUILDING CODE AND THE LATEST EDITION OF THE NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION (NDS).

2. MANUFACTURED WOOD TRUSS SYSTEMS SHALL BE DESIGNED BY A WOOD TRUSS SYSTEMS ENGINEER, AS DEFINED BY THE WTCA, LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED. THE TRUSS SYSTEM SHALL BE DESIGNED FOR THE LOADS INDICATED ON THE CONTRACT DOCUMENTS.

A. THE TRUSS SYSTEM SUBMITTAL SHALL INCLUDE:

- TRUSS ERECTION PLAN INDICATING LOCATION AND TRUSS DESIGNATIONS.
- TEMPORARY AND PERMANENT BRIDGING SIZE AND LOCATIONS FOR TRUSS STABILITY.
- TRUSS-TO-TRUSS GIRDER CONNECTION HARDWARE.
- TRUSS DESIGN CALCULATIONS.

B. ALL PAGES OF THE TRUSS SYSTEM SUBMITTAL SHALL BE SIGNED AND SEALED BY THE SAME TRUSS SYSTEM ENGINEER, PRIOR TO SUBMITTAL FOR REVIEW. TRUSSES SHALL NOT BE FABRICATED UNTIL THE SUBMITTAL HAS BEEN APPROVED BY THE ARCHITECT OR ENGINEER OF RECORD. ALL PAGES OF THE TRUSS SYSTEM SUBMITTAL SHALL INDICATE:

- THE NAME, ADDRESS, TELEPHONE NUMBER, AND FACSIMILE NUMBER OF THE TRUSS SYSTEM ENGINEER.
- THE PROJECT NAME AND ADDRESS.
- INDICATION OF THE APPLICABLE CODES USED TO DESIGN THE TRUSS SYSTEM.
- IDENTIFICATION OF THE COMPUTER PROGRAM USED TO DESIGN THE TRUSS SYSTEM.

C. TRUSSES SHALL BE DESIGNED AND FABRICATED TO CONFORM TO THE GEOMETRY SHOWN AND THE LOADS SHOWN IN SECTION A, "DESIGN CRITERIA." WEB CONFIGURATIONS ARE FOR ILLUSTRATION ONLY AND SHALL BE DESIGNED BY THE TRUSS SYSTEMS ENGINEER, UNLESS SPECIFIC OPENINGS ARE REQUIRED ON THE CONTRACT DOCUMENTS.

- PROVIDE A MINIMUM 2X6 TOP CHORD AND BOTTOM CHORD.
- TRUSS DESIGN SHALL INCORPORATE SNOW DRIFT LOADING AND UNBALANCED SNOW LOADING.
- TRUSS END VERTICALS AND STUDDED GABLE END TRUSSES SHALL BE DESIGNED FOR WIND LOADING.
- TRUSSES AND TRUSS CONNECTIONS SHALL BE DESIGNED AND FABRICATED USING GALVANIZED METAL PLATE CONNECTIONS. THE MINIMUM CONNECTION PLATE SIZES SHALL BE 15 SQUARE INCHES AND THE MINIMUM UN-COATED THICKNESS SHALL BE 20 GAUGE (0.033").

3. CERTIFICATION OF SHOP DRAWINGS AND DESIGN CALCULATIONS:

THE ENGINEER THAT SEALS THE SHOP DRAWINGS AND CALCULATIONS SHALL INCLUDE IN THE FOLLOWING CERTIFICATION. "I, \_\_\_\_\_, PE, DO HEREBY CERTIFY THAT I HAVE PERSONALLY REVIEWED THE CONTRACT DRAWINGS AND SPECIFICATIONS. FURTHER, I HAVE INCORPORATED ALL PERFORMANCE CRITERIA SPECIFIED IN THE CONTRACT DRAWINGS AND SPECIFICATIONS INTO THE SHOP DRAWINGS AND CALCULATIONS SUBMITTED FOR APPROVAL. I UNDERSTAND THAT ANY PERFORMANCE CRITERIA THAT WAS NOT INCORPORATED INTO THE SHOP DRAWINGS AND CALCULATIONS IS GROUNDS FOR REJECTION."

4. THE DESIGN OF THE STRUCTURE IS BASED UPON THE USE OF THE FOLLOWING PRODUCTS:

A. WOOD:

USE	WOOD TYPE	GRADE	Fb(Psi)	Fcp(Psi)	E(Psi)
STUDS (2 X 4) (2 X 6)	SPRUCE-PINE-FIR	#1	875	1,150	1,400,000
	SPRUCE-PINE-FIR	#2	875	1,150	1,400,000

ALL MEMBERS SHALL BE SURFACED DRY AND HAVE A MAXIMUM MOISTURE CONTENT OF 19%.

B. ROOF SHEATHING SHALL BE 19/32" APA RATED PLYWOOD OR ORIENTED STRAND BOARD, 40/20 SPAN RATING, EXPOSURE 1, LAID IN A CONTROLLED RANDOM STAGGERED PATTERN, WITH EDGE CLIPS OR SOLID BLOCKING BETWEEN SUPPORTS, LONG PANEL DIMENSION PERPENDICULAR TO THE FRAMING MEMBERS, AND CONTINUOUS OVER A MINIMUM OF THREE SUPPORTS. ALLOW FOR 1/8" GAP AT ALL PANEL EDGE AND END JOINTS UNLESS OTHERWISE RECOMMENDED BY MANUFACTURER.

C. ALL WOOD PRODUCTS IN DIRECT CONTACT WITH CONCRETE OR MASONRY SHALL BE PRESSURE TREATED AND MEET THE FOLLOWING RETENTION LEVELS:

USE	CHEMICAL TREATMENT	RETENTION (PCF)
NOT IN CONTACT WITH SOIL	CCA-C	0.25
	ACQ	0.25
	CBA-A	0.20
	CA-B	0.10
	SBX	0.42

5. CONNECTIONS SHALL MEET THE FOLLOWING REQUIREMENTS:

A. ALL ANCHOR BOLTS REQUIRE 2" X 2" SQUARE PLATE WASHERS BE INSTALLED BETWEEN THE HEAD OR NUT AND THE WOOD MEMBER.

B. WOOD MEMBERS SHALL BE CONNECTED TOGETHER USING THE FOLLOWING NAILING SCHEDULE, UNLESS NOTED OTHERWISE. NO STAPLES ARE ALLOWED UNLESS NOTED OTHERWISE.

LOCATION	NAILING
DOUBLE TOP PLATE	16d @ 16" O.C.
DOUBLE TOP PLATE SPLICE	8-16d

FOR ADDITIONAL MINIMUM FASTENERS REFER TO:

TABLE 2304.9.1 IN THE 2006 IBC

C. ALL CONNECTIONS ARE BASED ON USING COMMON NAILS. ANY SUBSTITUTION OF BOX, SINKER, RING SHANK, FINISH, SIDING, PLYWOOD, CASING, STAPLES, ETC. SHALL BE APPROVED IN ADVANCE BY THE ENGINEER. ALL NAILS SHALL CONFORM TO THE FOLLOWING MINIMUM STANDARDS:

SIZE	LENGTH	DIA.	HEAD
6d	2"	0.099"	FULL ROUND HEAD
8d	2 1/2"	0.113"	FULL ROUND HEAD
10d	3"	0.192"	FULL ROUND HEAD
12d	3 1/4"	0.192"	FULL ROUND HEAD
16d	3 1/2"	0.207"	FULL ROUND HEAD

D. ALL FASTENERS (SCREWS, NAILS, BOLTS, ETC.) AND CONNECTORS INSTALLED IN CONTACT WITH PRESSURE TREATED LUMBER SHALL MEET OR EXCEED THE FOLLOWING:

CHEMICAL TREATMENT	FASTENER AND CONNECTOR OPTION 1	OPTION 2
CCA-C	G-90 HOT DIP GALVANIZED	STAINLESS STEEL
ACQ	G-185 HOT DIP GALVANIZED	STAINLESS STEEL
CBA-A	G-185 HOT DIP GALVANIZED	STAINLESS STEEL
CA-B	G-185 HOT DIP GALVANIZED	STAINLESS STEEL

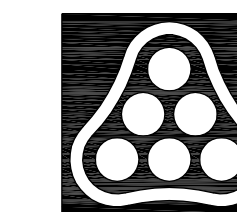
STAINLESS STEEL FASTENERS AND CONNECTORS SHALL BE A304 OR A316. GALVANIZED AND STAINLESS STEEL FASTENERS AND CONNECTORS SHALL NOT BE IN DIRECT CONTACT. ALL CONNECTORS AND THEIR ASSOCIATED FASTENERS SHALL BE OF SAME MATERIAL.

E. NAIL ROOF SHEATHING WITH 10d COMMON NAILS AT 6" O.C. ALONG PANEL EDGES AND AT 12" O.C. AT INTERMEDIATE SUPPORTS.

F. ALL MANUFACTURED CONNECTORS SHALL BE BY SIMPSON STRONG-TIE COMPANY, INC., OR APPROVED EQUAL, AND CONNECTED WITH THE FASTENERS SPECIFIED BY THE MANUFACTURER.

G. FASTEN MULTIPLE MANUFACTURED WOOD MEMBERS TOGETHER IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

6. STAGGER SPLICES OF DOUBLE TOP PLATES 4'-0" MINIMUM.



No.	Revision	By	Date
<b>PHASE II - STORM WATER DRAIN #332</b> <b>WEST PUMP STATION</b> <b>STRUCTURAL GENERAL NOTES</b> JAMES L. ARMOUR, P.E. - CITY ENGINEER CITY OF WICHITA PROJECT NO. 468-84396 <b>Professional Engineering Consultants, P.A.</b> 303 S. TOPEKA • WICHITA, KANSAS 67202 316-262-2691 • FAX 316-262-3003			
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