STRUCTURAL ABBREVIATIONS

A.B.	ANCHOR BOLT	I.D.	INSIDE DIAMETER
ADD'L	ADDITIONAL	I.F.	INSIDE FACE
AL	ALUMINUM	INV	INVERT
ALT	ALTERNATE		
APPROX	APPROXIMATE	JT	JOINT
ARCH	ARCHITECTURAL		
		K.O.	KNOCK OUT
BAL	BALANCE		
BETW	BETWEEN	L	ANGLE STRUCTURAL SHAPE
B.L.	BUILDING LINE	LB	POUND
BLDG	BUILDING	L.L.	LIVE LOAD
BLK	BLOCK	LLV	LONG LEG VERTICAL
BM	BEAM	LOC	LOCATION
BOT	BOTTOM	L.P.	LOW POINT
BRG	BEARING	L.W.	LONG WAY
BT	BENT		
		MAS	MASONRY
C	CHANNEL STRUCTURAL SHAPE	MAX	MAXIMUM
CANT'L	CANTILEVER	MECH	MECHANICAL
C.J.	CONSTRUCTION JOINT	MFR	MANUFACTURE, MANUFACTURER
CL	CLEAR	M.H.	MANHOLE
C.M.U.	CONCRETE MASONRY UNIT	MID	MIDDLE
COL	COLUMN	MIN	MINIMUM
COMP	COMPRESSIBLE		
CONC	CONCRETE	N	NORTH
CONN	CONNECTION	N.F.	NEAR FACE
CONST	CONSTRUCTION	NO.	NUMBER
CONT	CONTINUOUS	N.T.S.	NOT TO SCALE
CSTG	CASTING		
CTC	CENTER TO CENTER	O-C	ON CENTER
CTR	CENTER	O.D.	OUTSIDE DIAMETER
		O.F.	OUTSIDE FACE
DET	DETAIL	OPNG	OPENING
DIA	DIAMETER	OPP	OPPOSITE
DIAG	DIAGONAL		
DIM	DIMENSION	P.C.O.	PILE CUT OFF
DN	DOWN	PL	PLATE
DO	DITTO	P.S.F.	POUNDS PER SQUARE FOOT
DP	DEEP	PVC	POLYVINYL CHLORIDE
DWG	DRAWING		
DWL	DOWEL	R	RADIUS
		R.D.	ROOF DRAIN
E	EAST	REINF	REINFORCEMENT
EA	EACH	REQD	REQUIRED
E.F.	EACH FACE	RM	ROOM
E.J.	EXPANSION JOINT	R.O.	ROUGH OPENING
EL	ELEVATION		
ELEC	ELECTRICAL	S	SOUTH
EMB	EMBEDMENT	SECT	SECTION
ENCL	ENCLOSURE	SHT	SHEET
EQ	EQUAL	SIM	SIMILAR
EQUIP	EQUIPMENT	SL	SLAB
E.S.	EACH SIDE	SP	SPIRAL
E.W.	EACH WAY	SPEC	SPECIFICATION
E.W. T&B	EACH WAY TOP & BOTTOM	SQ	SQUARE
EXIST	EXISTING	S.ST.	STAINLESS STEEL
EXP	EXPANSION	STD	STANDARD
EXT	EXTERIOR	STIR	STIRRUP
		STL	STEEL
F.B.	FLOOR BEAM	STR	STRUCTURAL
F.D.	FLOOR DRAIN	S.W.	SHORT WAY
FDN	FOUNDATION		
F.F.	FAR FACE	T&B	TOP AND BOTTOM
FIN	FINISH	T/C	TOP OF CONCRETE
FL	FLOOR	THK	THICK
FT	FEET	T/	TOP OF
FTG	FOOTING	TR	TREAD
		TYP	TYPICAL
GA	GAUGE		
GALV	GALVANIZE	U.O.N.	UNLESS OTHERWISE NOTED
G.B.	GRADE BEAM		
GD	GRADE	VERT	VERTICAL
GRTG	GRATING		
		W	WIDE FLANGE STRUCTURAL SHAPE, WIDTH, WEST
H	HIGH		
HGT	HEIGHT	W/	WITH
HOR	HORIZONTAL	WSTP	WATERSTOP
H.P.	HIGH POINT		
H.S.	HIGH STRENGTH		
HVAC	HEATING, VENTILATING & AIR CONDITIONING		

GENERAL

G-1 THESE NOTES ARE GENERAL AND APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS OTHERWISE.

G-2 THE TYPICAL DETAILS FOLLOWING THESE NOTES ARE TO BE USED WHEN REFERRED TO OR WHEN NO OTHER MORE RESTRICTIVE OR DIFFERENT DETAILS ARE SHOWN ON THE DRAWINGS.

G-3 LIVE LOADS: AS INDICATED ON DRAWINGS
STRUCTURES ARE DESIGNED FOR EQUIPMENT LOADS AS SHOWN ON THE DRAWINGS. VERIFY EQUIPMENT DIMENSIONS AND LOADS AND CONTACT ENGINEER IF ACTUAL LOADS ARE GREATER THAN SHOWN.

G-4 SEISMIC DESIGN: ZONE 1

G-5 WIND DESIGN: 90 MPH, EXPOSURE C, AND I = 1.00

G-6 ALL DIMENSIONS INDICATED (*) TO BE DETERMINED BY EQUIPMENT FURNISHED. STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR WITH THE MANUFACTURER PRIOR TO CONSTRUCTION.

G-7 EQUIPMENT ANCHOR BOLT SIZES, TYPES, AND PATTERNS SHALL BE VERIFIED WITH THE MANUFACTURER. ALL BOLT PATTERNS SHALL BE TEMPLATED TO INSURE ACCURACY OF PLACEMENT.

G-8 STRUCTURAL DRAWINGS SHALL BE USED IN COORDINATION WITH DRAWINGS OF ALL OTHER DISCIPLINES AND MANUFACTURER'S SHOP DRAWINGS.

G-9 DIMENSIONING: ALL MANUFACTURED PRODUCTS HAVE THEIR MANUFACTURED DIMENSIONS GIVEN IN INCHES.
DIMENSION NUMBERS WITH NO UNITS SHOWN ARE IN INCHES

G-10 LEAKAGE TESTING OF HYDRAULIC STRUCTURES SHALL NOT BEGIN UNTIL THE STRUCTURAL ELEMENTS HAVE REACHED THE SPECIFIED MINIMUM CONCRETE STRENGTH. BACKFILL SHALL NOT BE PLACED AROUND THE STRUCTURE UNTIL THE LEAKAGE TEST HAS BEEN COMPLETED.

FOUNDATIONS

F-1 GROUNDWATER ELEVATIONS:
A) NORMAL HIGH GROUNDWATER EL. 900.00.
B) MAXIMUM GROUNDWATER (FLOOD) EL. 910.00.

F-2 ALLOWABLE SOIL BEARING PRESSURE:
AS INDICATED ON DRAWINGS

F-3 CONCRETE GENERAL NOTES APPLY TO FOUNDATIONS.

F-4 INSTALL ADEQUATE SHEETING, SHORING, AND BRACING FOR EXCAVATION AND FOR PROTECTION OF ADJACENT EXISTING STRUCTURES AS PER SPECIFICATIONS

F-5 ADEQUATE DEWATERING MEASURES SHALL BE TAKEN TO PROTECT STRUCTURES FROM FLOATATION DURING CONSTRUCTION.

F-6 MINIMUM DEPTH OF FOUNDATION = 3'-0" BELOW GRADE.

MASONRY

M-1 COMBINED COMPRESSIVE STRENGTH OF THE MASONRY PRISM SHALL BE 1500 PSI AT 28 DAYS AFTER GROUTING. ALL MASONRY SHALL BE INSPECTED DURING CONSTRUCTION.

M-2 GROUT ALL REINFORCED CELLS OF CONCRETE BLOCK MASONRY.

M-3 MORTAR SHALL BE TYPE M PER UBC. GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 2500 PSI.

M-4 STANDARD BAR SPLICES SHALL BE 48 BAR DIAMETERS FOR MASONRY.

STRUCTURAL STEEL

S-1 GENERAL REQUIREMENTS: AISC SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, NINTH EDITION AND LATEST SUPPLEMENTS.

S-2 MATERIAL: ASTM A36.

S-3 CONNECTIONS: SEE SPECIFICATIONS

S-4 PAINTING: SEE SPECIFICATIONS. DO NOT PAINT SURFACES TO BE IN CONTACT WITH FIELD PLACED CONCRETE.
DO NOT PAINT TOP FLANGES TO WHICH METAL DECK OR PERMANENT SLAB FORM WILL BE WELDED.

S-5 ALL MEMBER DESIGNATIONS ARE STANDARD AISC IN THE FT-LB DIMENSION SYSTEM BUT MEMBER LENGTHS ARE GIVEN IN METERS.

S-6 WELD CALL OUTS ARE GIVEN IN INCHES FOR BOTH THE SIZE AND SPACING OF WELDS USING STANDARD AWS SYMBOLS.

ALUMINUM FRAMING

A-1 ALL ALUMINUM SHALL BE NEW AND CONFORM TO THE APPLICABLE ASTM SPECIFICATIONS AS REGISTERED WITH "THE ALUMINUM ASSOCIATION."

A-2 A) STRUCTURAL SHAPES AND PLATES ALLOY 6061-T6.
B) WELDING FILLER ALLOY 5356.
C) BOLTS-STAINLESS STEEL AISI TYPE 316.
D) ANCHOR BOLTS-STAINLESS STEEL AISI TYPE 316
E) ADHESIVE ANCHORS AND EXPANSION BOLTS-STAINLESS STEEL AISI TYPE 316.

A-3 SHOP CONNECTIONS SHALL BE BOLTED OR WELDED.

A-4 FIELD CONNECTIONS SHALL BE BOLTED: FIELD WELDING SHALL NOT BE PERMITTED UNLESS SO NOTED ON CONTRACT DRAWINGS.

A-5 BRACING SHALL HAVE A MINIMUM OF TWO BOLTS PER CONNECTION UNLESS NOTED OTHERWISE.

A-6 ALL BOLTS SHALL BE 5/8" DIA. MINIMUM UNLESS OTHERWISE NOTED ON CONTRACT DRAWINGS.

A-7 BEAM CONNECTIONS SHALL BE PROVIDED WITH A MINIMUM TWO BOLT CONNECTION AND AS INDICATED ON DRAWINGS.

A-8 WHERE ALUMINUM COMES IN CONTACT WITH CONCRETE OR OTHER DISSIMILAR MATERIALS, BACK PAINT ALUMINUM WITH BITUMINOUS PAINT.

CONCRETE

C-1 CONCRETE STRENGTH: 4000 PSI @ 28 DAYS, WEIGHT = 145 PCF

C-2 REINFORCEMENT: ASTM A615, GRADE 60 EXCEPT BUILDING COLUMNS AND BEAMS FORMING A FRAME SHALL USE ASTM A706 OR A615, GRADE 60, WITH A MAXIMUM YIELD STRENGTH OF 78,000 PSI.

C-3 MESH REINFORCEMENT: ASTM A185 AND A82

C-4 DETAILS, WORKMANSHIP, AND GENERAL PROCEDURE:
ACI 318, ACI 315, ACI 301, UNLESS OTHERWISE NOTED.

C-5 NOTES FOR SPLICE AND EMBEDMENT TABLE:
A) THE MINIMUM LENGTH OF LAPS FOR SPLICES SHALL BE AS GIVEN IN THE TABLE FOR CLASS "B" LAPS UNLESS SHOWN OTHERWISE ON THE DRAWINGS. PROVIDE CLASS "A" LAPS ONLY WHERE NOTED ON THE DRAWINGS.
B) THE SPLICE AND EMBEDMENT LENGTHS FOR WALLS AND SLABS ARE BASED ON A 5" MINIMUM ON CENTER BAR SPACING. SEE THE DRAWINGS FOR SPLICE AND EMBEDMENT WHERE BARS ARE SPACED CLOSER THAN 5".
C) TOP BARS ARE DEFINED AS ALL HORIZONTAL WALL BARS AND OTHER BARS WITH 12" OR MORE FRESH CONCRETE PLACED BENEATH.
D) HOOK EMBEDMENTS APPLY ONLY WHERE THE SIDE COVER (NORMAL TO THE HOOK PLANE) IS AT LEAST 2.5". THE COVERS REFERENCED ON THE TABLE ARE FROM THE HOOK EXTENSION TO THE FACE OF THE CONCRETE.
E) THE TABLE DOES NOT APPLY TO LIGHTWEIGHT CONCRETE OR EPOXY COATED REINFORCING BARS. SEE ACI 318 FOR APPROPRIATE ADDITIONAL MULTIPLIERS FOR THOSE CASES.

C-6 CONSTRUCTION JOINTS SHALL BE LOCATED AS SHOWN ON THE DRAWINGS. SEE SPECIFICATIONS FOR LOCATION OF ADDITIONAL JOINTS.

C-7 CONCRETE COVER FOR REINFORCING SHALL BE:

A)	SURFACES WHICH ARE IN CONTACT WITH LIQUIDS	2" MIN.
B)	SURFACES CAST AGAINST SUBGRADE	3" MIN.
C)	FORMED SURFACES EXPOSED TO WEATHER OR IN CONTACT WITH SOIL	2" MIN.
D)	FORMED SURFACES NOT EXPOSED TO WEATHER OR IN CONTACT WITH SOIL OR LIQUID.	1 1/2" MIN.

C-8 EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DOCUMENTS, SHALL BE PROVIDED FOR PRIOR TO PLACING CONCRETE.

C-9 DRILLED EPOXY DOWELS: WHERE DOWELS ARE SHOWN TO BE PLACED INTO HARDENED CONCRETE, PLACE AS SPECIFIED AND THE FOLLOWING SHALL APPLY:
A) THE HOLE DIAMETER SHALL BE NO LARGER THAN 1/8" GREATER THAN THE DIAMETER OF THE REINFORCING BAR AT THE DEFORMATIONS.
B) THE DEPTH OF EMBEDMENT SHALL BE 12 BAR DIAMETERS, UNLESS SHOWN OTHERWISE.
C) ADJUST THE DOWEL LOCATIONS AS NEEDED TO AVOID DRILLING THROUGH ANY REINFORCING BARS. IF THE DOWEL NEEDS TO BE PLACED MORE THAN ONE INCH OUT OF ALIGNMENT, CONTACT THE ENGINEER.

C-10 REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH ANY METAL PIPE, PIPE FLANGE, METAL CONDUIT, OR OTHER METAL PARTS EMBEDDED IN CONCRETE. A MINIMUM CLEARANCE OF 2 INCHES SHALL BE PROVIDED.

C-11 SLABS WITH SLOPING SURFACES SHALL HAVE THE INDICATED SLAB THICKNESS MAINTAINED AS THE MINIMUM. SLAB BOTTOMS CAN EITHER SLOPE WITH THE TOP SURFACE OR BE LEVEL UNLESS OTHERWISE INDICATED ON DRAWINGS. REINFORCEMENT IN SLABS WITH SLOPING SURFACES SHALL BE PLACED AT THE REQUIRED CLEARANCE FROM THE SLAB SURFACE.

C-12 VERTICAL REINFORCEMENT FOR CONCRETE OR MASONRY SHALL BE SPLICED WITH DOWEL BARS OF THE SAME SIZE AND SPACING FROM THE FOUNDATION USING A STANDARD SPLICE LENGTH UNLESS OTHERWISE SPECIFIED.

C-13 SLOPES SHOWN ON SLAB SURFACES BY FLOW ARROWS SHALL BE 1.0 PERCENT, UNLESS INDICATED OTHERWISE.

C-14 AT WALL JOINTS WHERE WATERSTOP IS NOT REQUIRED THE JOINT FACE MAY BE PREPARED WITH A KEY OR ROUGHENED SURFACE (SEE SPECIFICATIONS).

C-15 WHEN HORIZONTAL WALL CONSTRUCTION JOINTS EXTEND BEYOND WHERE REQUIRED, THEY SHALL BE TERMINATED AT A VERTICAL CONSTRUCTION JOINT LOCATED PER SPECIFICATIONS.

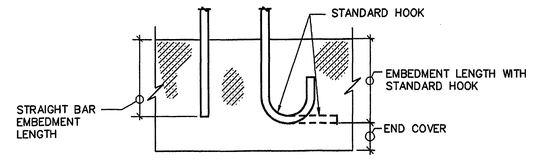
C-16 WHERE SPLICES ARE INDICATED BETWEEN BARS OF DIFFERENT SIZES, THE SPLICE LENGTH SHALL BE BASED ON THE SMALLER BAR SIZE.

C-17 DOWELS SHOWN EXTENDING FROM PREVIOUSLY PLACED CONCRETE SHALL EXTEND ONE SPLICE LENGTH BEYOND THE JOINT, UNLESS DIMENSIONED OTHERWISE. WHERE A DIMENSION IS PROVIDED, THE BAR SPLICING TO THE DOWEL SHALL END ONE SPLICE LENGTH FROM THE END OF THE DOWEL.

REINFORCING LAP SPLICE & EMBEDMENT

BAR SIZE	MINIMUM LAP LENGTH (INCHES)				MIN. EMBEDMENT LGTH. (in)		
	TOP BARS		OTHER BARS		STRAIGHT BARS		WITH STD. HOOK
	CLASS		CLASS		TOP BARS	OTHER BARS	
	A	B	A	B			
SLABS & WALLS W/ 2 in + COVER							
#3	16	21	12	16	16	12	6
#4	16	21	12	16	16	12	7
#5	20	25	15	19	20	15	9
#6	24	30	18	23	24	18	10
#7	33	43	25	33	33	25	12
#8	38	49	29	37	38	29	14
#9	49	63	37	48	49	37	15
#10	60	78	46	60	60	46	17
#11	75	97	57	74	75	57	19
SLABS & WALLS W/ < 2 in COVER							
#3	16	21	12	16	16	12	8
#4	16	21	12	16	16	12	10
#5	20	25	15	19	20	15	12
#6	24	30	18	23	24	18	15
#7	38	49	29	37	38	29	17
#8	47	62	36	47	47	36	19
#9	58	76	44	58	58	44	22
#10	71	91	54	70	71	54	25
#11	85	110	65	84	85	65	27
BEAMS & COLUMNS W/ 3.75 in CLEAR SPACING**							
#3	16	21	12	16	16	12	6
#4	16	21	12	16	16	12	7
#5	20	25	15	19	20	15	9
#6	24	30	18	23	24	18	10
#7	33	43	25	33	33	25	12
#8	39	51	30	39	39	30	14
#9	50	64	38	49	50	38	15
#10	60	78	46	60	60	46	17
#11	72	94	55	72	70	55	19

** FOR BAR CLEAR SPACING LESS THAN 3 3/4 in, ADD 46%
FOR BAR CLEAR SPACING LESS THAN 2 1/4 in, ADD 104%



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REVISIONS			
NO.	BY	DATE	REMARKS
1	ARB	JAN. 2000	RECORD DRAWING

DES MZ
DWN DRK
CKD DB

ROANOKE VIRGINIA, CHARTERED 1882

CITY OF ROANOKE, VIRGINIA
WATER POLLUTION CONTROL PLANT UPGRADE AND EXPANSION

STRUCTURAL ABBREVIATIONS & GENERAL NOTES

NOT TO SCALE

DATE MAY 1997

S SHEET 41 OF 44

CAD REF. NO. 00605365