Beaver Water District

BEAVER WATER DISTRICT

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

CONFORMED TO BID - FEBRUARY 2025

BLACK & VEATCH

B&V PROJECT NO. 417134

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

CERTIFICATE OF AUTHORIZATION
BLACK & VEATCH CORP.
NO. 381
ARKANSAS



301 N. PRIMROSE ROAD
LOWELL, AR 72745

GENERAL

DRAWING NO.	SHEET NUMBER	SHEET NAME
01	000-G-000	COVER SHEET
02	000-G-001	SHEET INDEX
03	000-G-002	LEGENDS AND NOTES
04	000-G-003	DESIGN CRITERIA
05	000-G-004	PROCESS FLOW SCHEMATIC
06	000-G-005	HYDRAULIC PROFILE
07	000-C-001	CIVIL - ABBREVIATIONS
08	000-C-002	CIVIL - LEGENDS AND GENERAL NOTES
09	000-S-001	STRUCTURAL - GENERAL NOTES
10	000-S-002	STRUCTURAL - LOADING CRITERIA (IBC 2021)
11	000-S-003	STRUCTURAL - LEGENDS AND ABBREIVATIONS
12	000-S-004	STRUCTURAL - STANDARD CONCRETE REINFORCEMENT DETAILS
13	000-S-005	STRUCTURAL - STANDARD CONCRETE JOINT DETAILS
14	000-S-006	STRUCTURAL - TYPICAL CONCRETE CRACK AND SURFACE REPAIR DETAILS AND NOTES
15	000-S-007	STRUCTURAL - STANDARD LADDER AND GRATING DETAILS
16	000-M-001	PROCESS MECHANICAL - LEGENDS AND GENERAL NOTES
17	000-E-001	ELECTRICAL - LEGENDS
18	000-E-002	ELECTRICAL - ABBREVIATIONS AND NOTES
19	000-I-001	INSTRUMENTATION - P&ID - LEGEND AND ABBREVIATIONS I
20	000-I-002	INSTRUMENTATION - P&ID - LEGEND AND ABBREVIATIONS II
21	000-I-003	INSTRUMENTATION - P&ID - LEGEND AND ABBREVIATIONS III

SITEWORK / CIVIL

DRAWING NO.	SHEET NUMBER	SHEET NAME
22	000-C-100	CIVIL - GENERAL ARRANGEMENT AND CIVIL SITE WORK
23	000-C-150	CIVIL - FRISCO CHURCH ROAD TRAFFIC CONTROL PLAN
24	000-C-200	CIVIL - OVERALL SITE GRADING PLAN
25	000-C-201	CIVIL - PARTIAL GRADING AND EROSION CONTROL PLAN - CLEARWELL & FLOW METER VAULT
26	000-C-202	CIVIL - PARTIAL GRADING AND EROSION CONTROL PLAN AND PROFILE - CLEARWELL OVERFLOW
27	000-C-300	CIVIL - YARD PIPING OVERALL SITE
28	000-C-301	CIVIL - PLAN AND PROFILE STA 10+00 TO 12+50
29	000-C-302	CIVIL - PLAN AND PROFILE STA 100+00 TO 103+00
30	000-C-303	CIVIL - PLAN AND PROFILE STA 103+00 TO 108+00
31	000-C-304	CIVIL - PLAN AND PROFILE STA 150+00 TO 153+25
32	000-C-305	CIVIL - PLAN AND PROFILE STA 200+00 TO 203+00
33	000-C-310	CIVIL - PLAN AND PROFILE STA 300+00 TO 305+00
34	000-C-311	CIVIL - PLAN AND PROFILE STA 305+00 TO 313+00
35	000-C-312	CIVIL - PLAN AND PROFILE STA 313+00 TO 320+00
36	000-C-313	CIVIL - PLAN AND PROFILE STA 320+00 TO 328+00
37	000-C-314	CIVIL - PLAN AND PROFILE STA 328+00 TO 334+50
38	000-C-350	CIVIL - GROUNDWATER DRAINAGE SYSTEM PLAN
39	000-C-401	CIVIL - UPSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN
40	000-C-402	CIVIL - DOWNSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN (DIP OPTION)
41	000-C-403	CIVIL - DOWNSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN (STEEL OPTION)
42	000-C-501	CIVIL - DETAILS I
43	000-C-502	CIVIL - DETAILS II
44	000-C-503	CIVIL - DETAILS III
45	000-C-504	CIVIL - DETAILS IV
46	000-C-505	CIVIL - DETAILS V
47	000-C-506	CIVIL - TRAFFIC CONTROL DETAILS AND NOTES
48	000-C-507	CIVIL - EROSION CONTROL DETAILS
49	000-C-508	CIVIL - COMBINATION AIR RELEASE AND VACUUM VALVE (CAV) VAULT
50	000-C-509	CIVIL - BLOW-OFF VALVE VAULT
51	000-C-510	CIVIL - THRUST BLOCK AND COLLAR DETAILS

STRUCTURAL

DRAWING NO.	SHEET NUMBER	SHEET NAME
52	045-S-101	STRUCTURAL - OVERALL LOWER LEVEL PLAN
53	045-S-102	STRUCTURAL - OVERALL ROOF PLAN
54	045-S-103	STRUCTURAL - PARTIAL LOWER LEVEL PLAN I
55	045-S-104	STRUCTURAL - PARTIAL LOWER LEVEL PLAN II
56	045-S-105	STRUCTURAL - PARTIAL ROOF PLAN I
57	045-S-106	STRUCTURAL - PARTIAL ROOF PLAN II
58	045-S-110	STRUCTURAL - FLOW METER VAULT PLANS
59	045-S-301	STRUCTURAL - SECTIONS I
60	045-S-302	STRUCTURAL - SECTIONS II
61	045-S-303	STRUCTURAL - SECTIONS III
62	045-S-310	STRUCTURAL - FLOW METER VAULT SECTIONS
63	045-S-501	STRUCTURAL - DETAILS I
64	045-S-502	STRUCTURAL - DETAILS II
65	045-S-503	STRUCTURAL - EXISTING CLEARWELL STRUCTURAL DETAILS I
66	045-S-504	STRUCTURAL - EXISTING CLEARWELL STRUCTURAL DETAILS II

PROCESS MECHANICAL

DRAWING NO.	SHEET NUMBER	SHEET NAME
67	045-M-101	PROCESS MECHANICAL - OVERALL LOWER FLOOR PLAN
68	045-M-102	PROCESS MECHANICAL - OVERALL ROOF PLAN
69	045-M-103	PROCESS MECHANICAL - FLOW METER VAULT PLAN AND SECTIONS
70	045-M-301	PROCESS MECHANICAL - SECTIONS
71	045-M-401	PROCESS MECHANICAL - ENLARGED ROOF PLAN - INFLUENT BOX
72	045-M-402	PROCESS MECHANICAL - ENLARGED ROOF PLAN - EFFLUENT CHANNEL
73	045-M-501	PROCESS MECHANICAL - DETAILS I
74	045-M-502	PROCESS MECHANICAL - DETAILS II

ELECTRICAL

DRAWING NO.	SHEET NUMBER	SHEET NAME
75	000-E-100	ELECTRICAL - OVERALL SITE PLAN
76	000-E-601	ELECTRICAL - ONE-LINE DIAGRAMS AND SCHEDULES
77	045-E-101	ELECTRICAL - POWER PLAN
78	045-E-102	ELECTRICAL - FLOW METER VAULT POWER AND GROUNDING PLAN

INSTRUMENTATION

DRAWING NO.	SHEET NUMBER	SHEET NAME
79	000-I-501	INSTRUMENTATION - INSTRUMENT INSTALLATION DETAILS
80	000-I-601	INSTRUMENTATION - DCS NETWORK CONTROL BLOCK DIAGRAM
81	000-I-602	INSTRUMENTATION - INSTRUMENT INTERCONNECTION DIAGRAM
82	045-I-601	INSTRUMENTATION - P&ID - 16 MG CLEARWELL AND FLOW METER VAULT

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	NM
DETAILED:	JPS
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

GENERAL

SHEET INDEX

000-G-001

PLOTTED: 11/26/2024 12:05:00 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task _23-3.rvt
REVIT VERSION: 2021
D11000

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

GENERAL NOTES:

1. THESE ABBREVIATIONS AND LEGENDS APPLY TO THE ENTIRE SET OF DRAWINGS; HOWEVER, SOME ABBREVIATIONS AND LEGENDS MAY NOT BE APPLICABLE TO THIS PROJECT. CONTRACTOR IS TO COORDINATE AND COMPLY WITH ALL APPLICABLE WORK.

2. SEE SHEETS 000-I-001, 000-I-002, AND 000-I-003 FOR ADDITIONAL LEGENDS AND ABBREVIATIONS.

3. ALL NEW AND EXISTING CONSTRUCTION AND CONTOURING IS BASED UPON USGS NVGD29 DATUM. SEE GENERAL SITEWORK NOTES FOR BENCHMARKS.

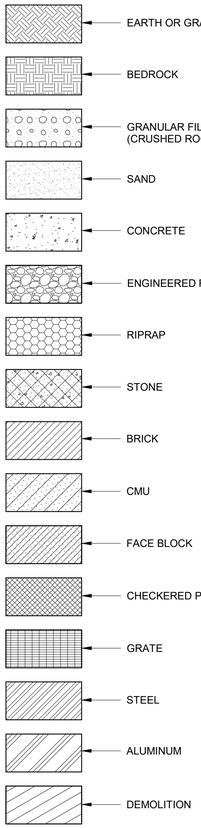
4. ALL ELEVATIONS AND LOCATIONS OF EXISTING PIPING, STRUCTURES, AND UTILITIES AFFECTING NEW WORK SHALL BE FIELD-VERIFIED IN ADVANCE BY THE CONTRACTOR.

5. CONTRACTOR SHALL PERFORM SURFACE RESTORATION AS SPECIFIED IN DIVISION 32.

6. REFERENCE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING DEMOLITION, MODIFICATION, AND SALVAGE.

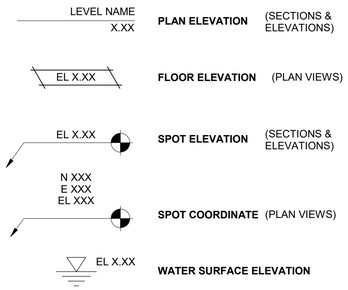
7. "SCREENED" (LIGHT) DELINEATION SHOWN ON ALL SHEETS DENOTES EXISTING FACILITIES. "SCREENED" INFORMATION WAS TAKEN FROM PREVIOUS CONSTRUCTION DRAWINGS AND FIELD SURVEY, IS FOR REFERENCE ONLY, AND SHALL BE FIELD-VERIFIED BEFORE THE ORDERING OF MATERIALS & BEGINNING CONSTRUCTION. "BOLD" (DARK) DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS CONTRACT. DASHED DELINEATION SHOWN ON ALL SHEETS DENOTES FUTURE WORK UNLESS OTHERWISE NOTED.

FILL PATTERNS



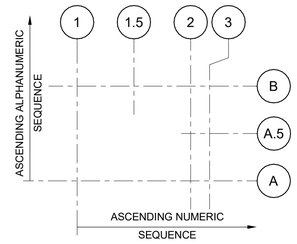
ELEVATION & GRID CALLOUTS

ELEVATION CALLOUTS

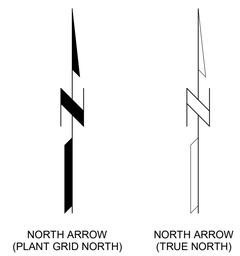


GRID/COLUMN CALLOUTS

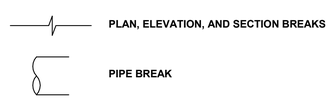
TYPICAL GRID/COLUMN LAYOUT



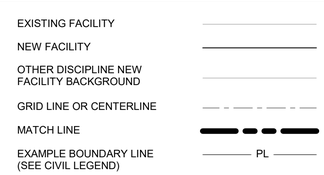
NORTH ARROW



BREAKS

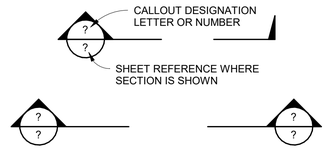


LINE STYLES

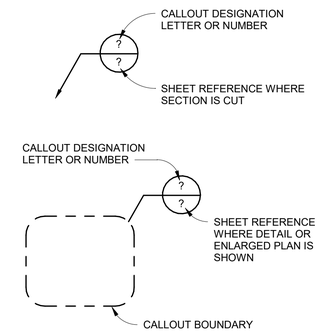


VIEW CALLOUTS

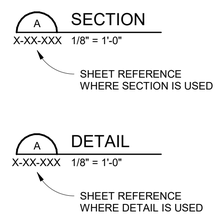
SECTION CALLOUTS



DETAIL/ENLARGED PLAN AREA CALLOUTS



SECTION & DETAIL VIEW TITLES



ANNOTATION

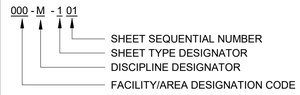
SHEET NOTES



REVISIONS



DRAWING NUMBERING SYSTEM



DISCIPLINE DESIGNATORS & HEIRARCHY

G	GENERAL
D	DEMOLITION
C	CIVIL
L	LANDSCAPE
A	ARCHITECTURAL
S	STRUCTURAL
M	PROCESS MECHANICAL
P	PLUMBING
F	FIRE PROTECTION
H	HVAC/BUILDING MECHANICAL
E	ELECTRICAL
I	INSTRUMENTATION AND CONTROLS

AREA/FACILITY DESIGNATION CODES

000	GENERAL, SITE WORK
045	16 MG CLEARWELL, TW INTERCONNECT FLOW METER VAULT, GROUNDWATER DRAINAGE MANHOLE

SHEET TYPE DESIGNATORS

0	GENERAL (SYMBOLS, LEGENDS, NOTES, ETC.)
1	PLANS (ARRANGEMENT PLANS, PARTIAL PLANS)
2	ELEVATIONS
3	SECTIONS
4	LARGE SCALE VIEWS (ENLARGED PLANS, STAIR SECTIONS OR SECTIONS THAT ARE NOT DETAILS)
5	DETAILS
6	SCHEDULES & DIAGRAMS
7	SCHEMATICS (ONE-LINES, BLOCK DIAGRAMS)
8	USER DEFINED
9	3D MODEL (PERSPECTIVES, ISOMETRICS, PHOTOGRAPHS)

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	NM
DETAILED:	NVN
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

GENERAL

LEGENDS AND NOTES

000-G-002

3 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 12:05:33 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/415-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D1 1000

ITEM	UNITS	16 MG CLEARWELL & FAYETTEVILLE FW MAIN RELOCATION
CLEARWELL BASINS		
TYPE	--	PARTIALLY-BURIED REINFORCED CONCRETE
NUMBER OF BASINS	NO.	2
VOLUME / BASIN	MG	8
TOTAL VOLUME	MG	16
DIMENSIONS PER BASIN (ROUNDED)	FT x FT	150.5 x 375
MAX SIDEWATER DEPTH	FT	19.7
OVERFLOW WEIR CAPACITY	MGD	240
FLOW METERING		
NUMBER	NO.	1
TYPE	--	MAGNETIC FLOW
SIZE	INCH	54

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16 MG CLEARWELL

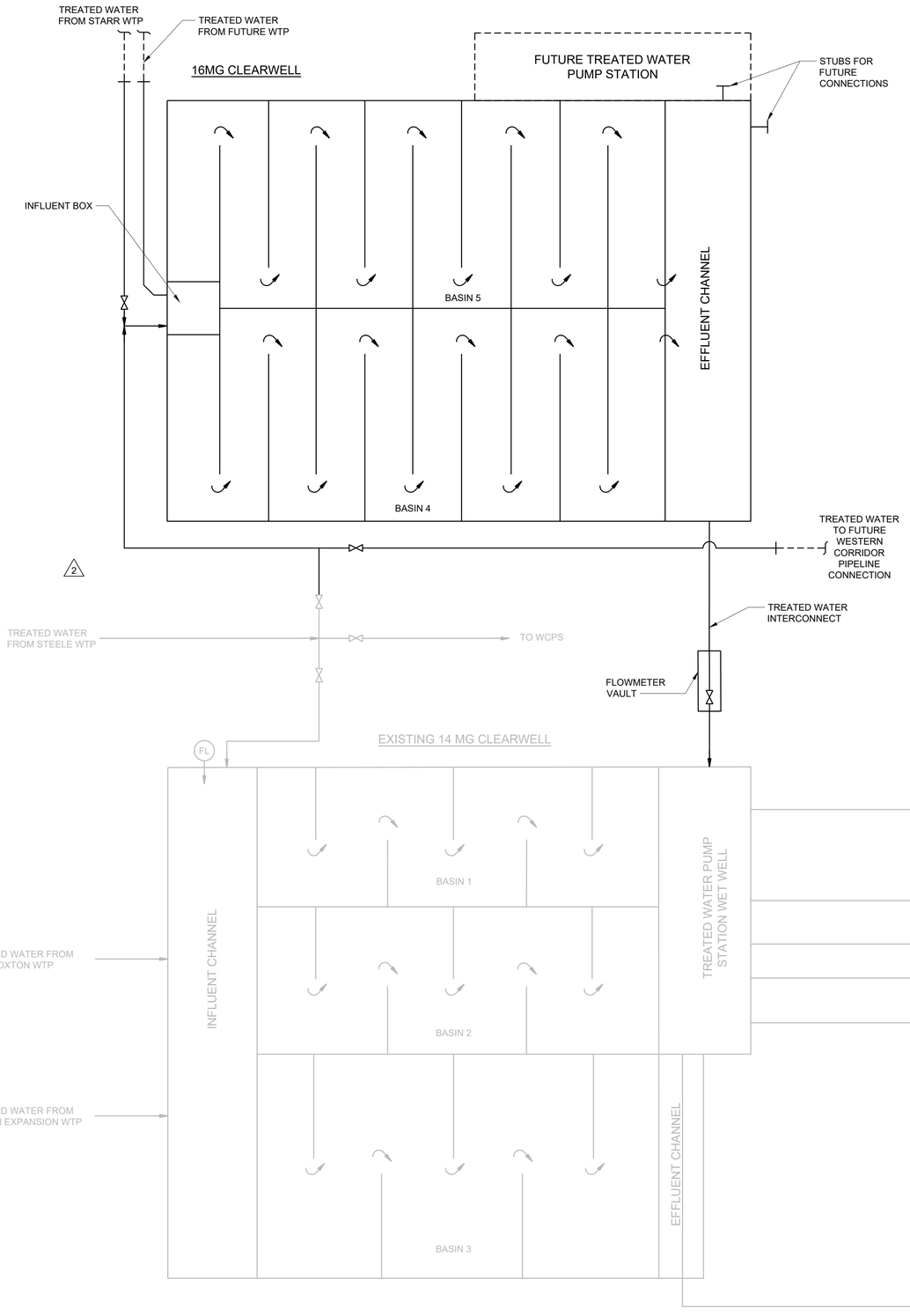
GENERAL

DESIGN CRITERIA

000-G-003

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 12:10:21 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task _23-3.rvt
REVIT VERSION: 2021
D11000



(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 2/10/2025 1:24:45 PM
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D71000
D71004

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Black & Veatch Corporation
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2	01/30/25	ISSUED PER ADDENDUM NO. 2

REVISIONS AND RECORD OF ISSUE

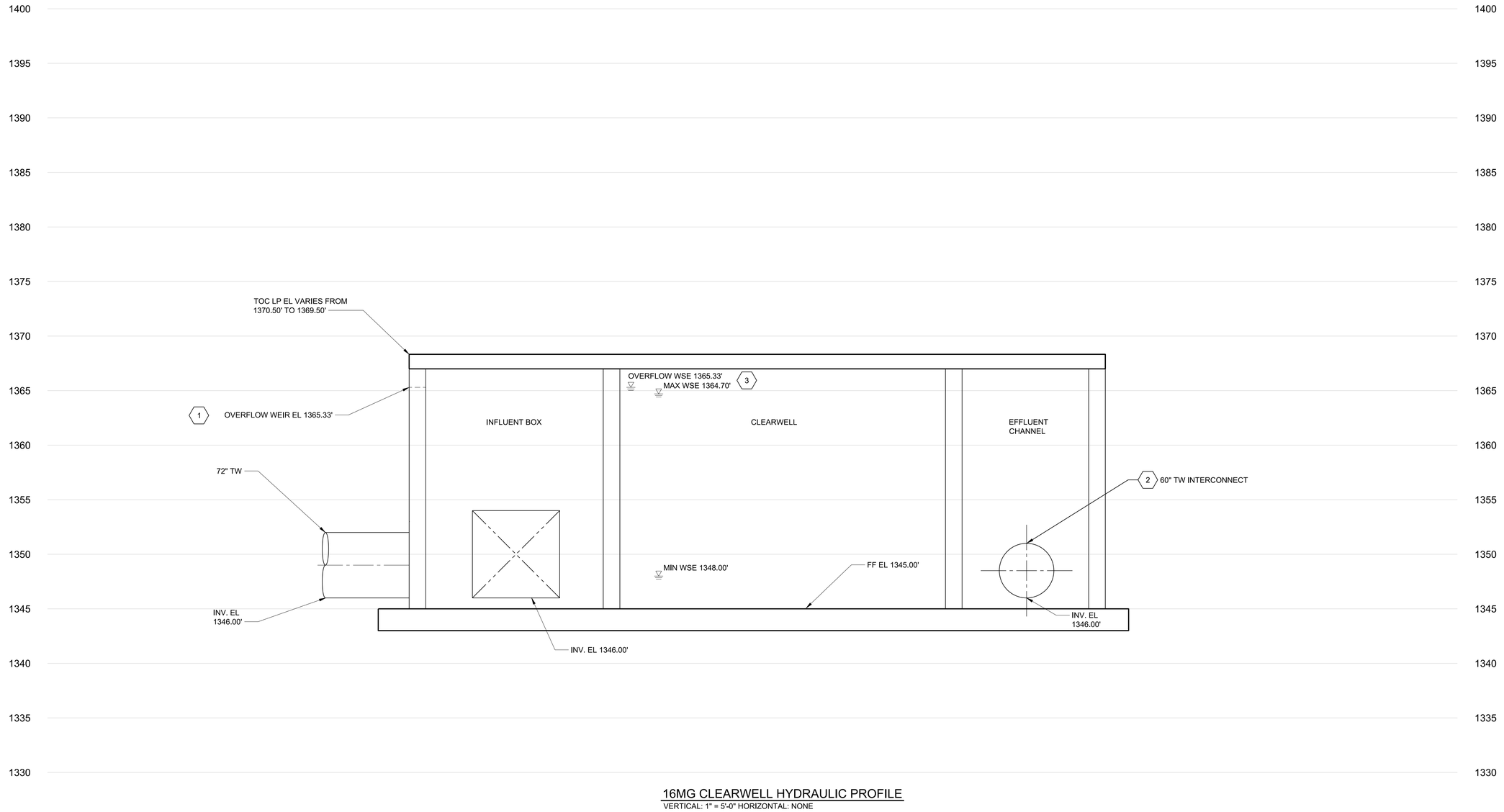
DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
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16 MG CLEARWELL

GENERAL

PROCESS FLOW SCHEMATIC

000-G-004



16MG CLEARWELL HYDRAULIC PROFILE

VERTICAL: 1" = 5'-0" HORIZONTAL: NONE

GENERAL KEYNOTES:

1. OVERFLOW WEIR OPENINGS ARE IN BASIN 4 & 5 ONLY. NOT IN INFLUENT BOX.
2. CONNECTED TO EXISTING CLEARWELL TREATED WATER PUMP STATION WET WELL.
3. MAX DESIGN WSE REPRESENTS 80 MGD FLOW THROUGH THE CLEARWELL. THE ACTUAL WSE WILL VARY BASED ON PLANT PRODUCTION AND TREATED WATER PUMPING RATE.

5' 3' 0 5' 10'
1"=5'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/19/2024 7:10:50 AM
FILE: C:\PW_WORKING\BVW_AMERICAS_2\D1868556\000-G-005.DWG
ED1000
D1000

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16 MG CLEARWELL

GENERAL

HYDRAULIC PROFILE

000-G-005

A

AB	AGGREGATE BASE
ABV	ABOVE
AC	ASPHALT CONCRETE
ACP	ASBESTOS CEMENT PIPE
AD	AREA DRAIN, ANODE
ADD	ADDITIONAL
ADJ	ADJUSTABLE, ADJACENT
ADMIN	ADMINISTRATION
ADWF	AVERAGE DRY-WEATHER FLOW
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AH	AHEAD
ALT	ALTERNATE, ALTERNATIVE
ANC	ANCHOR
AP	ACCESS PANEL, ANGLE POINT
APPR	APPROACH
APPROX	APPROXIMATE, APPROXIMATELY
AR	ANCHOR ROD
ARCH	ARCHITECTURAL
ASSY	ASSEMBLY
ATM	ATMOSPHERE, ATMOSPHERIC
AUTO	AUTOMATIC
AUX	AUXILIARY
AVG	AVERAGE
AWG	AMERICAN WIRE GAUGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
AWWF	AVERAGE WET-WEATHER FLOW

B

B	BORE HOLE
B TO B	BACK TO BACK
BAL	BALANCE
BC	BACK OF CURB
BET	BETWEEN
BF	BLIND FLANGE
BHP	BRAKE HORSEPOWER
BITUM	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
BM	BENCHMARK
BNR	BIOLOGICAL NUTRIENT REMOVAL
BOD	BIOLOGICAL/BIOCHEMICAL OXYGEN DEMAND
BOF	BOTTOM OF FOOTING
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BP	BACK PRESSURE
BRG	BEARING
BS	BOTH SIDES
BU	BELL-UP
BVC	BEGINNING OF VERTICAL CURVE

C

C	CURVE
C TO C	CENTER TO CENTER
CB	CATCH BASIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
C&G	CURB AND GUTTER
CIP	CAST IRON PIPE
CISP	CAST IRON SOIL PIPE
CL	CLASS
C/L	CENTERLINE
CLG	CEILING
CLR	CLEAR, CLEARANCE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMC	CEMENT MORTAR COATED
CML	CEMENT MORTAR LINED
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT, COMPANY
COD	CHEMICAL OXYGEN DEMAND
COL	COLUMN
COMB	COMBINATION
COMB SWR	COMBINED SEWER
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUED, CONTINUOUS, CONTINUATION, CONTROL
CONTR	CONTRACTOR
COR	CORNER
CORR	CORRIDOR, CORRUGATED
CP	CONTROL POINT, CATHODIC PROTECTION, CATCH POINT
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CSP	CORRUGATED STEEL PIPE
CTR(S)	CENTER(S)
CTS	CORROSION/CATHODIC TEST STATION
CU	CUBIC, COPPER
CY	CUBIC YARD

D

D	DOOR
DB	DUCT BANK
DBL	DOUBLE
DEG	DEGREE
DEPT	DEPARTMENT
DET	DETAIL
DI	DROP INLET, DUCTILE IRON
DIA	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIST	DISTRIBUTION
DIV	DIVISION
DMJ	DISMANTLING JOINT
DN	DOWN
DR	DRAIN
DW	DRY WELL
DWG(S)	DRAWING(S)

E

E	EAST, EASTING
EA	EACH
ECC	ECCENTRIC
ECC RED	ECCENTRIC REDUCER
EFF	EFFLUENT, EFFICIENCY
EG	EXISTING GRADE
EJ	EXPANSION JOINT
EL	ELEVATION
ELB	ELBOW
ELL	ELBOW
ELEC	ELECTRIC, ELECTRICAL
EMER	EMERGENCY
ENC	ENCASEMENT
ENCL	ENCLOSURE
EOL	END OF LINE
EOP	EDGE OF PAVEMENT
EOS	EDGE OF SLAB
EQ	EQUAL
EQUIP	EQUIPMENT
EVC	END OF VERTICAL CURVE
EW	EACH WAY
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION, EXPOSED
EXT	EXTENSION, EXTERIOR, EXTERNAL

F

F	FAHRENHEIT, FACE
F TO F	FACE TO FACE
FAB	FABRICATE(D)(TION)
FC	FACE OF CONCRETE, FAIL CLOSED
FCA	FLANGED COUPLING ADAPTER
FD	FLOOR DRAIN
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FIG	FIGURE
FL	FLOOR, FLOW LINE
FLEX	FLEXIBLE
FLG	FLANGE(D)
FM	FORCE MAIN
FMH	FLEXIBLE METAL HOSE
FO	FAIL OPEN
FOB	FLAT ON BOTTOM
FOM	FACE OF MASONRY
FOT	FLAT ON TOP
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FAR SIDE, FLOOR SLEEVE
FT	FOOT, FEET
FTG	FOOTING
FURN	FURNISH, FURNISHED
FW	FINISHED WATER
FWD	FORWARD
FWE	FILTERED WATER EFFLUENT

G

G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRADE BREAK
GC	GROOVED COUPLING
GEN	GENERAL, GENERATOR
GL	GLASS
GM	GAS METER
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
GR	GRADE

H

H	HIGH, HOUR
HDG	HOT-DIPPED GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HEX	HEAT EXCHANGER
HGT	HEIGHT
HH	HANDHOLE
HMC	HARNESSED MECHANICAL COUPLING
HMJ	HARNESSED MECHANICAL JOINT
HORIZ	HORIZONTAL
HP	HIGH POINT, HIGH PRESSURE, HORSEPOWER
HR	HOUR, HANDRAIL
HS	HIGH STRENGTH
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWY	HIGHWAY
HYDRO	HYDROPNEUMATIC, HYDROGENERATION

I

ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IN	INCH(ES)
INCL	INCLUDING
INCR	INCREASE
INST	INSTRUMENT, INSTRUMENTATION
INSUL	INSULATE, INSULATED, INSULATING
INT	INTERIOR, INTERNAL
INV	INVERT
IPS	IRON PIPE SIZE

J

JB	JUNCTION BOX
JT	JOINT

K

KVA	KILOVOLT AMPERE

L

L	LENGTH, LONG, LOW
LAT	LATERAL, LATITUDE
LB(S)	POUND(S)
LC	LENGTH OF CURVE
LF	LINEAR FEET
LH	LEFT HAND
LIN	LINEAL, LINEAR
LONG	LONGITUDE
LP LOW	POINT, LOW PRESSURE
LT	LEFT

M

MAINT	MAINTENANCE
MAN	MANUAL(LY)
MAX	MAXIMUM
MBR	MEMBRANE BIOREACTOR
MC	MECHANICAL COUPLING
MECH	MECHANICAL
MED	MEDIUM
MF	MICROFILTRATION
MFR	MANUFACTURER
MG	MILLION GALLONS
MG/L	MILLIGRAMS PER LITER
MGD	MILLION GALLONS PER DAY
MH	MAINTENANCE HOLE, MANHOLE
MIN	MINIMUM, MINUTE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MJRG	MECHANICAL JOINT RETAINER GLAND
MJTR	MECHANICAL JOINT WITH TIE ROD
MO	MOTOR OPERATED
MSL	MEAN SEA LEVEL
MTD	MOUNTED
MTL	MATERIAL
MTR	MOTOR
MW	MONITORING WELL

N

N	NORTH, NORTHING, NITROGEN (TOTAL AS N)
N/A	NOT APPLICABLE
NAD	NORTH AMERICAN DATUM (HORIZONTAL)
NAVD	NORTH AMERICAN VERTICAL DATUM
NC	NORMALLY CLOSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO.	NUMBER(S)
NOM	NOMINAL
NPSH	NET POSITIVE SUCTION HEAD
NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
NPT	NATIONAL PIPE THREAD
NRS	NON-RISING STEM
NS	NEAR SIDE
NTS	NOT TO SCALE

O

OC	ON CENTER, ODOR CONTROL
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE, OVERFLOW
OH	OVERHEAD
OPER	OPERATING
OPNG	OPENING
OPP	OPPOSITE
OZ	OUNCE

P

P&ID	PIPING/PROCESS AND INSTRUMENTATION DIAGRAM
P	PHOSPHORUS (TOTAL AS P)
PPM	PARTS PER MILLION
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PE	PLAIN END
PG	PRESSURE GAUGE
PH	PIPE HANGER
PI	POINT OF INTERSECTION
PNL(S)	PANEL(S), PANELBOARD(S)
POC	POINT ON CIRCULAR CURVE, POINT OF CONNECTION
POT	POINT ON TANGENT
PP	POWER POLE
PROJ	PROJECTION
PRS	PRESSURE REDUCING STATION
PS	PIPE SUPPORT
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POINT OF TANGENCY, POINT
PVC	POLYVINYL CHLORIDE, POINT OF VERTICAL CURVATURE
PVT	POINT OF VERTICAL TANGENCY
PVCP	POLYVINYL CHLORIDE PIPE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT

Q

Q	RATE OF FLOW
QCPLG	QUICK COUPLING

R

R	RADIUS, RISER
R/W	RIGHT OF WAY
RCP	REINFORCED CONCRETE PIPE
RCCP	REINFORCED CONCRETE CYLINDER PIPE
RECIRC	RECIRCULATING
RED	REDUCER, REDUCING
REF	REFERENCE
REINF	REINFORCED, REINFORCING
REM	REMOVABLE, REMOVE
REQD	REQUIRED
RET	RETURN
REV	REVISION, REVISED, REVERSED
RH	RIGHT HAND
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RS	RISING STEM
RT	RIGHT
ROW	RIGHT OF WAY

S

S	SECOND, SLOPE, SOUTH
SCHED	SCHEDULE
SCFM	STANDARD CUBIC FEET PER MINUTE
SD	STORM DRAIN
SEC	SECOND
SECT	SECTION
SF	SQUARE FEET
SH	SHEET
SIM	SIMILAR
SP	STEEL PIPE
SPA	SPACING, SPACES
SPEC(S)	SPECIFICATION(S)
SPL	SPECIAL
SPLY	SUPPLY
SQ	SQUARE
SS	STAINLESS STEEL
SS	SANITARY SEWER
ST SWR	STORM SEWER
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE
STR	STRUCTURAL
SUSP	SUSPENDED
SYM	SYMMETRICAL
SYS	SYSTEM

T

T	TELEPHONE, TOP
TAN	TANGENT
TBC	TOP BACK OF CURB
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCHMARK
TC	TOP OF CURB
TDS	TOTAL DISSOLVED SOLIDS
TEMP	TEMPERATURE, TEMPORARY
TH	TEST HOLE
THD	THREADED
THK	THICK, THICKNESS
TOC	TOP OF CONCRETE, TABLE OF CONTENTS, TOTAL ORGANIC CARBON
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY
TOP	TOP OF PIPE
TOW	TOP OF WALL
TP	TEST PIT
TRANS	TRANSFORMER
TS	TOTAL SOLIDS
TSS	TOTAL SUSPENDED SOLIDS
TW	TREATED WATER
TYP	TYPICAL

U

UB	UTILITY BOX
UF	ULTRAFILTRATION
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
UP	UTILITY POLE
USGS	UNITED STATES GEOLOGICAL SURVEY
UV	ULTRAVIOLET

V

V	VALVE (SEE P&ID ABBREVIATIONS), VERTICAL, VOLT, VENT
VAC	VACUUM
VB	VALVE BOX
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VOCs	VOLATILE ORGANIC COMPOUNDS
VP	VAPOR PRESSURE

W

W	WEST, WIDE, WATER
W/	WITH
WC	WATER COLUMN
WEF	WATER ENVIRONMENT FEDERATION
W	WATER LEVEL
WM	WATER METER
W/O	WITHOUT
WP	WATERPROOF
WS	WATERSTOP
WS	WATER SURFACE
WSL	WATER SURFACE LEVEL
WT	WEIGHT
WW	WETWELL

X

x	BY, TIMES

Y

YH	YARD HYDRANT

NOTES:

1. FOR EQUIPMENT ABBREVIATIONS, INCLUDING FOR VALVES, REFER TO P&ID LEGEND AND ABBREVIATIONS DRAWINGS FUNCTION CODE ABBREVIATIONS.
2. FOR SYSTEM AND PROCESS STREAM ABBREVIATIONS, REFER TO P&ID LEGEND AND ABBREVIATIONS DRAWINGS SYSTEM CODE AND PROCESS CODE ABBREVIATIONS.
3. FOR PIPE MATERIAL AND INSULATION MATERIAL ABBREVIATIONS REFER TO P&ID LEGEND AND ABBREVIATIONS DRAWINGS PIPELINE MATERIAL CODE AND INSULATION MATERIAL CODE ABBREVIATIONS.

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Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

ABBREVIATIONS

000-C-001

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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EXISTING FACILITY LEGEND

- CONSTRUCTION EASEMENT LINE
- EASEMENT LINE
- PERMANENT EASEMENT LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- SURVEY LINE / SECTION LINE
- TEMPORARY EASEMENT LINE
- UTILITY EASEMENT LINE
- EXISTING GRADE CONTOUR
- EXISTING PIPING
- CENTERLINE
- ELECTRICAL (OVERHEAD)
- ELECTRICAL (UNDERGROUND)
- FENCE
- GAS LINE
- RAILROAD, EACH TRACK
- TELEPHONE (OVERHEAD)
- TELEPHONE (UNDERGROUND)
- WATER LINE
- WATER OR GAS VALVE
- WATER OR GAS METER
- SEWER OR STORMDRAIN MANHOLE
- VALVE
- UTILITY POLE WITH GUY ANCHOR
- FIRE HYDRANT
- YARD HYDRANT
- STREET LIGHT POLE
- HEDGE, BRUSH, SHRUBS, WOODS
- DECIDUOUS TREE AND TRUNK DIAMETER
- CONIFEROUS TREE AND TRUNK DIAMETER
- SWAMP
- SPOT ELEVATION

LEGENDS NOTES:

1. REFER TO PROCESS MECHANICAL LEGENDS FOR VALVE, PIPE JOINT, AND PIPE FITTING SYMBOLS.
2. LEGEND SYMBOLS AND ABBREVIATIONS SHOWN IN THIS DRAWING ARE BASED ON A TEMPLATE THAT IS NOT PROJECT SPECIFIC. SOME LEGEND SYMBOLS AND ABBREVIATIONS ARE NOT USED ON THIS SPECIFIC PROJECT, BUT ARE SHOWN TO PROVIDE A DICTIONARY FOR SYMBOLS AND ABBREVIATIONS THAT MAY ALSO BE USED DURING THE PROJECT CONSTRUCTION PHASE.

NEW FACILITY LEGEND

- DESIGN POINT
- PERCENT SLOPE
- STATION
- SLOPE RUN : RISE
- CURVE NUMBER
- SPOT ELEVATION
- SURFACED STREET, ROAD OR DRIVE
- SURFACED STREET, ROAD OR DRIVE WITH CURBS
- CATCH BASIN
- SEWER OR STORMDRAIN MANHOLE
- DRAINAGE COURSE OR FLOW LINE
- FINISHED GRADE CONTOUR
- BANK OR SLOPE LINES
- BORE HOLE OR TEST HOLE AND NUMBER
- SURVEY LINE WITH PI, PT, OR POT
- CONCRETE ENCASEMENT - PLAN VIEW
- CULVERT
- NEW PIPING
- NEW PIPING IN PROFILE
- BUILDINGS, STRUCTURES
- STRUCTURES UNDERGROUND
- FUTURE BUILDINGS, STRUCTURES
- FENCE
- SILT FENCE
- CENTERLINE
- FIRE HYDRANT
- YARD HYDRANT
- STREET LIGHT POLE
- TO BE DEMOLISHED
- WHEELCHAIR ACCESSIBILITY MARKER
- EARTH OR GRADE
- BEDROCK
- GRANULAR FILL (CRUSHED ROCK OR GRAVEL)
- SAND
- AC PAVEMENT
- CONCRETE
- ENGINEERED FILL
- RIPRAP
- CHECKERED PLATE
- BAR GRATING (LINES IN DIRECTION OF SPAN)

PIPING IDENTIFICATION LEGEND

- 6" DS — NEW PIPING
- PIPE SERVICE PROCESS CODE, SEE P&ID LEGEND & ABBREVIATIONS
- PIPE SIZE
- 6" DS — EXISTING PIPING
- 6" DS — FUTURE PIPING

EQUIPMENT & VALVE TAG LEGEND

- XXX — MECHANICAL EQUIPMENT/VALVE TAG, SEE P&ID LEGEND AND ABBREVIATIONS

GENERAL NOTES

1. HORIZONTAL CONTROL: COORDINATES ARE BASED ON MODIFIED STATE PLANE IN US SURVEY FEET. A GRID TO GROUND SCALE FACTOR OF 1.00005586 WAS APPLIED AT POINT 100. THE STATE PLANE COORDINATE OF POINT 100 IS: N 705463.715 / e: 705463.715. AR NORTH ZONE (NAD 83) (2011) (EPOCH:2010.000). THE ORTHROMETRIC HEIGHT OF POINT 100: 1343.40 FEET (NAVD88-GEOID18). POINT 100 IS A 2" BRASS PLANT CONTROL MONUMENT, IN 5' WIDE CONCRETE ELECTRIC DUCT BANK, BEING SET BY BWD AND STAMPED: WTP - 2, N-14928.284 E-5324.643, ELEV 1362.86. COORDINATES ON STRUCTURES DEPICT THE EXTERIOR FACE OF THE CONCRETE SUBSTRUCTURE FOUNDATION WALL OR FOOTING WALL.
2. VERTICAL CONTROL: ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). BENCHMARKS AND/OR STRUCTURE ELEVATIONS FROM EXISTING SURVEYS OR REFERENCE DRAWINGS MAY RESULT IN VARIANCES WITH ELEVATIONS INDICATED ON THE DRAWINGS FOR EXISTING FACILITIES.
3. PER BENTON COUNTY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) MAPS, THE PLANT IS NOT WITHIN THE 500-YEAR (YR) OR 100-YR FLOOD PLAINS. FLOOD ELEVATION DATA IS NOT APPLICABLE.
4. EXISTING UTILITIES AND STRUCTURES (UNDERGROUND, SURFACE, OR OVERHEAD) ARE INDICATED ONLY TO THE EXTENT THAT SUCH INFORMATION WAS KNOWN, OR MADE AVAILABLE TO, OR DISCOVERED BY THE ENGINEER IN PREPARING THE DRAWINGS. THE LOCATIONS, CONFIGURATIONS, AND ELEVATIONS OF SUBSURFACE FACILITIES AND UTILITIES ARE APPROXIMATE, AND NOT ALL UTILITIES AND FACILITIES MAY BE INDICATED. OVERHEAD UTILITIES ARE NOT INDICATED IN ARCHITECTURAL ELEVATIONS, PROFILE OR SECTION DRAWINGS. THE ENGINEERING INVESTIGATIONS, LOCATION, AND DESIGNATION OF SUBSURFACE UTILITIES INDICATED IN THESE CONTRACT DOCUMENTS HAS BEEN PERFORMED TO QUALITY LEVEL IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING PRINCIPLES AND PRACTICES AS OUTLINED IN ASCE STANDARD AND GUIDELINE BULLETIN CI/ASCE 38-02 UNLESS OTHERWISE DESIGNATED. WHERE SUCH ACTIVITIES HAVE BEEN PERFORMED TO A HIGHER LEVEL OF QUALITY, THE HIGHER QUALITY LEVEL FOR THE AFFECTED AREAS IS INDICATED IN THE CONTRACT DOCUMENTS.
5. "SCREENED" (LIGHT) DELINEATION INDICATED ON THE DRAWINGS DENOTES EXISTING FACILITIES. "SCREENED" INFORMATION WAS TAKEN FROM EXISTING CONSTRUCTION DRAWINGS AND DATA AND SURVEYS, IS FOR REFERENCE ONLY, AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO THE ORDERING OF MATERIALS AND BEGINNING OF CONSTRUCTION. "BOLD" DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS CONTRACT.
6. CONTRACTOR'S STAGING, PARKING AND MATERIAL STORAGE SHALL BE LIMITED TO THE SPACE(S) DESIGNATED ON THE DRAWINGS. PROVIDING ADDITIONAL STORAGE OR PARKING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
7. CALL BEFORE YOU DIG. CONTRACTOR SHALL DETERMINE ACCURATE LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STRUCTURES, WHETHER INDICATED ON THE DRAWINGS OR NOT, IN THE FIELD IN ADVANCE OF EXCAVATING, BY CONTACTING ALL UTILITIES AND OTHER AGENCIES, AND BY PROSPECTING. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL, DEMOLITION, RECONSTRUCTION, AND RECONNECTION OF EXISTING FACILITIES AS REQUIRED TO COMPLETE THE WORK. IF REQUIRED AFTER FIELD LOCATION AND VERIFICATION, CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO DETERMINE ANY NECESSARY MODIFICATIONS TO THE DESIGN OF NEW WORK.
8. BEFORE CONSTRUCTION IS STARTED, CONTRACTOR SHALL COORDINATE WITH THE OWNER OF EACH UTILITY AND DEFINE THE REQUIREMENTS AND METHODS TO ACCOMMODATE THE PROTECTION, TEMPORARY SUPPORT, ADJUSTMENT, OR RELOCATION OF ANY UTILITIES AFFECTED BY THE PROPOSED NEW WORK.
9. CONTRACTOR SHALL COMPLY WITH THE GOVERNING AGENCY NPDES CONSTRUCTION REQUIREMENTS, AND SHALL PROVIDE APPROPRIATE MITIGATION MEASURES OR PROTECTION AND RESTORATION AT ALL LOCATIONS AS REQUIRED BY THEIR OPERATIONS, AND AS DIRECTED BY ENGINEER. SPECIAL CONSTRUCTION REQUIREMENTS, TEMPORARY PROTECTIVE FENCING OR BARRICADES, SHEETING, SHORING, EROSION PROTECTION, AND SURFACE RESTORATION AT CERTAIN LOCATIONS ARE INDICATED ON THE DRAWINGS AND SPECIFIED TO BRING THE CONTRACTOR'S ATTENTION TO SENSITIVE AREAS.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL PROPERTY CORNER AND SURVEYING CONTROL MARKERS AND MONUMENTS. MONUMENTS DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REESTABLISHED BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF ARKANSAS.
11. THE LOCATION OF BORINGS, AND TEST HOLES INDICATED ON THE DRAWINGS ARE APPROXIMATE. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORT FOR ACTUAL BORINGS AND TEST HOLE LOCATIONS AND LOGS.
12. CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING TREES, SHRUBS, AND PLANTS, UNLESS OTHERWISE NOTED.
13. CONTRACTOR SHALL INSTALL ALL PIPELINES, PAVING, WALKWAYS, AND CURB AND GUTTER AT A UNIFORM GRADE BETWEEN ELEVATIONS DEPICTED ON THE DRAWINGS.
14. FOR ALL SITE GRADING, SMOOTH PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE, UNLESS NOTED OTHERWISE IN THE DRAWINGS. PARABOLIC ROUNDING SHALL APPLY TO ALL CUT AND FILL SECTIONS.
15. FINISHED GRADE ELEVATION AT THE BUILDING FACE, WHERE NOT ADJACENT TO PAVEMENT, SHALL BE APPROXIMATELY 6 INCHES BELOW FINISHED FLOOR ELEVATION UNLESS OTHERWISE NOTED. FINISHED GRADE ELEVATION ADJACENT TO BASINS SHALL BE APPROXIMATE AS INDICATED BY CONTOURS, OR AS REQUIRED TO MEET STAIR LANDINGS.
16. THE CONTRACTOR'S CONSTRUCTION OPERATIONS SHALL CONFORM TO FEDERAL, STATE, AND LOCAL AGENCY SAFETY AND HEALTH RULES AND REGULATIONS FOR EXCAVATION AND TRENCHING, CONFINED SPACE ENTRY, WORK IN HAZARDOUS LOCATIONS, WORK AT HEIGHTS, AIR QUALITY CONTROL, NOISE CONTROL, TRAFFIC CONTROL, AND ANY OTHER POTENTIALLY HAZARDOUS CONDITIONS.
17. ALL PRESSURIZED OR SURCHARGED PIPELINES, PIPE FITTINGS, COUPLINGS, JOINTS, EXPANSION JOINTS, TANK CONNECTIONS, AND CHANNEL CONNECTIONS SHALL BE PROVIDED WITH THRUST RESTRAINT BASED ON SPECIFIED PRESSURES AND TEMPERATURES.
18. THE DRAWINGS INDICATE TYPES OF PIPE SUPPORT SYSTEMS AT VARIOUS LOCATIONS. HOWEVER, All PIPE SUPPORTS, HANGERS, BRACKETS, INSERTS OR BRACES ARE NOT SHOWN. CONTRACTOR SHALL REFER TO THE SPECIFICATIONS AND PROVIDE A COMPLETE SUPPORT SYSTEM AS REQUIRED.
19. THE TERM "PROPOSED" AS INDICATED ON THE DRAWINGS MEANS THE ITEM IS DESIGNED OR PLANNED TO BE PROVIDED BY OWNER OR OTHERS SEPARATE FROM THIS CONTRACT. THE TERM "FUTURE" AS INDICATED ON THE DRAWINGS REFERS TO THE ENGINEER'S INTERPRETATION OF THE ITEM FOR THE FUTURE, BASED ON AVAILABLE INFORMATION.
20. THE EXISTING PROCESS FACILITIES SHALL REMAIN IN OPERATION CONTINUOUSLY THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES. INDIVIDUAL PROCESS FACILITIES CAN BE TAKEN OUT OF SERVICE FOR LIMITED PERIODS OF TIME TO FACILITATE CONSTRUCTION AS SPECIFIED IN THE CONTRACT DOCUMENTS.
21. STRUCTURES SUCH AS CURBS AND GUTTERS, CONCRETE AND ASPHALT DRIVES AND WALKWAYS, PAVING BRICKS, FENCING, RETAINING WALLS, ETC., CROSSED BY PIPELINES ARE NOT ALL INDICATED IN PROFILE. CONTRACTOR SHALL RESTORE ANY EXISTING STRUCTURES THAT ARE DISTURBED, DAMAGED, OR REMOVED BY CONSTRUCTION.
22. CONTRACTOR SHALL REPLACE EXISTING PIPE CULVERTS THAT ARE REMOVED TO INSTALL NEW PIPELINES WITH NEW PIPE CULVERTS OF THE SAME SIZE, MATERIAL AND CONSTRUCTION AT THE SAME LOCATION AND INVERT ELEVATION AS THOSE THAT WERE REMOVED, AND SHAPE THE DITCH TO DRAIN WITH THE REPLACED CULVERT. CONTRACTOR SHALL PROVIDE ANY TEMPORARY CULVERTS THAT MAY BE REQUIRED FOR CONTRACTOR'S OPERATIONS. CONTRACTOR SHALL COORDINATE REMOVAL AND REPLACEMENT OF ANY CULVERTS WITHIN PUBLIC RIGHT-OF-WAY WITH THE REGULATING AGENCY.
23. HORIZONTAL STATIONING ALONG PIPELINE ALIGNMENTS IS A HORIZONTAL MEASUREMENT. FOR MEASUREMENT AND PAYMENT FOR PIPELINES, CONTRACTOR SHALL PROVIDE THE ACTUAL PIPE LENGTH DETERMINED ACCOUNTING FOR THE SLOPE OR VERTICAL CURVE ON WHICH PIPELINES ARE INSTALLED.
24. UNLESS OTHERWISE SPECIFIED, INDICATED ON THE DRAWINGS, OR DIRECTED BY THE ENGINEER, INSTALL PIPELINES SLOPING DOWNWARD FROM AN AIR VALVE. HIGH POINTS IN PIPELINES WILL NOT BE PERMITTED EXCEPT AT LOCATIONS OF AIR VALVES AS INDICATED ON THE DRAWINGS. REVIEW PIPELINE PROFILE REQUIREMENTS WITH THE ENGINEER PRIOR TO PREPARING LAYING SCHEDULES AND PERFORMING FIELD CONSTRUCTION STAKING.
25. PROVIDE A MINIMUM 3.0 FEET COVER FOR ALL PIPELINES, INCLUDING BLOW-OFFS, BASED ON FINISHED GRADE.
26. AIR RELEASE VALVES AND ISOLATION VALVES SHALL BE INSTALLED BELOW THE LEVEL IDENTIFIED ABOVE FOR REQUIRED MINIMUM COVER.
27. CONTRACTOR SHALL DETERMINE ACCURATE LOCATION, ELEVATION, AND ARRANGEMENT OF CONNECTIONS OF NEW PIPELINES WITH EXISTING PIPELINES BASED ON ACTUAL CONDITIONS IN THE FIELD, INCLUDING EXPOSING EXISTING PIPING, PRIOR TO FABRICATING NEW PIPING. CONTRACTOR SHALL PROVIDE FITTINGS, ADAPTERS, SOLID SLEEVE CLOSURES, AND HARNESSED MECHANICAL COUPLING; ROTATE FITTINGS; DEFLECT JOINTS; AND MODIFY EXISTING PIPING AS APPLICABLE AND AS REQUIRED TO MAKE CONNECTIONS, INCLUDING ADJUSTMENTS FOR ANY OFFSETS IN CENTERLINE ELEVATIONS BETWEEN PIPELINES. CONTRACTOR SHALL PROVIDE TEMPORARY PLUG WITH FACTORY OUTLET SIZED AS REQUIRED FOR CONTRACTOR'S TESTING AND DISINFECTION WORK BEFORE MAKING CONNECTION, WHERE APPLICABLE. CONTRACTOR SHALL COORDINATE MAKING EACH CONNECTION WITH THE OWNER.
28. ALL DUCTILE IRON PIPE (DIP) SHALL BE PROTECTED WITH POLYETHYLENE ENCASEMENT. LOCATIONS WHERE DIP IS TO BE WRAPPED (SINGLE OR DOUBLE) WITH POLYETHYLENE ENCASEMENT, STEEL CYLINDER PIPE ARE TO BE WRAPPED (SINGLE OR DOUBLE) WITH POLYETHYLENE ENCASEMENT ARE AS SPECIFIED AND AS INDICATED ON THE DRAWINGS.
29. PROVIDE BURIED POTABLE WATER PIPELINE HORIZONTAL AND VERTICAL SEPARATION FROM SANITARY SEWER AND OTHER PIPELINES AS REQUIRED BY ARKANSAS DEPARTMENT OF HEALTH AND ENVIRONMENTAL QUALITY RULES AND REGULATIONS.

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

LEGENDS AND GENERAL NOTES

000-C-002

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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STRUCTURAL NOTES

GENERAL

1. THE APPLICABLE BUILDING CODE IS INDICATED ON THE LOADING CRITERIA DRAWING.
2. THE REQUIREMENTS INDICATED ON THIS SHEET ARE INTENDED AS A BASIC SUMMARY OF THE MATERIAL AND CONSTRUCTION REQUIREMENTS FOR THE PROJECT. ADDITIONAL, MORE STRINGENT REQUIREMENTS ARE GIVEN IN THE PROJECT DETAIL DRAWINGS AND SPECIFICATIONS.
3. ALL STRUCTURAL RELATED SHOP DRAWINGS SHALL BE REVIEWED BY THE ENGINEER PRIOR TO CONSTRUCTION.
4. STRUCTURES MAY BE BUOYANT WHEN EMPTY DURING CONSTRUCTION. CONTRACTOR SHALL PROTECT STRUCTURES AGAINST FLOTATION UNTIL CONSTRUCTION IS COMPLETE.
5. STRUCTURES MAY BE UNSTABLE UNTIL THEY ARE CONSTRUCTED IN THIER ENTIRETY. CONTRACTOR IS RESPONSIBLE FOR DESIGNING TEMPORARY STRUCTURAL SUPPORTS TO RESIST WIND LOADS, CONSTRUCTION LOADS, AND ANY OTHER TEMPORARY CONDITIONS THAT MAY OCCUR DURING CONSTRUCTION, IN ORDER TO MAINTAIN STABILITY OF THE CONSTRUCTION WORK. ANCHORS FOR CONTRACTOR'S TEMPORARY SUPPORT SYSTEMS THAT ATTACH TO CONCRETE OR MASONRY SHALL BE LOCATED TO AVOID DAMAGING EMBEDDED REINFORCEMENT OR UTILITIES.

CAST-IN-PLACE CONCRETE

1. A MINIMUM 28 DAY COMPRESSIVE STRENGTH (f'c) OF 4,000 PSI WAS UTILIZED IN THE DESIGN OF STRUCTURAL REINFORCED CONCRETE. SEE SPECIFICATIONS FOR CONSTRUCTION STRENGTH REQUIREMENTS.
2. THE LOCATION OF ALL CONSTRUCTION JOINTS AND OTHER TYPES OF JOINTS, OTHER THAN THOSE SPECIFIED OR SHOWN ON THE PLANS, SHALL BE ACCEPTABLE TO THE ENGINEER PRIOR TO PLACING CONCRETE.

REINFORCING STEEL

1. ALL REINFORCING BAR SHALL BE GRADE 60, DEFORMED, ASTM A615, UNLESS NOTED OTHERWISE.
2. DIMENSIONS TO REINFORCING BARS ARE TO BAR CENTERLINES, UNLESS NOTED OTHERWISE. BAR COVER IS THE CLEAR DISTANCE BETWEEN THE BAR AND THE CONCRETE SURFACE.
3. NO WELDING OF REINFORCING BARS SHALL BE PERMITTED UNLESS APPROVAL IS OBTAINED FROM THE ENGINEER PRIOR TO CONSTRUCTION.
4. FOR CONCRETE SLABS THAT HAVE A SLOPING TOP FACE, THE TOP LAYERS OF REINFORCEMENT SHALL BE PLACED ON A SIMILAR SLOPE SO THAT SPECIFIED COVER IS MAINTAINED.

POST-INSTALLED ANCHORS

1. POST-INSTALLED ANCHORS SHALL INCLUDE ADHESIVE ANCHORS (THREADED RODS, BOLTS OR REINFORCING BARS), EXPANSION ANCHORS, AND UNDERCUT ANCHORS INSTALLED INTO HARDENED CONCRETE OR MASONRY. SEE THE ANCHORAGE IN CONCRETE AND MASONRY SPECIFICATION SECTION FOR ADDITIONAL REQUIREMENTS.
2. POST-INSTALLED ANCHORS SHALL ONLY BE USED WHERE INDICATED ON THE DRAWINGS. CONTRACTOR SHALL OBTAIN APPROVAL FROM ENGINEER PRIOR TO USING POST-INSTALLED ANCHORS FOR MISSING OR MISPLACED CAST-IN-PLACE ANCHORS.
3. CARE SHALL BE TAKEN TO AVOID CONFLICTS WITH EXISTING REINFORCING STEEL AND OTHER EMBEDDED ITEMS WHEN DRILLING HOLES. REINFORCING BARS SHALL NOT BE DAMAGED DURING DRILLING OR ANCHOR INSTALLATION. HOLES SHALL BE DRILLED AND CLEANED PER THE PRODUCT MANUFACTURER'S INSTRUCTIONS. ANCHORS SHALL BE INSTALLED PER THE PRODUCT MANUFACTURER'S INSTRUCTIONS AT NOT LESS THAN MINIMUM EDGE DISTANCES AND/OR SPACING INDICATED IN THE MANUFACTURER'S LITERATURE.
4. SUBSTITUTION REQUESTS FOR PRODUCTS OTHER THAN THOSE LISTED IN THE SPECIFICATION OR INDICATED ON THE DRAWINGS SHALL BE SUBMITTED TO ENGINEER FOR REVIEW AND APPROVAL. PRODUCT ICC-ESR EVALUATION REPORTS SHALL BE INCLUDED WITH THE SUBMITTAL PACKAGE. IF REQUESTED, CALCULATIONS PREPARED BY A REGISTERED PROFESSIONAL ENGINEER USING METHODS AND PROCEDURES REQUIRED BY THE BUILDING CODE MAY BE REQUIRED AS PART OF THE SUBMITTAL PACKAGE.
5. UNLESS NOTED OTHERWISE, THE MINIMUM EMBEDMENT PROVIDED FOR ADHESIVE ANCHORED REINFORCING BARS SHALL DEVELOP THE FULL TENSILE STRENGTH OF THE BAR.
6. SPECIAL INSPECTION WILL BE PROVIDED FOR ALL POST-INSTALLED ANCHORS.

STAINLESS STEEL

1. STAINLESS STEEL BOLTS SHALL CONFORM TO ASTM F593, ALLOY GROUP 1 OR 2, UNLESS NOTED OTHERWISE. MINIMUM YIELD STRENGTH SHALL BE 45 KSI.
2. STAINLESS STEEL PLATES SHALL CONFORM TO ASTM A240, TYPE 316L.
3. STAINLESS STEEL STRUCTURAL SHAPES SHALL CONFORM TO ASTM A1069 OR ASTM A276, TYPE 316L.

ALUMINUM

1. UNLESS NOTED OTHERWISE, ALUMINUM ALLOY IN ALL ALUMINUM STRUCTURAL MATERIALS SHALL BE 6061-T6. PIPE AND TUBING FOR GUARDRAIL AND HANDRAIL SHALL BE ALLOY 6061-T6 OR 6005A-T61.
2. ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE OR DISSIMILAR METALS SHALL BE COATED OR COVERED WITH A HEAVY COAT OF BITUMINOUS PAINT TO PREVENT ALUMINUM-CONCRETE REACTION OR ELECTROLYTIC ACTION.

STRUCTURAL STEEL

1. ROLLED WIDE FLANGE SHAPES SHALL HAVE A MINIMUM YIELD STRENGTH OF 50 KSI;
   CHANNELS, PLATES, AND ANGLES A MINIMUM OF 36 KSI;
   STRUCTURAL PIPES A MINIMUM OF 35 KSI;
   ROUND STRUCTURAL TUBES A MINIMUM OF 46 KSI;
   RECTANGULAR STRUCTURAL TUBES A MINIMUM OF 50 KSI.
2. WELDING SHALL BE DONE WITH A FILLER MATERIAL HAVING A MINIMUM TENSILE STRENGTH OF 70 KSI.
3. BOLTED CONNECTIONS SHALL USE 3/4" DIA ASTM F3125, GRADE A325 BOLTS OR GRADE F1852 TWIST-OFF BOLTS, WITH THE THREADS EXCLUDED FROM THE SHEAR PLANE, UNLESS NOTED OTHERWISE.
4. CARBON STEEL OR GALVANIZED STEEL ANCHOR RODS AND ANCHOR BOLTS SHALL CONFORM TO ASTM F1554 GRADE 36.
5. HOLES FOR ANCHOR RODS AND ANCHOR BOLTS IN COLUMN BASE PLATES USING ASTM F844 OR F436 FLAT CIRCULAR WASHERS SHALL BE AS FOLLOWS:

   BOLTS/RODS 3/4" TO 1" - 5/16" OVERSIZE
   BOLTS/RODS 1" TO 2" - 1/2" OVERSIZE
   BOLTS/RODS OVER 2" - 1" OVERSIZE

   AT THE CONTRACTORS OPTION, OVERSIZED HOLES LARGER THAN THOSE LISTED ABOVE MAY BE USED, PROVIDED THAT 3/8" PLATE WASHERS ARE USED WITH STANDARD HOLES AND FIELD WELDED WITH A 5/16" FILLET WELD TO THE BASE PLATE ALONG A MIN OF 3 SIDES.
6. STEEL LEGEND


INDICATES TWO BOLT ATTACHMENT OF HORIZONTAL BRACING TO UNDERSIDE OF BEAM. SHIM AS REQUIRED


INDICATES ANGLE OR PLATE TO BE WELDED ON THREE SIDES


INDICATES FOUR BOLT ATTACHMENT OF MONORAIL TO UNDERSIDE OF SUPPORT BEAM. SPACER OR STANDOFF DETAIL AS REQUIRED



INDICATES NONSTANDARD FRAMING CONNECTION



INDICATES HORIZONTAL OR VERTICAL BRACING CONNECTION DETAIL


INDICATES MOMENT CONNECTION

VERTICAL BRACING IS SHOWN ON PLAN THUS:


EXTENDING UP FROM THE ELEVATION INDICATED


EXTENDING DOWN FROM THE ELEVATION INDICATED

EXTENDING UP AND DOWN FROM THE ELEVATION INDICATED

EXCAVATION, BACKFILL, AND FOUNDATIONS

1. FOUNDATION CONSTRUCTION SHALL NOT BEGIN UNTIL ANY REQUIRED SPECIAL INSPECTION HAS BEEN COMPLETED AND THE CONTRACTOR NOTIFIED TO PROCEED.
2. TO FACILITATE SCHEDULING, AT LEAST 48 HOURS ADVANCE NOTICE SHALL BE GIVEN TO THE ENGINEER PRIOR TO THE REQUIRED INSPECTIONS.
3. UNLESS NOTED OTHERWISE, BACKFILL SHALL NOT BE PLACED AGAINST WALLS WHICH SUPPORT A CONCRETE SLAB OR WALKWAY UNTIL THE TOP SLAB OR WALKWAY HAS BEEN PLACED IN ITS ENTIRETY AND ALL CONCRETE HAS REACHED THE SPECIFIED DESIGN STRENGTH.
4. OVER-EXCAVATION OF SOIL, OR OVER-BREAKING OF ROCK, THAT WOULD RESULT IN A STRUCTURAL CONCRETE THICKNESS GREATER THAN INDICATED ON THE DRAWINGS SHALL BE CLASSIFIED AS UNAUTHORIZED EXCAVATION. CONTRACTOR SHALL SELECT ONE OF TWO METHODS TO ADDRESS UNAUTHORIZED EXCAVATION.
   - REPLACE UNAUTHORIZED EXCAVATION MATERIAL WITH LEAN CONCRETE THAT IS PLACED SEPARATELY FROM THE STRUCTURAL CONCRETE INDICATED ON THE DRAWINGS. CONTRACTOR WILL RECEIVE NO ADDITIONAL PAYMENT FOR THE LEAN CONCRETE.
   - REPLACE UNAUTHORIZED EXCAVATION MATERIAL WITH STRUCTURAL CONCRETE THAT IS PLACED MONOLITHICALLY WITH THE STRUCTURAL CONCRETE INDICATED ON THE DRAWINGS, CREATING AN ENLARGED SECTION. CONTRACTOR SHALL NOTIFY ENGINEER FOR DIRECTION PRIOR TO PERFORMING THIS WORK. THE INCREASED CONCRETE THICKNESS MAY REQUIRE ADDITIONAL REINFORCEMENT AND/OR OTHER DESIGN MODIFICATIONS. IF THE INCREASED CONCRETE THICKNESS EXCEEDS 36 INCHES, ENGINEER MAY REQUIRE CONTRACTOR TO IMPLEMENT MASS CONCRETE HEAT MITIGATION PROCEDURES. CONTRACTOR WILL RECEIVE NO ADDITIONAL PAYMENT FOR EXTRA STRUCTURAL CONCRETE, ADDITIONAL REINFORCEMENT, OTHER DESIGN MODIFICATIONS, OR MASS CONCRETING PROCEDURES.
5. THE FOLLOWING NET ALLOWABLE BEARING PRESSURES WERE UTILIZED IN THE DESIGN OF THE FOUNDATIONS.

   SPREAD FOOTINGS.....2500 PSF
   MAT FOUNDATIONS.....2500 PSF
   FROST DEPTH..... 2'-6"
   COEFFICIENT AGAINST SLIDING (ULTIMATE).....0.53

EXISTING STRUCTURES

1. THE DRAWINGS DEPICT WORK AT EXISTING STRUCTURES. ALL DIMENSIONS AND ALL DEPICTIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS, STARTING FABRICATION, OR STARTING CONSTRUCTION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE, REPAIRS OR STRUCTURAL MODIFICATIONS THAT ARE REQUIRED DUE TO DEMOLITION BEYOND THE LIMITS IDENTIFIED IN THE DRAWINGS.
3. REINFORCEMENT FOR ANY EXISTING CONCRETE OR MASONRY ELEMENT SHALL NOT BE DAMAGED UNLESS THE ELEMENT IS TO BE DEMOLISHED. WHEN LOCATING EXISTING REINFORCEMENT IS REQUIRED, IT SHALL BE LOCATED USING NON-DESTRUCTIVE METHODS. REINFORCING STRANDS IN EXISTING PRESTRESSED CONCRETE SHALL NOT BE CUT UNLESS INDICATED ON THE DRAWINGS OR OTHERWISE AUTHORIZED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE, REPAIRS OR STRUCTURAL MODIFICATIONS THAT ARE REQUIRED DUE TO DAMAGE OF CONCRETE, MASONRY OR REINFORCEMENT THAT HAS BEEN IDENTIFIED ON THE DRAWINGS TO REQUIRE FIELD VERIFICATION.
4. CORE DRILLING AND SAW CUTTING SHALL NOT BE PERFORMED UNLESS INDICATED ON THE DRAWINGS OR APPROVED BY ENGINEER.
5. EXPOSED CONCRETE SURFACES THAT REMAIN AFTER DEMOLITION SHALL BE REPAIRED TO MATCH ADJACENT CONCRETE SURFACES.
6. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, EXPOSED CONCRETE SURFACES WITH REINFORCEMENT, ANCHOR BOLTS, HANGER RODS, OR OTHER EXPOSED METAL EMBEDMENTS SHALL BE REPAIRED BY CUTTING OFF THE METAL AT THE FACE OF THE CONCRETE, GRINDING SMOOTH, AND COATING. COATING SHALL EXTEND A MINIMUM OF 1" BEYOND THE EDGE OF ANY EXPOSED METAL.

SPECIAL INSPECTIONS

1. CODE REQUIRED SPECIAL INSPECTIONS AND TESTS WILL BE CONDUCTED BY APPROVED AGENCIES EMPLOYED BY THE OWNER IN ACCORDANCE WITH THE APPLICABLE BUILDING CODE.
2. THE STATEMENT OF SPECIAL INSPECTIONS WILL BE PREPARED BY THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE DURING CONSTRUCTION.
3. EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF A MAIN WIND OR SEISMIC FORCE RESISTING SYSTEM, DESIGNATED SEISMIC SYSTEM OR A WIND OR SEISMIC RESISTING COMPONENT LISTED IN THE STATEMENT OF SPECIAL INSPECTIONS SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND OWNER PRIOR TO COMMENCEMENT OF WORK ON THE SYSTEM OR COMPONENT.
4. SEE THE QUALITY CONTROL SECTION AND THE CODE REQUIRED SPECIAL INSPECTIONS AND PROCEDURES SECTION OF THE SPECIFICATIONS FOR FURTHER CLARIFICATION OF RESPONSIBILITIES.

STRUCTURAL OBSERVATIONS

1. IN ACCORDANCE WITH THE APPLICABLE BUILDING CODE, THE OWNER WILL RETAIN A LICENSED ENGINEER TO MAKE STRUCTURAL OBSERVATIONS TO OBSERVE REPRESENTATIVE LOCATIONS OF STRUCTURAL SYSTEMS, DETAILS AND LOAD PATHS FOR GENERAL CONFORMANCE TO THE DESIGN INTENT AS DEFINED IN THE APPROVED CONSTRUCTION DOCUMENTS.
2. STRUCTURAL OBSERVATION DOES NOT INCLUDE OR WAIVE ANY SPECIAL INSPECTION AND TESTING REQUIREMENTS INDICATED IN THE APPLICABLE BUILDING CODE.
3. SEE THE CODE REQUIRED STRUCTURAL OBSERVATIONS SECTION OF THE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

DELEGATED DESIGN

1. THE FOLLOWING ITEMS ARE IDENTIFIED IN THE DRAWINGS AND SPECIFICATIONS AS BEING DESIGNED AND SEALED BY THE CONTRACTOR OR THE CONTRACTOR'S SUPPLIER IN ACCORDANCE WITH THE SPECIFICATIONS INDICATED BELOW. SUBMITTALS FOR THESE ITEMS SHALL BE PREPARED BY THE SUPPLIERS AND SUBMITTED TO ENGINEER AND CODE OFFICIAL FOR REVIEW.

   SECTION 055000 – METAL LADDERS.

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

GENERAL NOTES

000-S-001

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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REVIT VERSION: 2021
D11000

BASIC LOADING CRITERIA

THE APPLICABLE BUILDING CODE IS THE 2021 INTERNATIONAL BUILDING CODE (IBC).

1. DEAD LOAD ..... CALCULATED

2. LIVE LOADS:
   - CLEARWELL ..... 100 PSF
   - OPERATING AND PROCESS FLOORS ..... 150 PSF
   - ALL FLOORS NOT INDICATED ..... 100 PSF
   - ROOF ..... 20 PSF(UNREDUCED)

3. LATERAL EARTH PRESSURE (EQUIVALENT FLUID PRESSURE)
   - ACTIVE, DRAINED ..... 35 PSF/FT
   - ACTIVE, UNDRAINED ..... 80 PSF/FT
   - AT-REST, DRAINED ..... 50 PSF/FT
   - AT-REST, UNDRAINED ..... 85 PSF/FT

4. LATERAL SURCHARGE ..... EQUIVALENT TO 2 FEET OF SOIL WHERE ADJACENT TO A ROADWAY

5. COMPACTIVE SURCHARGE LOAD ..... 400 PSF AT FINISH GRADE ELEVATION DECREASING LINEARLY AT SAME RATE AS BACKFILL LOAD INCREASES. FOR WALLS 8 FEET OR LESS IN HEIGHT, USE CRITERIA 4 ABOVE AS COMPACTIVE SURCHARGE.



6. HYDROSTATIC FLUID PRESSURE ..... 63 PSF/FT

7. SNOW LOAD:
   - GROUND SNOW LOAD (P_g) ..... 15 PSF
   - SNOW EXPOSURE FACTOR (C_e) 1.0

8. SEISMIC LOAD:
   - MAPPED MCE SHORT PERIOD SPECTRAL RESPONSE ACCELERATION (S_S) 0.161g
   - MAPPED MCE ONE SECOND PERIOD SPECTRAL RESPONSE ACCELERATION (S_1) 0.092g
   - DESIGN SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS (S_{DS}) 0.139g
   - DESIGN SPECTRAL RESPONSE ACCELERATION AT ONE SECOND PERIOD (S_{D1}) 0.092g
   - SITE CLASS C

9. WIND LOAD:
   - BASIC (ULTIMATE) DESIGN WIND SPEED ..... 115 MPH
   - ALLOWABLE STRESS (NOMINAL) DESIGN WIND SPEED ..... 89 MPH
   - GROUND ELEVATION FACTOR (K_e) 1.0
   - EXPOSURE C

10. RAIN INTENSITY (15-MINUTES) ..... 7.04 INCHES/HR

11. FLOOD DESIGN DATA:
   - DESIGN FLOOD ELEVATION ..... ZONE X

SNOW AND SEISMIC LOADING CRITERIA FOR BUILDINGS	CLEARWELL
RISK CATEGORY	III
FLAT-ROOF SNOW LOAD (P_f), PSF	16.5
SNOW IMPORTANCE FACTOR (I_S)	1.1
SNOW LOAD SLOPE FACTOR (C_S)	1.0
THERMAL FACTOR (C_t)	1.0
SEISMIC IMPORTANCE FACTOR	1.25
SEISMIC DESIGN CATEGORY	B
BASIC SEISMIC FORCE RESISTING SYSTEM	ORDINARY REINFORCED CONCRETE SHEAR WALLS
STRENGTH DESIGN BASE SHEAR, KIPS	-
SEISMIC RESPONSE COEFFICIENT (C_S)	0.01
RESPONSE MODIFICATION FACTOR (R)	4
FLOOD DESIGN CLASS PER ASCE 24	III

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Kansas City, Missouri

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16 MG CLEARWELL

STRUCTURAL

LOADING CRITERIA
(IBC 2021)

000-S-002

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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STRUCTURAL ABBREVIATIONS

A

ADDL	ADDITIONAL
AFF	ABOVE FINISH FLOOR
AHR	ANCHOR
ALT	ALTERNATE
ALUM	ALUMINUM
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
AROD	ANCHOR ROD
ASSY	ASSEMBLY
AWG	AMERICAN WIRE GAUGE

B

BLDG	BUILDING
BM	BENCHMARK, BEAM
BO	BOTTOM OF
BOT	BOTTOM
BRDG	BRIDGING
BRG	BEARING
BTWN	BETWEEN

C

C	CAMBER
CANTIL	CANTILEVER
CHKD	CHECKERED
CHKDPL	CHECKERED PLATE
CIP	CAST-IN-PLACE
CJ	CONTRACTION JOINT
CJP	COMPLETE JOINT PENETRATION
CL	CENTERLINE
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUOUS,CONTINUATION, CONTROL
COORD	COORDINATE
COV	COVER
CRNR	CORNER
CSJ	CONSTRUCTION JOINT
CTRD	CENTERED
CTRS	CENTERS

D

db	BAR DIAMETER
DBA	DEFORMED BAR ANCHOR
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DN	DOWN
DWA	DEFORMED WIRE ANCHOR
DWG(S)	DRAWING, DRAWINGS
DWL(S)	DOWEL, DOWELS

E

E	EAST
EA	EACH
EE	EACH END
EF	EACH FACE
EJ	EXPANSION JOINT
EL	ELEVATION
EMBED	EMBEDMENT
EMER	EMERGENCY
ENGR	ENGINEER
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR

F

FAB	FABRICATE
f'c	28 DAY CONCRETE STRENGTH =
FD	FLOOR DRAIN
FDN	FOUNDATION
FIN	FINISH(ED)
FLR	FLOOR
FS	FAR SIDE
FT	FOOT
FTG	FOOTING
FUT	FUTURE
FV	FIELD VERIFY
Fy	STRUCTURAL STEEL YIELD STRENGTH =
fy	REINFORCING STEEL YIELD STRENGTH =

G

GA	GAUGE
GALV	GALVANIZED
GEN	GENERAL
GR	GRADE

H

H	HORIZONTAL REACTION
HC	HOLLOW CORE
HCA	HEADED CONCRETE ANCHOR
HEX	HEXAGONAL
HGR	HANGER
HORIZ	HORIZONTAL
HP	HIGH POINT
HSS	HOLLOW STRUCTURAL SECTION

I

ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCHES
INT	INTERIOR, INTERNAL
INV	INVERT

J

JT	JOINT

K

K	KIPS (1000 LBS)
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH

L

L	LENGTH, ANGLE
LAB	LABORATORY
LB(S)	POUND, POUNDS
ld	DEVELOPMENT LENGTH
LE	LEFT END
LIN	LINES
LLBB	LONG LEG BACK TO BACK
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LONG	LONGITUDINAL
LP	LOW POINT
LSH	LONG SIDE HORIZONTAL
LSHP	LONG SLOTTED HOLE PARALLEL
LSLT	LONG SLOTTED HOLE TRANSVERSE
LSV	LONG SIDE VERTICAL
LWC	LIGHTWEIGHT CONCRETE

M

M	MOMENT
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MC	MOMENT CONNECTION, MECHANICAL COUPLING
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURE(R)
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL

N

N	NORTH
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NS	NEAR SIDE
NTS	NOT TO SCALE
NWC	NORMAL WEIGHT CONCRETE

O

OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OPER	OPERATING
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
OVS	OVERSIZED HOLE
OZ	OUNCE

P

P	AXIAL LOAD
PAF	POWDER ACTUATED FASTENER
PAR	PARALLEL
PCC	PRECAST CONCRETE
PCF	POUNDS PER CUBIC FOOT
PEMB	PRE-ENGINEERED METAL BUILDING
PERP	PERPENDICULAR
PJP	PARTIAL JOINT PENETRATION
PL	PLATE
PLCS	PLACES
PLF	POUNDS PER LINEAR FOOT
PR	PAIR
PRELIM	PRELIMINARY
PROJ	PROJECTION
PROP	PROPERTY
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POST TENSIONED

Q

QTY	QUANTITY

R

R	RADIUS, RISER, REMAINDER
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RECT	RECTANGULAR
REF	REFERENCE
REINF	REINFORCEMENT
REQD	REQUIRED
REV	REVISION
RO	ROUGH OPENING

S

S	SOUTH
SC	SLIP CRITICAL, SHEAR CONNECTOR
SCHED	SCHEDULE
SECT	SECTION
SH	SHEET
SIM	SIMILAR
SJ	SAW JOINT
SLBB	SHORT LEG BACK TO BACK
SPA	SPACING
SPEC	SPECIFICATION
SPRT	SUPPORT
SQ	SQUARE
SS	STAINLESS STEEL
SSHP	SHORT SLOTTED HOLE PARALLEL
SSHT	SHORT SLOTTED HOLE TRANSVERSE
STD	STANDARD
STIF	STIFFENER
STIR	STIRRUP
STL	STEEL
STR	STRUCTURE, STRUCTURAL
SYM	SYMMETRICAL

T

T	TREAD, SCHEDULED PLATE THICKNESS, TOP
T&B	TOP & BOTTOM
TAN	TANGENT
TEMP	TEMPERATURE
THD	THREADED
THK	THICK, THICKNESS
TO	TOP OF
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY
TOS	TOP OF STEEL
TOW	TOP OF WALL
TYP	TYPICAL

U

UNO	UNLESS NOTED OTHERWISE
USGS	UNITED STATES GEOLOGICAL SURVEY

V

VERT	VERTICAL
VNR	VENEER

W

W	WEST
W/	WITH
W/O	WITHOUT
WF	WIDE FLANGE
WP	WORK POINT
WT	WEIGHT
WWR	WELDED WIRE REINFORCEMENT

X

x	BY, TIMES
XS	EXTRA STRONG
XXS	DOUBLE EXTRA STRONG

Y

	NOT USED

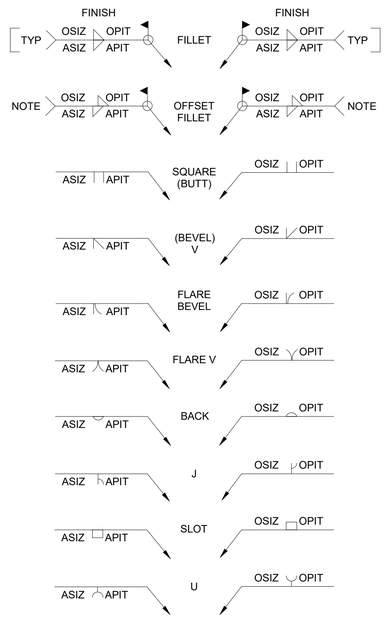
Z

	NOT USED

SPECIAL CHARACTERS

@	AT
&	AND
ø	DIAMETER
#	NUMBER
%	PERCENT

WEAR SYMBOL LEGEND



BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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STRUCTURAL

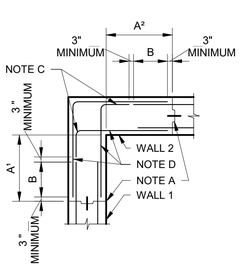
LEGENDS AND ABBREVIATIONS

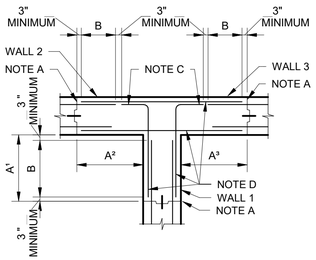
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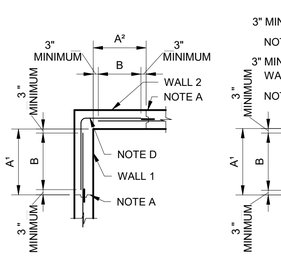
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D11000

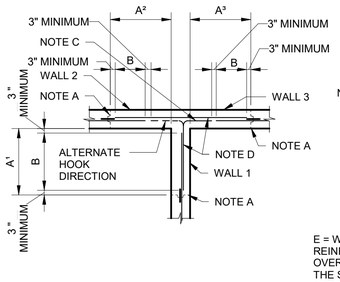




A = VERTICAL CONSTRUCTION JOINT NEAREST TO WALL CORNER.

A^X = DISTANCE FROM INSIDE CORNER FACE TO NEAREST VERTICAL CONSTRUCTION JOINT IN SIMILARLY NUMBERED WALL. A^X SHALL NOT BE LESS THAN DIMENSIONS INDICATED BY THESE DETAILS; NOR GREATER THAN INDICATED ON PLAN DRAWINGS; BUT IN ANY CASE SHALL NOT EXCEED 30 FEET IN LIQUID CONTAINMENT STRUCTURES OR 40 FEET IN OTHER STRUCTURES. IN T WALL JOINTS WHICH DO NOT REQUIRE WATERSTOP, A1 MAY BE ZERO.



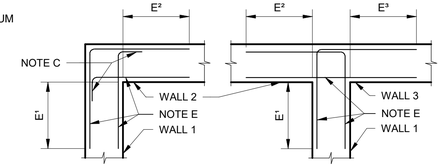


B = OPTIONAL SPLICE LOCATION UNLESS SPECIFICALLY NOTED ON PLAN DRAWINGS. SPLICE LENGTH SHALL NOT BE LESS THAN THAT REQUIRED FOR TOP BARS AS SHOWN IN TABLE ON THIS SHEET. USE SPLICE LENGTH FOR THE SMALLER OF THE TWO BARS BEING SPLICED.

C = STANDARD HOOK

D = TYPICAL CORNER REINFORCEMENT. SIZE SHALL MATCH LARGEST ADJACENT WALL HORIZONTAL REINFORCEMENT; SPACING SHALL MATCH MINIMUM ADJACENT WALL HORIZONTAL REINFORCEMENT SPACING.

MAIN REINFORCEMENT FOR ALL STRUCTURES



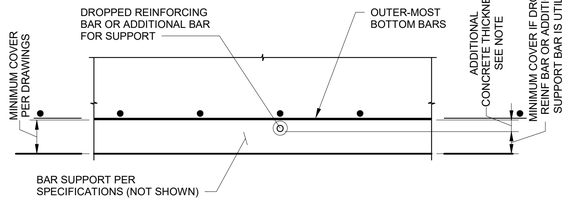
E = WHERE SPECIFICALLY NOTED ON THE DRAWINGS, ADDITIONAL CORNER REINFORCEMENT SHALL BE PLACED IN BOTH FACES OF THE INDICATED CORNER OVER THE FULL HEIGHT. ADDITIONAL CORNER REINFORCEMENT SHALL BE OF THE SAME SIZE AND SPACING AS THE MAIN CORNER REINFORCEMENT. PLACE ADDITIONAL REINFORCEMENT ALTERNATELY WITH, AND EQUAL DISTANCE BETWEEN, MAIN CORNER REINFORCEMENT.

E^X = DISTANCE FROM INSIDE CORNER FACE TO TERMINATION OF ADDITIONAL CORNER REINFORCEMENT IN SIMILARLY NUMBERED WALL. E^X SHALL NOT BE LESS THAN 0.20 THE CLEAR SPAN DISTANCE MEASURED HORIZONTALLY BETWEEN THIS CORNER AND THE NEXT OR 0.40 THE CLEAR SPAN DISTANCE OR CANTILEVERED DISTANCE MEASURED VERTICALLY, WHICHEVER IS SMALLER, BUT NOT LESS THAN 3'-0".

CONTRACTORS OPTION: E BAR TAILS MAY BE SPLICED USING LAPPED SPLICE LENGTHS FOR TOP BARS. SPLICES SHALL NOT BE LOCATED IN THE CORNER AREA COMMON TO BOTH WALLS AND SHALL CLEAR HOOK ENDS BY 3" MINIMUM.

ADDITIONAL REINFORCEMENT WHERE SPECIFICALLY NOTED ON THE DRAWINGS

NOTES:
1. DETAILS ON THIS DRAWING APPLY TO ALL DRAWINGS UNLESS OTHERWISE NOTED.
2. WORK THIS DRAWING WITH THE STANDARD CONCRETE JOINT DETAILS.

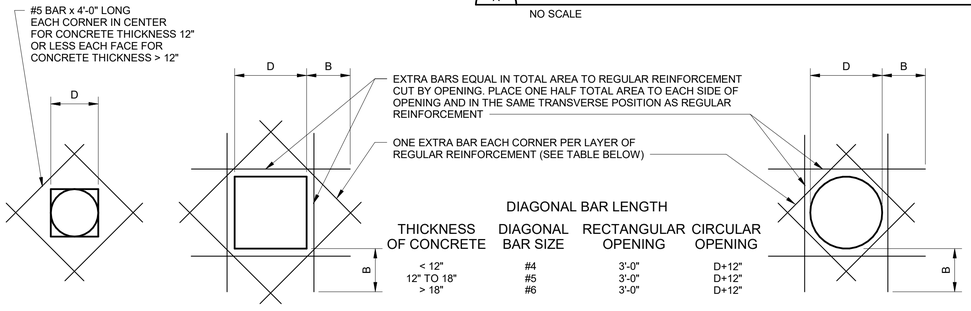


NOTE:
WHERE DROPPED REINFORCING BARS OR ADDITIONAL BARS ARE UTILIZED AS SUPPORT BARS IN THE PLACEMENT OF THE BOTTOM MAT REINFORCING, CONCRETE COVER TO THE SUPPORT BARS SHALL NOT BE LESS THAN REQUIRED PER THE DRAWINGS AND THE CONCRETE THICKNESS OF THE SLAB OR FOOTING SHALL BE INCREASED, EQUAL TO THE DIAMETER OF THE SUPPORT BAR, AT NO ADDITIONAL COST. ALTERNATIVELY, UPON THE APPROVAL OF THE ENGINEER, A SHALLOWER BOLSTER MADE BE USED TO MAINTAIN THE MINIMUM CLEAR COVER FOR THE BOTTOM MAT REINFORCING.

NOTES:
1. VERTICAL REINFORCEMENT IS NOT SHOWN.
2. THESE DETAILS SHALL BE APPLICABLE TO ALL WALL CORNERS UNLESS NOTED OTHERWISE ON THE DRAWINGS.

A TYPICAL HORIZONTAL CORNER REINFORCEMENT DETAILS
NO SCALE

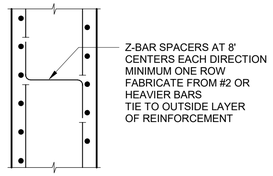
B REINFORCING SUPPORT DETAIL
NO SCALE



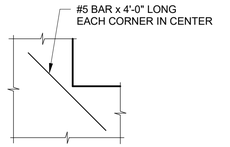
B = THE REQUIRED LENGTH FOR LAPPED SPLICE FOR TOP BARS AS SHOWN ON THIS SHEET

TYPICAL REQUIRED UNLESS ADDITIONAL REINFORCEMENT SPECIFICALLY INDICATED AT OPENINGS ON DRAWINGS

C TYPICAL EXTRA REINFORCEMENT AT OPENINGS 12" TO < = 54"
NO SCALE

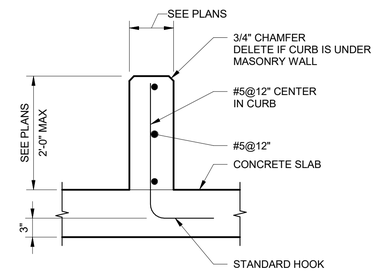


D SPACERS FOR WALL REINFORCEMENT
NO SCALE



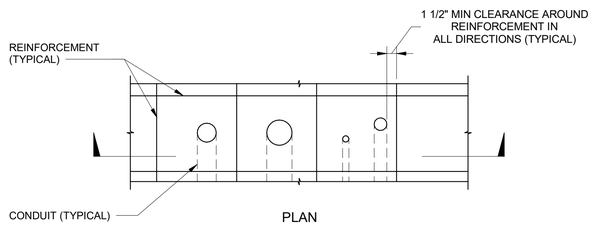
NOTE:
TYPICAL REQUIRED UNLESS ADDITIONAL REINFORCEMENT SPECIFICALLY INDICATED AT OPENINGS ON DRAWINGS

E TYPICAL EXTRA REINFORCEMENT AT ISOLATED RE-ENTRANT CORNERS
NO SCALE

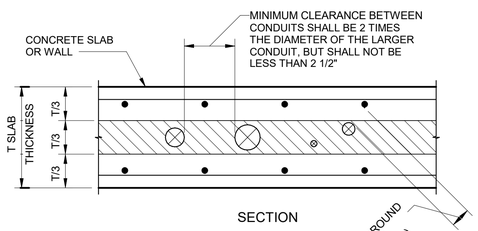


NOTE:
WHEN CURB WIDTH EXCEEDS 8", PROVIDE ABOVE REINFORCEMENT IN EACH FACE OF CURB

F TYPICAL CONCRETE CURB DETAIL
NO SCALE



PLAN



SECTION

NOTES:
1. PLACE CONDUIT ONLY IN SHADED AREA.
2. FOR CONDUIT REQUIREMENTS SEE THE ELECTRICAL DRAWINGS AND SPECIFICATIONS.
3. CONDUIT THAT IS TOO LARGE OR CONGESTED TO FIT WITHIN THE SLAB AND REINFORCEMENT AS INDICATED SHALL BE ROUTED BELOW THE SLAB AS INDICATED IN THE ELECTRICAL SPECIFICATIONS OR ON THE DRAWINGS.

G CONDUIT PLACING DETAIL
NO SCALE

LENGTH OF LAPPED SPLICES FOR REINFORCEMENT (INCHES)

UNLESS NOTED OTHERWISE ON THE DRAWINGS

BAR SIZE *	BEAMS & COLUMNS		WALLS & SLABS		BAR SIZE *
	**TOP BARS	OTHERS	**TOP BARS	OTHERS	
#3	16	16	16	16	#3
#4	19	16	19	16	#4
#5	24	18	24	18	#5
#6	33	26	29	22	#6
#7	55	42	48	37	#7
#8	69	53	60	46	#8
#9	84	65	74	57	#9
#10	103	79	91	70	#10
#11	122	94	108	83	#11

* LAP SPLICE LENGTH FOR BARS OF DIFFERENT SIZES SHALL BE THE GREATER OF THE SMALL BAR LAP LENGTH OR 0.75x THE LARGER BAR LAP LENGTH.

** TOP BARS ARE HORIZONTAL BARS SO PLACED THAT MORE THAN 12" OF CONCRETE IS CAST IN THE MEMBER BELOW THE BAR. HORIZONTAL BARS IN WALLS ARE TO BE PROVIDED WITH LAP LENGTHS AS REQUIRED FOR TOP BARS. VERTICAL BARS MAY BE CONSIDERED AS OTHER BARS.

CONCRETE COVER FOR REINFORCEMENT

UNLESS NOTED OTHERWISE ON THE DRAWINGS

LOCATION	SPECIFIED COVER
UNFORMED SURFACES ADJACENT TO EXCAVATION	3"
SURFACES INSIDE OZONE CONTACTOR STRUCTURES EXPOSED TO OZONE IN WATER OR AIR	3"
TOP SURFACES OF SLABS THAT ARE SUBMERGED	3"
FORMED SURFACES THAT ARE SUBMERGED, AND FORMED OR TOP SURFACES EXPOSED TO WEATHER, SATURATED AIR, OR EARTH	2"
OTHER LOCATIONS:	
BEAMS AND GIRDERS	1 1/2"
SLABS, WALLS AND JOISTS:	
#5 AND LARGER	1 1/2"
#4 AND SMALLER	1"

NOTES:
1. COVER IS MEASURED TO NEAREST BAR, STIRRUP, TIE, OR SPIRAL, AS APPLICABLE.
2. TOLERANCES FOR CONCRETE COVER AND THE FABRICATION AND PLACING OF REINFORCEMENT SHALL CONFORM TO ACI 117.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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REVIT VERSION: 2021
D1000

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

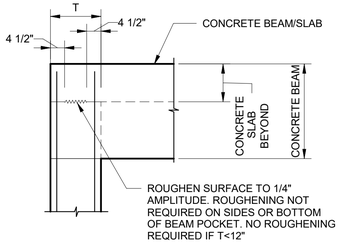
16 MG CLEARWELL

STRUCTURAL

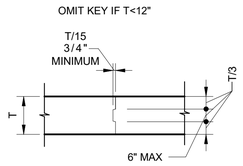
STANDARD CONCRETE REINFORCEMENT DETAILS

000-S-004

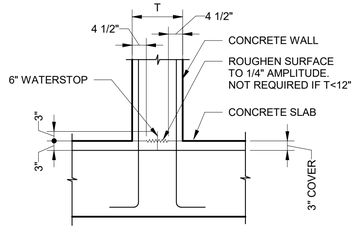
12 OF 82



TOP OF WALL TO BEAM/SLAB

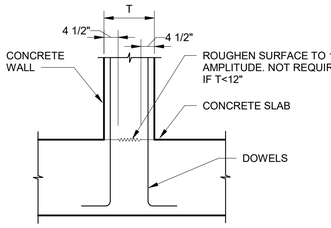


SLAB TO SLAB

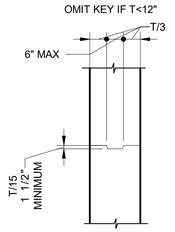


FOR T < 18"

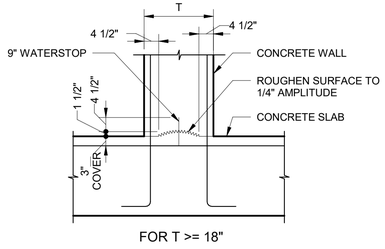
SLAB TO BOTTOM OF WALL



SLAB TO BOTTOM OF WALL



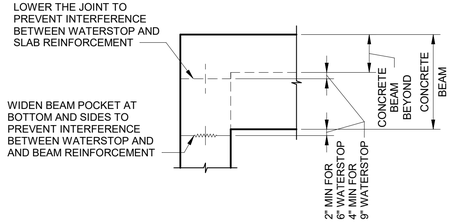
WALL TO WALL



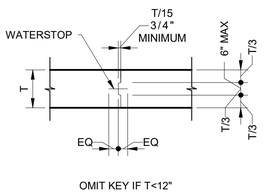
FOR T >= 18"

SLAB TO BOTTOM OF WALL

JOINTS WITHOUT WATERSTOPS

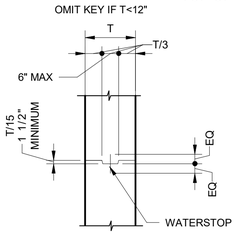


TOP OF WALL TO BEAM/SLAB

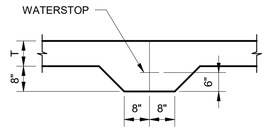


OMIT KEY IF T<12"

SLAB TO SLAB (T>=12")



WALL TO WALL



SLAB TO SLAB (T<12")

JOINTS WITH WATERSTOPS

2

NOTES:
1. REINFORCEMENT STEEL IS CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS.
2. "CSJ W/ WS" - CONSTRUCTION JOINT WITH WATERSTOP.
3. "CSJ" - CONSTRUCTION JOINT WITHOUT WATERSTOP.
4. UNLESS NOTED OTHERWISE, WATERSTOPS MAY BE STEEL OR PVC.
5. WATERSTOP SIZE SHALL BE 6" FOR WALLS AND SLABS LESS THAN 18" THICKNESS AND SHALL BE 9" FOR WALLS AND SLABS 18" OR GREATER IN THICKNESS.

A TYPICAL CONSTRUCTION JOINT DETAILS

NO SCALE

NOTES

1. DETAILS ON THIS DRAWING APPLY TO ALL DRAWINGS UNLESS NOTED OTHERWISE.
2. WORK THIS DRAWING WITH THE STANDARD CONCRETE REINFORCEMENT DETAILS.
3. AT WALL JOINTS AND AT WALL BASE JOINTS, SECURE ALL ELASTOMERIC WATERSTOPS IN THE CORRECT POSITION USING HOG RINGS OR GROMMETS SPACED AT 12 INCHES ALONG THE LENGTH OF THE WATERSTOP AND WIRE TIE TO ADJACENT REINFORCING STEEL.
4. AT SLAB JOINTS AND FOOTING JOINTS, ENSURE SPACE BENEATH AND AROUND WATERSTOP IS COMPLETELY FILLED WITH CONSOLIDATED CONCRETE. DURING OPERATION, MAKE VISUAL INSPECTION OF ENTIRE WATERSTOP AREA. LIMIT CONCRETE PLACEMENT TO ELEVATION OF WATERSTOP IN FIRST LIFT. RAISE ELASTOMERIC WATERSTOPS TO CONFIRM FULL CONSOLIDATION WITHOUT VOIDS. PLACE REMAINING CONCRETE TO FULL DEPTH OF SLAB.

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25	ISSUED PER ADDENDUM NO. 2

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

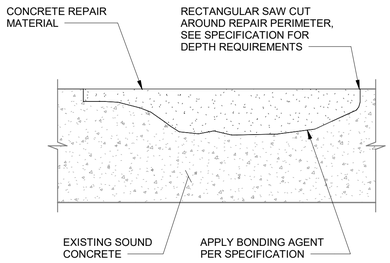
STANDARD CONCRETE JOINT DETAILS

000-S-005

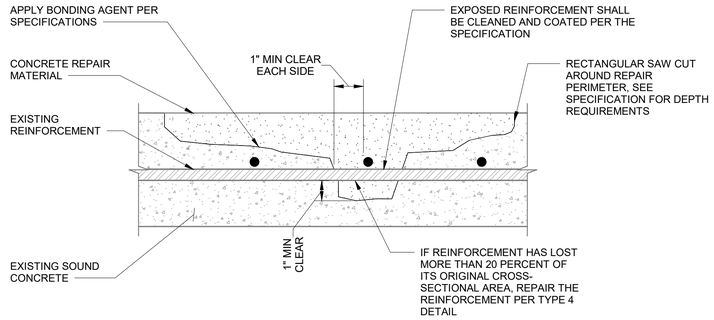
13 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FILE: Autodesk Docs://417134 - BWD Plant Expansion/453-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2024
D11000



TYPE 1 - NO EXPOSED REINFORCEMENT



TYPE 2 - MINOR EXPOSED REINFORCEMENT

GENERAL REPAIR NOTES

1. REPAIR PRODUCTS SHALL BE AS INDICATED IN THE PROJECT SPECIFICATIONS.
2. REPAIR ACTIVITIES SUCH AS CLEANING, SURFACE PREPARATION, PRODUCT APPLICATION, AND CURING SHALL BE AS INDICATED IN THE PROJECT SPECIFICATIONS.
3. THE CONCRETE SURFACE REPAIR DETAILS ARE APPLICABLE TO EXISTING CONCRETE THAT IS DAMAGED. SURFACE DEFECTS IN NEW CONCRETE CONSTRUCTED AS PART OF THIS PROJECT SHALL BE REPAIRED IN ACCORDANCE WITH THE CAST-IN-PLACE CONCRETE SPECIFICATIONS.
4. SURFACE REPAIR AREAS LESS THAN 2 FEET APART SHALL BE COMBINED INTO ONE LARGER RECTANGULAR REPAIR AREA WITH NO IRREGULAR SHAPES. SEE FIGURE.
5. IF CRACK REPAIR AND SURFACE REPAIR ARE REQUIRED IN A COMMON AREA, THE CRACK REPAIR PROCEDURE SHALL BE PERFORMED FIRST.

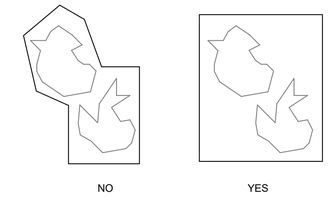
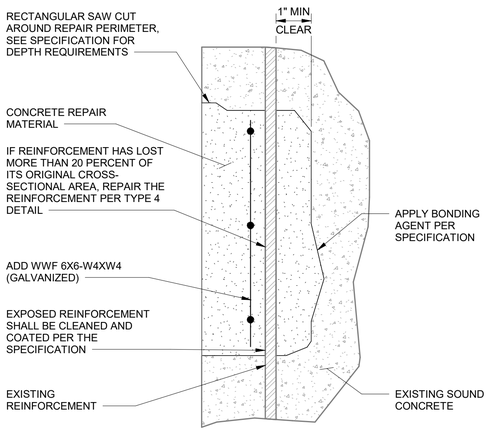
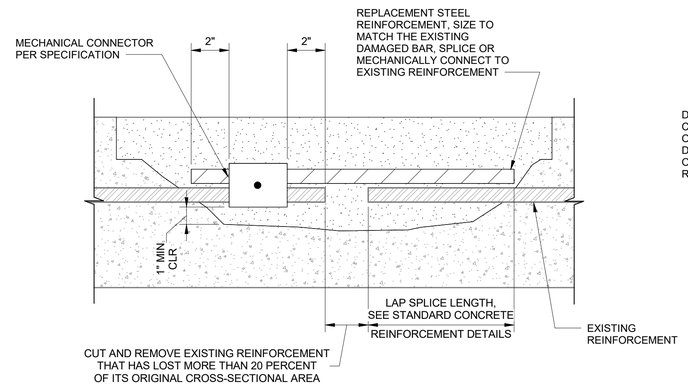


FIGURE
NO SCALE

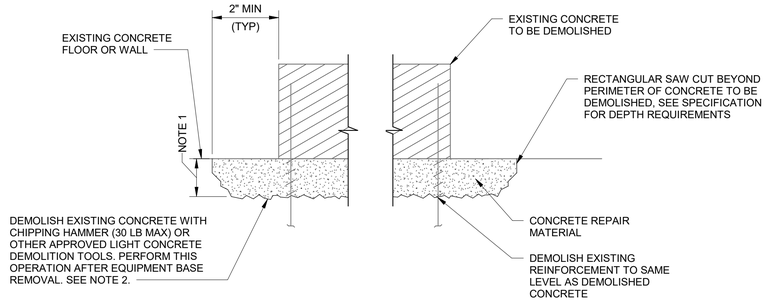


TYPE 3 - MAJOR EXPOSED REINFORCEMENT



FOR CLARITY, THE NEW BAR IS SHOWN ABOVE THE EXISTING BAR. FOR ACTUAL INSTALLATION, THE NEW BAR SHALL BE PLACED BESIDE THE EXISTING BAR SO BOTH HAVE THE SAME CONCRETE COVER.

TYPE 4 - REINFORCEMENT REPAIR

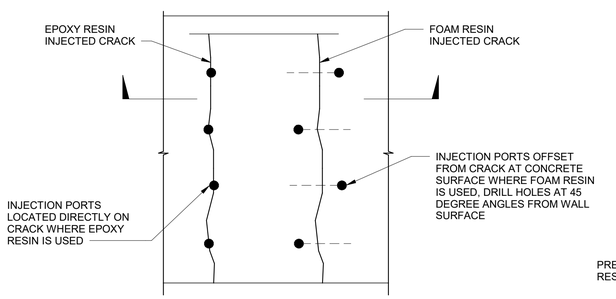


NOTES:

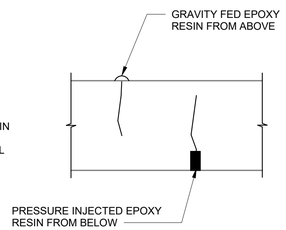
1. DEPTH OF CONCRETE DEMOLITION SHALL BE THE LESSER OF 2" OR THE DEPTH OF CONCRETE COVER OVER THE EXISTING REINFORCEMENT. DO NOT DAMAGE EXISTING REINFORCEMENT PARALLEL TO REPAIRED SURFACE.
2. CARE SHALL BE TAKEN TO AVOID DAMAGING CONCRETE SUBSTRATE DURING CHIPPING OPERATION.

B CONCRETE FLOOR OR WALL REPAIR FOLLOWING DEMOLITION
3" = 1'-0"

A CONCRETE SURFACE REPAIR
3" = 1'-0"



WALL ELEVATION



SLAB SECTION

INJECTION PORT SPACING AND ARRANGEMENT SHALL BE AS RECOMMENDED BY THE MATERIAL MANUFACTURER.

C CONCRETE CRACK REPAIR
1 1/2" = 1'-0"

EFFLORESCENCE REPAIR NOTES:

1. EFFLORESCENCE IS DEFINED AS A GENERALLY WHITE DEPOSIT FORMED WHEN WATER-SOLUBLE COMPOUNDS EMERGE IN SOLUTION FROM CONCRETE OR MASONRY AND PRECIPITATE BY REACTION SUCH AS CARBONATION OR CRYSTALLIZE BY EVAPORATION.
2. EFFLORESCENCE SALTS SHALL BE REMOVED WITH A STIFF BRUSH, WIRE BRUSH OR SCRAPER. IF THE EFFLORESCENCE IS SLIGHT, BRUSHING WITH WATER MAY REMOVE IT. IF NOT, BRUSHING WITH DILUTE ACID SUCH AS MURIATIC OR SULFAMIC ACID IS RECOMMENDED. IF THE CONCRETE IS PIGMENTED, IT IS RECOMMENDED THAT SULFAMIC ACID IN THE 5 TO 10% CONCENTRATION RANGE SHALL BE USED. NOTE THAT STRONGER ACIDS MAY ALTER THE COLOR.
3. A PRESSURE WASHER SHALL NOT BE USED FOR REMOVING THE EFFLORESCENCE SALTS.

CRAZING REPAIR NOTES:

1. CRAZING IS DEFINED AS A PATTERN OF FINE RANDOM CRACKS OCCURRED ON A CONCRETE SURFACE.
2. ROUGHEN THE CRAZING AREA ON THE CONCRETE SURFACE TO A 1/4" AMPLITUDE AND APPLY AN APPROVED SURFACE REPAIR MORTAR.
3. SURFACE PREPARATION, MIXING, APPLICATION AND CURING SHALL BE PERFORMED PER MANUFACTURER'S RECOMMENDATIONS.

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

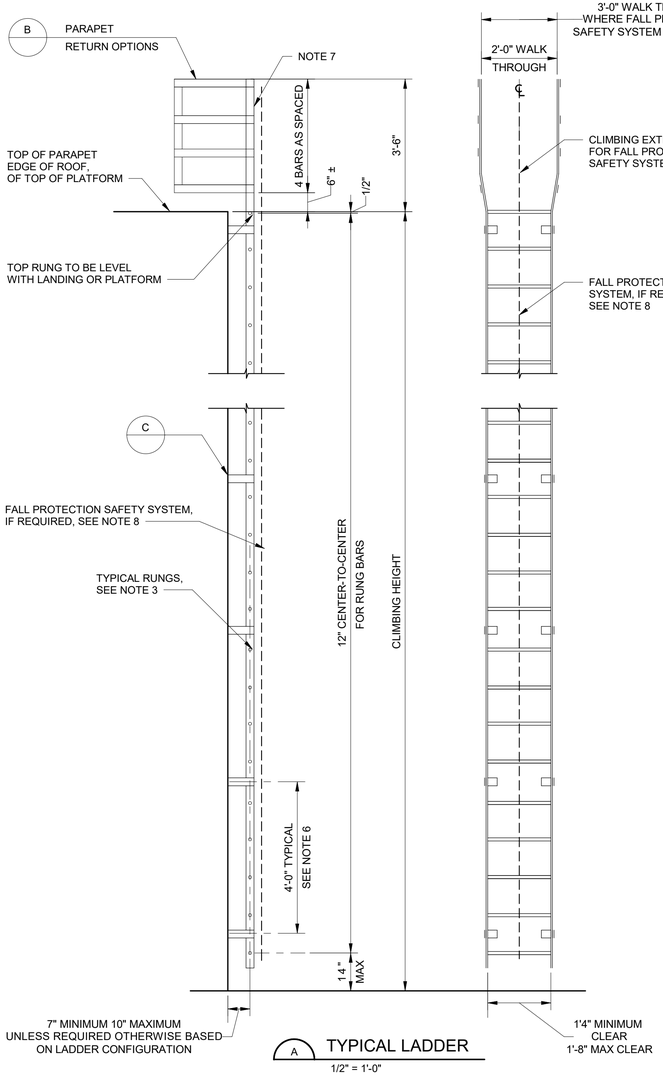
STRUCTURAL

TYPICAL CONCRETE CRACK AND SURFACE REPAIR DETAILS AND NOTES

000-S-006

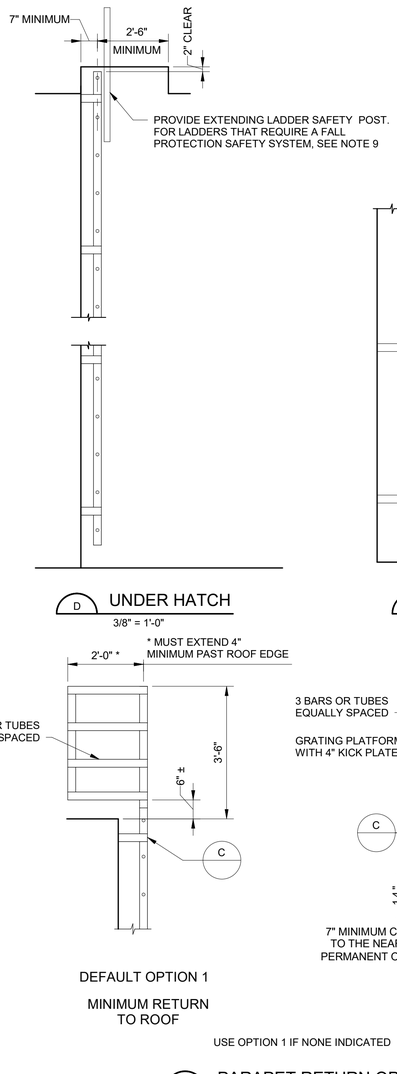
(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D11000



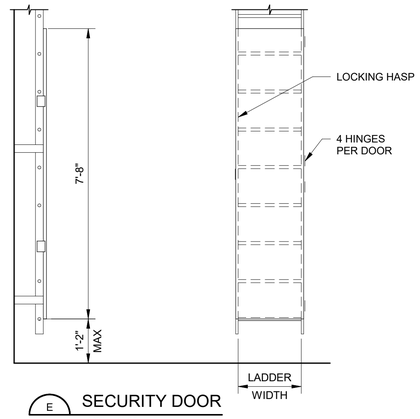
A TYPICAL LADDER

1/2" = 1'-0"



D UNDER HATCH

3/8" = 1'-0"

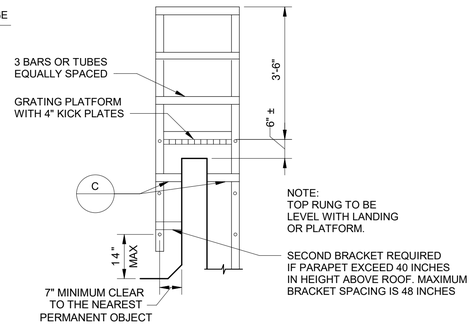


E SECURITY DOOR

1/2" = 1'-0"

DEFAULT OPTION 1

MINIMUM RETURN
TO ROOF



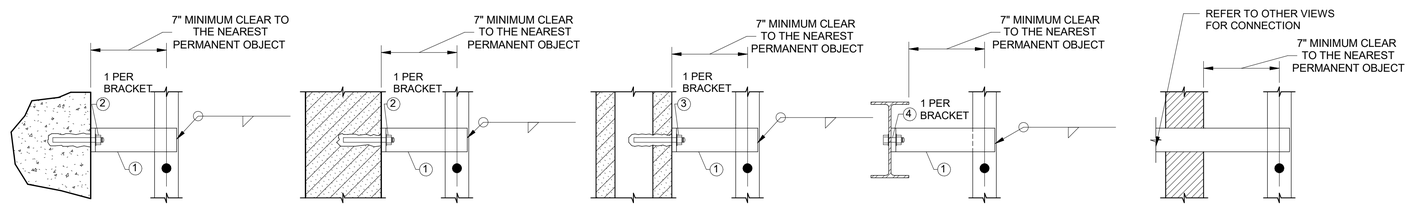
OPTION 2

RETURN TO REAR OF
PARAPET WITH
CROSSOVER PLATFORM

USE OPTION 1 IF NONE INDICATED

B PARAPET RETURN OPTIONS

1/2" = 1'-0"



① LADDER BRACKET BY LADDER SUPPLIER; WITH HOLES FOR CONNECTION TO STRUCTURE. ADJUSTABLE BRACKETS SHALL BE PROVIDED WHERE REQUIRED TO COMPENSATE FOR IRREGULAR OR OFFSET WALL SURFACES.

② 1/2" MIN STAINLESS STEEL ADHESIVE OR EXPANSION ANCHORS. MINIMUM EMBEDMENT PER THE ANCHOR MANUFACTURER'S ICC-ES REPORT.

③ 1/2" MIN DIAMETER STAINLESS STEEL ADHESIVE ANCHORS WITH SCREEN TUBES. MINIMUM EMBEDMENT PER THE ANCHOR MANUFACTURER'S ICC-ES REPORT.

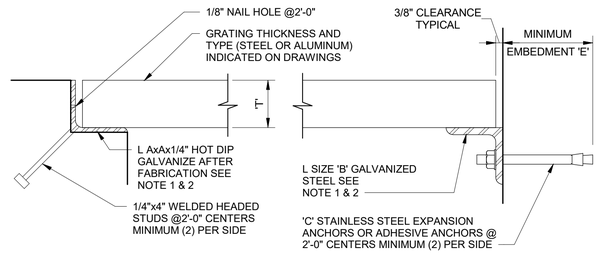
④ IF LADDER IS PAINTED OR GALVANIZED STEEL, USE 3/4" GALVANIZED STEEL, USE 3/4" MIN GALVANIZED HIGH STRENGTH STEEL BOLTS WITH COMPATIBLE NUT AND WASHERS. IF LADDER IS STAINLESS STEEL OR ALUMINUM, USE 3/4" MIN STAINLESS STEEL BOLTS WITH COMPATIBLE NUTS AND WASHERS.

C TYPICAL LADDER BRACKET CONNECTIONS

1/2" = 1'-0"

NOTES:

1. ALL LADDERS AND FALL PROTECTION SAFETY SYSTEM SHALL BE DESIGNED AND FABRICATED BY THE LADDER SUPPLIER IN CONFORMANCE WITH THE LATEST ISSUE OF OSHA/ANSI A14.3, SECTION 1910.27 APPLICABLE BUILDING CODE STANDARDS FOR FIXED WALL LADDERS, AND THE REQUIREMENTS OF THE CONTRACT DRAWINGS AND SPECIFICATIONS. GENERAL CONFIGURATION AND DETAILS SHALL CONFORM WITH THIS DRAWING.
2. LADDER AND ALL APPURTENANCES TO BE MATERIAL AS NOTED ON DRAWINGS. COORDINATE MATERIALS AND FABRICATION WITH THE SPECIFICATIONS FOR METAL FABRICATIONS AND FIBERGLASS, AS APPLICABLE.
   STEEL (PAINTED) - ASTM A36, SHOP PRIME PAINTED.
   STEEL (GALVANIZED) - ASTM A36, ZINC COATED IN ACCORDANCE WITH ASTM A123.
   ALUMINUM - ASTM A6061-T6 ALLOY WITH MILL FINISH UNLESS NOTED OTHERWISE.
   STAINLESS STEEL - ASTM TYPE 316L.
   FIBERGLASS - FIBERGLASS REINFORCED PULTRUDED TUBE, UV PROTECTED.
3. LADDER RUNGS TO BE MIN 1" DIAMETER BARS OR PREFABRICATED FLAT TOP LADDER TREADS WITH MINIMUM 1" WIDE SLIP RESISTANT SURFACES. SPACE RUNGS AT 12". LADDER SIDE RAILS SHALL BE FLAT STOCK.
4. FURNISH LADDERS IN CONFIGURATIONS REQUIRED TO FIT THE LOCATIONS INDICATED ON THE DESIGN DRAWINGS. CONTRACTOR SHALL VERIFY FINAL DIMENSIONS BEFORE FABRICATION.
5. LADDER SHOP DRAWINGS SHALL BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF THE PROJECT. IF REQUESTED, CALCULATIONS OR TEST REPORTS VERIFYING THE LADDERS COMPLIANCE WITH APPLICABLE STANDARDS SHALL BE SUBMITTED, AND SHALL BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF THE PROJECT.
6. IF A LADDER CONFIGURATION INDICATED ON THE DRAWINGS REQUIRES THAT THE LADDER SPAN A GREATER DISTANCE BETWEEN SUPPORTS THAN INDICATED ON THE TYPICAL DETAILS, THE LADDER SUPPLIER SHALL DESIGN THE LADDER, THE LADDER BRACKET, AND THE LADDER BRACKET CONNECTIONS FOR THE INDICATED SPAN IN ACCORDANCE WITH NOTE 1 ABOVE. THE BRACKET CONNECTIONS SHALL BE AT LEAST EQUAL TO THE TYPICAL CONNECTIONS INDICATED.
7. IF INTERRUPTION OF GUARDRAIL IS REQUIRED, SEE SELF-CLOSING SWING GATE DETAIL ON STANDARD GUARDRAIL DRAWING. SELF-CLOSING GATES SHALL BE UTILIZED AT ALL LADDER ENTRANCES EXCEPT LANDING (REST) PLATFORMS FOR CONTINUOUS LADDER CLIMBS.
8. A FALL PROTECTION SAFETY SYSTEM SHALL BE PROVIDED ON LADDERS AS INDICIATED IN THE DRAWINGS AND WHERE THE LENGTH OF CLIMBING IS MORE THAN 24 FEET OR WHERE THE LENGTH OF CLIMB IS LESS THAN 24 FEET, BUT THE TOP OF THE LADDER IS MORE THAN 24 FEET ABOVE GROUND LEVEL, FLOOR OR ROOF. THE LADDER FALL PROTECTION SAFETY SYSTEM SHALL BE OSHA APPROVED. LADDER AND ANCHORAGES SHALL BE DESIGNED TO SUPPORT OSHA REQUIRED FALL PROTECTION LOADS AND ANY LOADS INDICATED IN THE FALL PROTECTION SAFETY SYSTEM'S PRODUCT LITERATURE.
9. WHERE A FALL PROTECTION SAFETY SYSTEM IS REQUIRED AND THE LADDER TERMINATES BELOW AN ACCESS HATCH, THE FALL PROTECTION SAFETY SYSTEM SHALL INCORPORATE A TELESCOPING ANCHOR EXTENSION WHICH IS INTEGRAL WITH THE SAFETY SYSTEM. THE TELESCOPING ANCHOR EXTENSION SHALL REPLACE THE REQUIREMENT FOR THE EXTENDING LADDER SAFETY POST.



GRATING THICKNESS 'T'	L SIZE AxAx1/4 INCHES	L SIZE 'B' INCHES	'C' ANCHOR DIA	'C' ANCHOR MIN 'E'
1"	1 3/4 x 1 3/4*	2 1/2x2 1/2x1/4	1/2"	3 1/4"
1 1/4"	1 3/4 x 1 3/4*	2 1/2x2 1/2x1/4	1/2"	3 1/4"
1 1/2"	1 3/4 x 1 3/4	2 1/2x2 1/2x1/4	1/2"	3 1/4"
1 3/4"	2x2	3x3x3/8	3/4"	4 3/4"
2"	2 1/2x2 1/2*	3x3x3/8	3/4"	4 3/4"
2 1/4"	2 1/2x2 1/2	3x3x3/8	3/4"	4 3/4"
2 1/2"	3x3*	3x3x3/8	3/4"	4 3/4"

* TRIM AND BEVEL UPSTANDING LEG TO FIT

NOTES:

1. ALL GRATING SUPPORTED ON CONCRETE SHALL HAVE AN EMBEDDED ANGLE RECESSED AS SHOWN UNLESS NOTED OTHERWISE. GRATING SUPPORTED BY THE FACE MOUNTED ANGLE SHALL BE USED WHERE THE CONCRETE EXTENDS ABOVE THE TOP OF THE GRATING OR AT EXISTING STRUCTURES.
2. WHERE GRATING IS REQUIRED TO BE STAINLESS STEEL, SUPPORT ANGLES SHALL ALSO BE STAINLESS STEEL.

F METAL GRATING SUPPORT

3" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

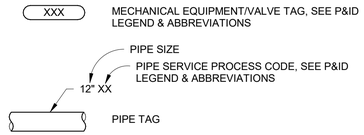
STANDARD LADDER AND GRATING DETAILS

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15 OF 82

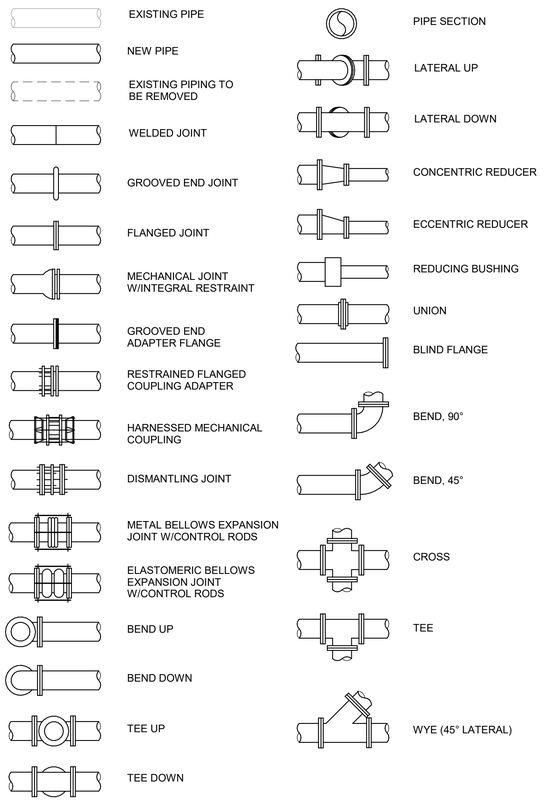
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REVIT VERSION: 2021
D1000

PIPE, EQUIPMENT & VALVE TAG LEGEND

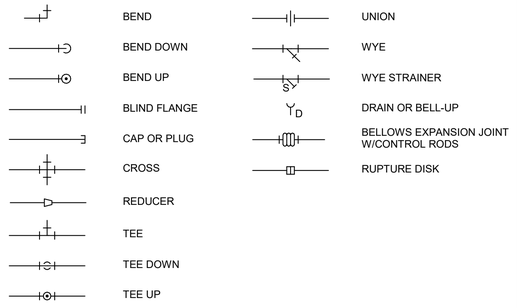


PIPE & FITTINGS SYMBOL LEGEND

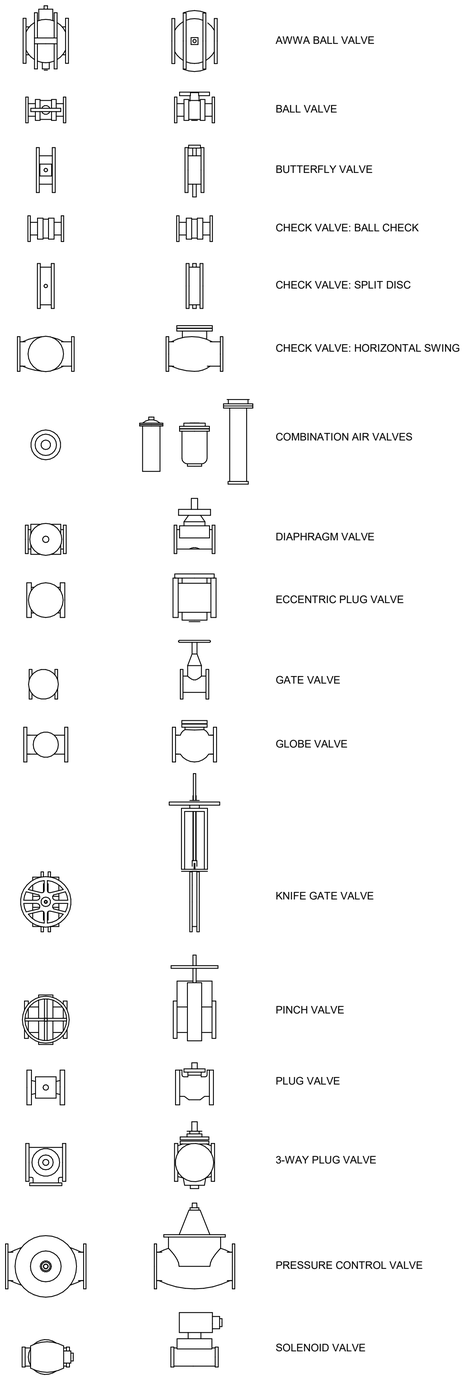
DOUBLE LINE



SINGLE LINE



VALVE SYMBOL LEGEND



GENERAL PROCESS MECHANCAL NOTES

1. LEGENDS SHOWN IN THIS DRAWING ARE BASED ON A TEMPLATE THAT IS NOT PROJECT SPECIFIC. SOME LEGEND SYMBOLS ARE NOT USED ON THIS PROJECT, BUT ARE SHOWN TO PROVIDE A DICTIONARY FOR SYMBOLS THAT MAY ALSO BE USED DURING THE PROJECT CONSTRUCTION PHASE.
2. FOR PROCESS MECHANICAL ABBREVIATIONS, REFER TO GENERAL ABBREVIATIONS.
3. REFER TO THE P&ID LEGEND AND ABBREVIATIONS FOR SINGLE-LINE VALVE, GATE, ACTUATOR, FITTING, EQUIPMENT, AND OTHER SYMBOLS.
4. FITTING TYPES IN THE LEGEND ON THIS SHEET SHOW FLANGED END CONNECTIONS. FITTINGS FOR OTHER END CONNECTION TYPES ARE SIMILAR.
5. VALVE TYPES IN THE LEGEND ON THIS SHEET REPRESENT THE TYPICAL APPEARANCE FOR EACH TYPE OF VALVE. THE ACTUAL VALVES USED FOR THIS PROJECT MAY VARY IN APPEARANCE.
6. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
7. SIZE OF FITTINGS SHOWN ON DRAWINGS SHALL MATCH CONNECTING PIPING, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS CONNECTING PIPING.
8. ALL REQUIRED HANGERS, SUPPORTS, BRACES, INSERTS, AND ACCESSORIES ARE NOT SHOWN ON THE DRAWINGS. PIPE SUPPORTS FOR 12-INCH DIAMETER AND SMALLER PIPES SHALL BE DESIGNED AND FURNISHED BY THE CONTRACTOR AS SPECIFIED.
9. ALL PRESSURIZED OR SURCHARGED PIPELINES, PIPE FITTINGS, COUPLINGS, JOINTS, EXPANSION JOINTS, TANK CONNECTIONS, AND CHANNEL CONNECTIONS SHALL BE PROVIDED WITH THRUST RESTRAINT BASED ON SPECIFIED PRESSURES AND TEMPERATURES.
10. NUMBER AND LOCATION OF UNIONS AND COUPLINGS SHOWN ON DRAWINGS IS ONLY APPROXIMATE. CONTRACTOR SHALL PROVIDE ALL UNIONS AND COUPLINGS REQUIRED BY THE SPECIFICATIONS AND AS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
11. WHERE A GROOVED END JOINT IS SHOWN,IT SHALL BE THE RIGID JOINT TYPE,UNLESS OTHERWISE SPECIFIED. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE JOINED TO THE COUPLING ADAPTER.
12. CONTRACTOR SHALL ORIENT VALVES AS SPECIFIED.

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	NM
DETAILED:	JPS
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

PROCESS MECHANICAL

LEGENDS AND GENERAL NOTES

000-M-001

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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ONE-LINE DIAGRAM LEGEND

1500KVA
2.4KV Δ - 480Y/277V
3-PH, 60HZ
TRANSFORMER WITH PRIMARY AND SECONDARY VOLTAGE, AND KVA RATING AS NOTED

CS 4#14,3/4"
20 3P-60 22:3#8,#10G, 4#14,2"
CIRCUIT NO.22 WITH 3#8 INSULATED CONDUCTORS AND 1#10 GROUND WIRE FOR A 20HP MOTOR WITH 3 POLE, 60A, MOTOR DISCONNECT SWITCH AND 4#14 INSULATED CONDUCTORS FOR AUXILIARY ITEM, AS FOR EXAMPLE A CONTROL STATION, ALL IN 2" CONDUIT.

AUXILIARY ITEMS MAY NOT BE COMPLETELY SHOWN
HS
20 3P-60 22:3#8,#10G 4#14,2"
CONDUCTORS FOR AUXILIARY ITEM SHALL NOT PASS THROUGH MOTOR DISCONNECT SWITCH.

AUXILIARY ITEMS MAY NOT BE COMPLETELY SHOWN
15
ONE-LINE SHOWING POWER AND CONTROL TO A PACKAGE UNIT, AS FOR EXAMPLE A STEAM GENERATOR OR AN AIR HANDLING UNIT, SHALL IMPLY THAT ANY AND ALL ASSOCIATED EQUIPMENT SHALL ALSO BE INSTALLED AND WIRED AS REQUIRED BY THE EQUIPMENT FURNISHED.

INDICATES THAT ALL OR PART OF CIRCUIT MAY BE ROUTED IN DUCT BANK OR UNDERGROUND. CONDUIT SIZE SHOWN ON ONE-LINE IS ABOVE GROUND AND/OR INSIDE OF STRUCTURE. SEE DUCT BANK SCHEDULE AND SECTIONS FOR CONDUIT SIZE OF UNDERGROUND PORTION OF CIRCUIT.

HIGH VOLTAGE DRAWOUT AIR OR VACUUM CIRCUIT BREAKER

3P-20
LOW VOLTAGE AIR CIRCUIT BREAKER, 3 POLE, 20 AMPERE

S4
SIZE 4 COMBINATION MAGNETIC MOTOR STARTER

LOW VOLTAGE DRAWOUT AIR CIRCUIT BREAKER

HIGH VOLTAGE DRAWOUT CONTACTOR

FUSE AND DISCONNECT SWITCH

S2
SIZE 2 COMBINATION MAGNETIC MOTOR STARTER, REVERSING OR 2 SPEED

S1
SIZE 1 COMBINATION REDUCED VOLTAGE AUTOTRANSFORMER

POTENTIAL TRANSFORMER

CURRENT TRANSFORMER

CURRENT OR POTENTIAL TEST SWITCH

G
GENERATOR

K
KIRK KEY INTERLOCK

E
ELECTRICAL INTERLOCK

R
RESISTOR

59G
PROTECTION RELAY WITH IEEE DEVICE FUNCTION AS SHOWN

V
SINGLE-FUNCTION METER

SURGE OR LIGHTNING ARRESTER

SURGE ARRESTER WITH SURGE CAPACITOR

GROUND CONNECTION

SCHEMATIC SYMBOLS

- WIRE CONNECTION POINT
- EXTERNAL CONNECTION POINT
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- STARTER, CONTACTOR OR RELAY COIL
- NORMALLY OPEN PUSH BUTTON
- NORMALLY CLOSED PUSH BUTTON
- MAINTAINED PUSH BUTTON
- NORMALLY CLOSED GEARED LIMIT SWITCH
- NORMALLY OPEN GEARED LIMIT SWITCH
- INDICATING LIGHT
- FUSE
- POTENTIOMETER
- CAPACITOR
- DIODE
- RESISTOR
- CONTROL POWER TRANSFORMER
- SWITCH
- MS MANUAL STARTER
- OL OVERLOAD
- OVERLOAD
- ELECTRODE
- FLOAT SWITCH (CLOSING ON RISING LEVEL)
- FLOAT SWITCH (OPENING ON RISING LEVEL)
- P PRESSURE SWITCH (CLOSING ON RISING PRESSURE)
- P PRESSURE SWITCH (OPENING ON RISING PRESSURE)
- V VACUUM SWITCH (CLOSING ON INCREASING VACUUM)
- V VACUUM SWITCH (OPENING ON INCREASING VACUUM)
- TEMPERATURE SWITCH (CLOSING ON RISING TEMPERATURE)
- TEMPERATURE SWITCH (OPENING ON RISING TEMPERATURE)
- FLOW ACTUATED SWITCH (CLOSING ON INCREASE IN FLOW)
- FLOW ACTUATED SWITCH (OPENING ON INCREASE IN FLOW)
- ON TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)
- ON TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS ENERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)
- OFF TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)
- OFF TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)
- TORQUE SWITCH (NORMALLY OPEN)
- TORQUE SWITCH (NORMALLY CLOSED)
- LIMIT SWITCH (NORMALLY OPEN)
- LIMIT SWITCH (NORMALLY OPEN, HELD CLOSED)
- LIMIT SWITCH (NORMALLY CLOSED)
- LIMIT SWITCH (NORMALLY CLOSED, HELD OPEN)
- DIFFERENTIAL PRESSURE SWITCH (NORMALLY OPEN, CLOSING ON INCREASING DIFF.)
- DIFFERENTIAL PRESSURE SWITCH (NORMALLY CLOSED, OPENING ON INCREASING DIFF.)

SWITCH & OUTLET SYMBOLS

- S SINGLE POLE SWITCH
- S_2 TWO POLE SWITCH
- S_{3A} THREE-WAY SWITCH CONTROLLING LIGHTS WITH "A" DESIGNATION
- S_4 FOUR-WAY SWITCH
- S^{C1}_{M} MOMENTARY SWITCH CONTROLLING CONTACTOR C1
- S^{DM}_{A} DIMMING WALL SWITCH CONTROLLING LIGHTS WITH "A" DESIGNATION
- S^{OS}_{A} WALL SWITCH OCCUPANCY SENSOR CONTROLLING LIGHTS WITH "A" DESIGNATION
- DUPLEX RECEPTACLE 120 VOLT
- SIMPLEX RECEPTACLE
- RANGE RECEPTACLE
- TWISTLOCK RECEPTACLE
- 30 240V, 1Ø RECEPTACLE, TYPICAL AMPERE RATING NOTED
- 60 480V, 3Ø WELDING RECEPTACLE, TYPICAL AMPERE RATING NOTED
- 120 VOLT DUPLEX RECEPTACLE (UPS)
- DUPLEX FLOOR OUTLET
- TELEPHONE OUTLET
- TELEPHONE FLOOR OUTLET
- CX COAXIAL CABLE OUTLET
- DATA NETWORK OUTLET

MISCELLANEOUS SYMBOLS

- STROBE
- HORN & STROBE
- HORN
- T THERMOSTAT
- J JUNCTION BOX
- GROUND ROD
- GROUND ROD WITH TEST WELL
- GROUND CONNECTION
- DISCONNECT SWITCH
- COMBINATION STARTER
- POWER PANEL
- LIGHTING PANEL
- MISCELLANEOUS PANEL
- LIGHTING CONTACTOR
- CAMERA
- PE PHOTOELECTRIC SENSOR, PHOTOCELL
- OS CEILING MOUNTED OCCUPANCY SENSOR
- OS WALL MOUNTED OCCUPANCY SENSOR

BREAKER DETAILS

DETAIL A

52 — 5KV, 1200A, 49KA
A 5KV CLASS MEDIUM-VOLTAGE, DRAWOUT, VACUUM OR AIR INSULATED CIRCUIT BREAKER WITH A 1,200 AMPERE FRAME. BREAKER HAS A 49,000 AMPERE MAXIMUM FAULT CURRENT INTERRUPTING RATING.

DETAIL B

3P-50
A LOW VOLTAGE FIXED MOUNTED MOLDED CASE CIRCUIT BREAKER WITH A 50 AMPERE TRIP RATING.
TRIP UNIT IS NON-ADJUSTABLE THERMAL-MAGNETIC TYPE.

1000AT, 1200AF — SST, LSIG, AFRD
A LOW VOLTAGE FIXED MOUNTED MOLDED CASE CIRCUIT BREAKER WITH A 1200 AMPERE FRAME AND A 1000 AMPERE TRIP RATING.
TRIP UNIT IS ADJUSTABLE SOLID-STATE TYPE WITH LONG-TIME, SHORT-TIME, INSTANTANEOUS, GROUND FAULT AND ARC-FLASH REDUCTION PROTECTION FEATURES.

DETAIL C

800AT, 1000AS, 1600AF — AFRD
A LOW VOLTAGE, DRAWOUT, POWER OR INSULATED CASE CIRCUIT BREAKER WITH A 1600A FRAME AND SOLID-STATE TRIP UNIT.
TRIP UNIT HAS A SENSOR MODULE RATED FOR 1000 AMPERES AND WITH A TRIP RATING OF 800 AMPERES AND ARC-FLASH REDUCTION PROTECTION FEATURES.

CONDUIT & WIRING INSTALLATION LEGEND

- CONDUIT EXPOSED
- CONDUIT CONCEALED
- CONDUIT TURNING UP. CONDUIT TURNING DOWN.
- CONDUIT PLUGGED FLUSH. CONDUIT CAPPED.
- L2 - 5 TYPICAL FOR HOME RUN TO BE ROUTED TO LIGHTING PANEL L2 & CONNECTED TO CIRCUIT #5 (MINIMUM NO. 12 AWG CONDUCTORS AND 3/4" CONDUIT)
- 1 LP1-1 A POLE OR STANCHION MOUNTED LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL LP1, CIRCUIT 1. CONTROLLED VIA FROM SWITCH A.
- 1 LP1-1 A WALL MOUNTED LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL LP1, CIRCUIT 1. CONTROLLED VIA FROM SWITCH A.
- 1 LP1-1 A CEILING, PENDANT, OR RECESSED LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL LP1, CIRCUIT 1. CONTROLLED VIA FROM SWITCH A.
- LP1-1 RECEPTACLE POWERED FROM LIGHTING PANEL LP1, CIRCUIT 1.
- LP1-1 A, 1 LINEAR LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL LP1, CIRCUIT 1. CONTROLLED VIA SWITCH A.
- LP1-1 EX EXIT LIGHTING FIXTURE. REFER TO FIXTURE NUMBER OR LETTERS IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL 1, CIRCUIT 1.
- LP1-1 EM EMERGENCY LIGHTING FIXTURE. REFER TO FIXTURE NUMBER OR LETTERS IN FIXTURE SCHEDULE. POWERED FROM LIGHTING PANEL 1, CIRCUIT 1.
- E UNDERGROUND CONCRETE ENCASED ELECTRICAL DUCT BANK
- UNDERGROUND CONCRETE ENCASED ELECTRICAL BANK ROUTED BENEATH SLAB-ON-GRADE
- EE DIRECT BURIED CONDUIT
- GROUND CONDUCTOR
- UE UE UNDERGROUND ELECTRIC
- OH OH OVERHEAD CIRCUIT

COMMUNICATION SYMBOLS

- HORN SPEAKER
- DUAL HORN SPEAKER
- WALL MOUNTED CONE SPEAKER
- SK CEILING MOUNTED CONE SPEAKER

PROTECTION/RELAY DEVICE NUMBERS

25 - SYNCHRONIZING OR SYNCHRONISM-CHECK DEVICE
27 - UNDERVOLTAGE RELAY
32 - DIRECTIONAL POWER RELAY
37 - UNDERCURRENT OR UNDERPOWER RELAY
46 - REV. PHASE OR PHASE-BAL. CURRENT RELAY
47 - PHASE SEQ. OR PHASE BAL. VOLTAGE RELAY
49 - MACHINE OR TRANSFORMER THERMAL RELAY
50 - INSTANTANEOUS OVERCURRENT
51 - AC TIME OVERCURRENT RELAY
52 - AC CIRCUIT BREAKER
59 - OVERVOLTAGE RELAY
63 - PRESSURE SWITCH
64 - GROUND DETECTOR RELAY
67 - AC DIRECTIONAL OVERCURRENT RELAY
71 - LIQUID OR GAS LEVEL RELAY
81 - FREQUENCY RELAY
83 - AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY
86 - LOCKOUT RELAY
87 - DIFFERENTIAL PROTECTIVE RELAY

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JCK
DETAILED:	AJS
CHECKED:	KRE
APPROVED:	KRE
DATE:	DECEMBER 2024
PROJECT NO.:	417134

GENERAL

ELECTRICAL

LEGENDS

000-E-001

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FDT1000
FDT1000

ELECTRICAL GENERAL NOTES

1. SOLID LINES (————————) INDICATE NEW WORK OR EQUIPMENT.
2. SCREENED LINES (————————) INDICATE EXISTING WORK OR EQUIPMENT.
3. DASHED LINES (– – – – – – – –) INDICATE FUTURE WORK OR EQUIPMENT.
4. REFER TO INDIVIDUAL DISCIPLINE CONTRACT DRAWINGS FOR ADDITIONAL ABBREVIATIONS, DETAILS, AND GENERAL DESIGN NOTES.
5. LEGEND SHEETS ARE GENERAL. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
6. INFORMATION RELATED TO CIRCUIT IDENTIFICATION, WIRE & CONDUIT SIZES, AND ROUTING, IS ON THE FOLLOWING DRAWING TYPES.
   - A. ONE-LINE DIAGRAMS SHOW CIRCUIT IDENTIFICATION, WIRE QUANTITY AND SIZES, AND CONDUIT SIZE WITHIN STRUCTURES. ONE-LINE DIAGRAMS ALSO INDICATE ORIGIN AND DESTINATION OF CIRCUITS, AND IDENTIFY CIRCUITS ROUTED UNDERGROUND.
   - B. FOR CIRCUITS WITHOUT UNDERGROUND PORTIONS, BUILDING FLOOR PLANS SHOW LOCATION OF EQUIPMENT FOR DETERMINING CIRCUIT LENGTH WITHIN THE STRUCTURE. FOR CIRCUITS WITH UNDERGROUND PORTIONS, ANTICIPATED PENETRATION OF UNDERGROUND CONDUITS ARE SHOWN ON STRUCTURE PLANS FOR DETERMINING THE LENGTH OF THE IN-STRUCTURE PORTIONS OF CIRCUITS. BUILDING FLOOR PLANS MAY ALSO SHOW HOME RUNS FOR LIGHTING, RECEPTACLE, AND OTHER MISCELLANEOUS EQUIPMENT CIRCUITS.
   - C. SITE PLANS INDICATE THE GENERAL ROUTING OF UNDERGROUND CONDUITS AND DUCT BANKS. CIRCUITS ROUTED IN UNDERGROUND CONDUITS OR DUCT BANKS ARE INDICATED IN DUCT BANK SECTIONS REFERENCED ON THE SITE PLAN.
   - D. DUCT BANK SECTIONS AND SCHEDULES IDENTIFY CONDUIT SIZE, CONDUIT MATERIAL, ARRANGEMENT OF THE UNDERGROUND CONDUITS, AND CIRCUITS ROUTED IN EACH UNDERGROUND CONDUIT.

AREA DESIGNATIONS

THE SPECIAL AREA DESIGNATION BOXES, AS DEFINED BELOW, ARE LOCATED ON THE PLAN DRAWINGS TO DEFINE ELECTRICAL INSTALLATION REQUIREMENTS. DESIGNATION BOXES ARE LOCATED WITHIN ROOM OR BELOW ROOM NUMBER. ALL INDOOR AREAS NOT INDICATED OTHERWISE ARE AREA TYPE 1 AND MINIMUM NEMA TYPE 1 ENCLOSURES.

AREA TYPE 1A	CORROSIVE CHEMICAL FEED AND STORAGE ROOMS. CONDUIT SYSTEM SHALL BE EXPOSED SCHEDULE 80 PVC RIGID NON-METALLIC CONDUIT WITH PVC FITTINGS, BOXES AND ACCESSORIES.
AREA TYPE 4	INDOOR WET LOCATIONS SUCH AS VAULTS, HOSEDOWN AREAS, BASEMENTS, ETC. MINIMUM NEMA TYPE 4 ENCLOSURE FOR EQUIPMENT AND GASKETED FITTINGS IN A CONDUIT SYSTEM.
AREA TYPE 7A	CLASS I, DIVISION 1 AREA AS DEFINED BY NEC. ALL EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.
AREA TYPE 7B	CLASS I, DIVISION 2, GROUP C AND D (METHANE, GASOLINE) AS DEFINED BY NEC. EQUIPMENT AND CONDUITS SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.
AREA TYPE 12	INDOOR, DRY, DIRTY AREA. REQUIRES MINIMUM NEMA TYPE 12 GASKETED ENCLOSURES FOR ALL EQUIPMENT AND GASKETED FITTINGS IN CONDUIT SYSTEMS.

GENERAL REQUIREMENTS

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUTING ALL CONDUITS NOT SHOWN ON THE PLANS. THIS SHALL INCLUDE ALL CONDUITS SHOWN ON THE ONE-LINES AND HOME-RUNS SHOWN ON THE PLAN DRAWINGS. CONDUITS SHALL BE ROUTED AS DEFINED IN THE SPECIFICATION.
2. SPARE WIRES SHALL BE TAPED AND COILED AND LABELED TO INDICATE WHERE OTHER END OF SPARE WIRE IS LOCATED.
3. IF EQUIPMENT SUPPLIED BY MANUFACTURER HAS A LARGER LOAD THAN VALUE SHOWN, THE CABLE CONDUIT AND ELECTRICAL EQUIPMENT SHALL BE ENLARGED, AS REQUIRED, TO ACCOMMODATE THE HIGHER VALUE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING PROPERLY SIZED STARTER OVERLOADS FOR EQUIPMENT FURNISHED.
5. LIGHTING AND RECEPTACLE CIRCUITS DESIGNATED ON THE FLOOR PLANS ARE NOT SHOWN ON THE ONE-LINES. CONDUCTORS FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM NO. 12AWG. CONDUIT FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM 3/4".
6. IN AREAS WHERE THERE ARE OVERHEAD BRIDGE CRANES, HOISTS, ETC. NO CONDUITS SHALL BE RUN OVERHEAD THAT WILL INTERFERE WITH THE OPERATION OF THE EQUIPMENT.

ELECTRICAL ABBREVIATIONS

A

A	AMBER, AMPERE, ALARM
AC	ALTERNATING CURRENT
ACB	AIR CIRCUIT BREAKER
ACR	ACCESS CARD READER
AF	AMPERE FRAME
AFD	ADJUSTABLE FREQUENCY DRIVE
AFRD	ARC-FLASH REDUCTION DEVICE
AM	AMMETER
ANN	ANNUNCIATOR
AR	ALARM RELAY
AS	AMMETER SWITCH, AMPERE SENSOR
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE

B

B	BUS
BC	BATTERY CHARGER
BKR	BREAKER
BR	BRAKE
BT	BEARING TEMPERATURE

C

C	CLOSE, COUNTER, CONTACTOR, CONTROL, CCTV CAMERA
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CB"A"	CIRCUIT BREAKER AUXILIARY CONTACT (OPEN WHEN BREAKER IS OPEN)
CB"B"	CIRCUIT BREAKER AUXILIARY CONTACT (CLOSED WHEN BREAKER IS OPEN)
CD	CONTROL DAMPER
CI	CELL INTERLOCK
CKT	CIRCUIT
CL2	CHLORINE
COS	CABLE OPERATED SWITCH
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CURRENT OF CONTROL RELAY, CARD READER
CS	CONTROL STATION
CT	CYCLE TIMER OR CURRENT TRANSFORMER
CTC	CYCLE TIMER CLUTCH
CTM	CYCLE TIMER MONITOR
2/C	2 CONDUCTOR
4"C	4" CONDUIT

D

DC	DIRECT CURRENT, DOOR CONTACT
DI	DOOR INTERLOCK
DM	DAMPER MOTOR, DEMAND METER, DIMMER SWITCH
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DPR	DIFFERENTIAL PRESSURE REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DS	DISCONNECT SWITCH, DOOR SWITCH, DESKTOP STATION
DVLS	DISCHARGE VALVE LIMIT SWITCH

E

E	ELECTRIC OPERATOR FOR CONTROL DAMPER OR VALVE
EC	EMPTY CONDUIT
EDS	ELECTRICAL DOOR STRIKE
EL	ELEVATION, EMERGENCY LIGHT
EMH	ELECTRICAL MANHOLE
ER	ELECTRODE RELAY
ES	END SWITCH, REQUEST TO EXIT SENSOR
E-STOP	EMERGENCY STOP
ETM	ELAPSED TIME METER
EX	EXISTING
EXP	EXPLOSION PROOF

F

F	FORWARD, FIELD
FO	FIBER OPTIC
FPR	FEEDER PROTECTION RELAY
FS	FLOW SWITCH

G

G	GREEN, GROUND, GENERATOR, GROUND FAULT
GD	GROUND DETECTOR
GEN	GENERATOR
GFCI,GFI	GROUND FAULT CURRENT INTERRUPTOR, GROUND FAULT INTERRUPTOR
GLS	GEARED LIMIT SWITCH
GPR	GENERATOR PROTECTION RELAY
GND	GROUND
#8G	#8 GROUND WIRE

H

H	HIGH, HUMIDISTAT
HH	HANDHOLE
HMT	HIGH MOTOR TEMPERATURE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HP	HORSEPOWER
HS	HAND STATION
HWCO	HIGH WATER CUTOFF
HZ	HERTZ (CYCLE)

I

I/O	INPUT/OUTPUT
I	INSTANTANEOUS
IJB	INTERCOM JUNCTION BOX

J

J,JB	JUNCTION BOX

K

K	KEY INTERLOCK
KAIC	THOUSAND AMPERES INTERRUPTING CURRENT
KCMIL	THOUSAND CIRCULAR MIL
KO	KEY OPERATED
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR
KW	KILOWATT
KWH	KILOWATT HOUR

L

L	LOW, LEVEL, LONG-TIME
LA	LIGHTNING ARRESTER
LAN	LOCAL AREA NETWORK
LC	LIGHTING CONTRACTOR
LCE	LIGHTING CONTACTOR ENCLOSURE LIGHTING CONTROL ENCLOSURE
LCP	LOCAL CONTROL PANEL
LCS	LOCAL CONTROL STATION
LOA	LOCAL-OFF-AUTO
LOR	LOCAL-OFF-REMOTE
LOS	LOCK OUT STOP
LP	LIGHTING PANEL
LS	LIMIT OR LEVEL SWITCH
LTG	LIGHTING
LWCO	LOW WATER CUTOFF

M

M	MAGNETIC MOTOR STARTER
MA	MILLIAMPERE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCLU	MOTOR CONTROL LINEUP
MD	MOISTURE DETECTOR, MOTION DETECTOR
MDL	MAGNETIC DOOR LOCK
MFR	MANUFACTURER
MH	MANHOLE, MOUNTING HEIGHT
MOV	MOTOR OPERATED VALVE
MPR	MOTOR PROTECTION RELAY
MS	MANUAL MOTOR STARTER
MSH	MOTOR SPACE HEATER
MTS	MANUAL TRANSFER SWITCH
MV	MILLIVOLT, MEDIUM VOLTAGE
MVA	MEGAVOLT AMPERE

N

N	NEUTRAL
NGR	NEUTRAL GROUNDING RESISTOR
NGT	NEUTRAL GROUNDING TRANSFORMER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN, NUMBER

O

O	OPEN
OL	OVERLOAD
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OS	OCCUPANCY SENSOR
O/U	OVER/UNDER

P

P	PRIMARY, POWER, POLE
PCS	PLANT CONTROL SYSTEM
PB	PUSH BUTTON, PULL BOX
PE	PHOTOELECTRIC SENSOR, PHOTOCELL
PF	POWER FACTOR
PFCC	POWER FACTOR CORRECTION CAPACITOR
PH	PHASE
PL	PILOT LIGHT
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	POWER PANEL
PR	PAIR
PRS	PROXIMITY SWITCH
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER, PROGRAM TIMER

Q

NOT USED

R

R	RED, RAISE, RELAY, REVERSE
RECP	RECEPTACLE
RES	RESISTOR
RH	REMOTE HANDSET
RT	REPEATING TIMER
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TERMINAL UNIT
RVSS	REDUCED VOLTAGE SOLID STATE STARTER

S

S	SHORT-TIME, SHIELDED, STARTER
SA	SURGE ARRESTER, SPEAKER AMPLIFIER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SF6	SULFUR HEXAFLOURIDE
SH	SPACE HEATER
SN	SOLID NEUTRAL
SO	SOLENOID OILER
SP	SINGLE POLE
SPD	SURGE PROTECTION DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SS	SELECTOR SWITCH, START/STOP, STAINLESS STEEL
SSM	SOLID-STATE METERING
SSS	SOLID STATE STARTER
SST	SOLID-STATE TRIP
SUPV	SUPERVISORY CONTROL
SV	SOLENOID VALVE
SWB,SWBD	SWITCHBOARD
SWG,SWGR	SWITCHGEAR

T

T	THERMOSTAT, TIMER, TOTALIZER, TRANSFORMER
TACH	TACHOMETER
TB	TERMINAL BLOCK
TC	TIMER CLUTCH
TD	TIME DELAY RELAY
TEMP	TEMPERATURE
TM	TIMER MOTOR
TQ	TORQUE
TR	TIMER RELAY, TRIAD
TS	TEMPERATURE SWITCH
TTB	TELEPHONE TERMINAL BOARD

U

UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY

V

V	VOLTS, VOLTAGE RESTRAINED
VA	VOLT AMPERE
VAR	VARMETER
VFD	VARIABLE FREQUENCY DRIVE
VI	VACUUM INTERRUPTER
VLS	VALVE LIMIT SWITCH
VM	VOLTMETER
VPI	VALVE POSITION INDICATOR
VS	VOLTMETER SWITCH

W

W	WHITE, WATTS
WH	WATTHOUR METER
WM	WATT METER
WP	WEATHERPROOF
WPI	WEATHERPROOF IN-USE
WS	WALL STATION

X

X	AUXILIARY RELAY
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

Y

Y	YELLOW

Z

Z	AUXILIARY RELAY, IMPEDANCE
ZS	POSITION SWITCH
ZSS	ZERO SPEED SWITCH

1-1PR#16S	ONE, SINGLE PAIR, TWISTED SHIELDED #16 CABLE
3-7/C#14	THREE, SINGLE, SEVEN CONDUCTOR #14 MULTICONDUCTOR CONTROL CABLES

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JCK
DETAILED:	AJS
CHECKED:	KRE
APPROVED:	KRE
DATE:	DECEMBER 2024
PROJECT NO.:	417134

GENERAL

ELECTRICAL

ABBREVIATIONS AND NOTES

000-E-002

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FILE: C:\PW_WORKING\BVW_AMERICAS_2\D1868560\000-E-002.DWG
FD11000
FD11003

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

EQUIPMENT IDENTIFICATION DESCRIPTION



AREA CODE - DENOTES ASSOCIATED PROCESS AREA NUMBER
SYSTEM CODE - DENOTES ASSOCIATED SYSTEM STREAM
FUNCTION CODE - DENOTES ASSOCIATED EQUIPMENT ABBREVIATION
SEQUENCE CODE - UNIQUE ALPHA-NUMERIC IDENTIFIER

AA - SSS - FFF - 9999

PIPELINE IDENTIFICATION DESCRIPTION

PIPE SIZE - INCHES UNLESS OTHERWISE NOTED
PROCESS CODE - DENOTES ASSOCIATED PROCESS STREAM
MATERIAL CODE - DENOTES ASSOCIATED MATERIAL ABBREVIATION

SSS - PPP - MTL

LINE SYMBOLS

- MAJOR PROCESS PIPING OR FLOW CHANNEL
- SECONDARY PROCESS PIPING
- MISCELLANEOUS PIPING
- SCREENED LINE DENOTES EXISTING PIPE OR EQUIPMENT
- DASHED LINE DENOTES FUTURE PIPE AND EQUIPMENT
- ELECTRIC SIGNAL
- HYDRAULIC SIGNAL
- PNEUMATIC SIGNAL
- SIGNAL CONNECTION POINT
- CONTROL SYSTEM BACKBONE NETWORK SIGNAL (ETHERNET)
- FIELD DEVICE NETWORK SIGNAL (ETHERNET)
- NON-STANDARD OR INDEPENDENT CONTROL SYSTEM NETWORK SIGNAL (AS NOTED ON DRAWINGS)

- X | I-XX — SIGNAL LINE COMING/GOING TO/FROM SHEET (MATCH LETTERS)
- X | I-XX — PROCESS LINE COMING/GOING TO/FROM ANOTHER (MATCH LETTERS)
- MATCH SHEET NO. IDENTIFIER / MATCH LINE NO.
- X — SIGNAL CONNECTION WITHIN THE SAME SHEET
- FLOW ARROW FOR PROCESS PIPING
- PROCESS LINES CROSSING (NOT CONNECTED)

MISCELLANEOUS MECHANICAL EQUIPMENT SYMBOLS

- AFTERCOOLER
- BOILER
- FILTER, AIR
- FILTER, WATER CARTRIDGE TYPE
- FILTER, WATER MEMBRANE TYPE
- FILTER SEPARATOR
- HEAT EXCHANGER, AIR
- HEAT EXCHANGER, DOUBLE PIPE
- HEAT EXCHANGER, FINNED TUBE
- HEAT EXCHANGER, PLATE & FRAME
- HEAT EXCHANGER, SHELL & TUBE
- HEAT EXCHANGER, SPIRAL
- HEAT EXCHANGER, TYPE 1
- HEAT EXCHANGER, TYPE 2
- HYDROCYCLONE
- MIXER, MECHANICAL
- MIXER, STATIC
- PARTICULATE FILTER
- REGULATOR, AIR
- SILENCER
- VALVE, MATERIAL HANDLING ROTARY
- VAPORIZER, AMBIENT

PUMP & BLOWER SYMBOLS

- BLOWER, CENTRIFUGAL
- BLOWER, POSITIVE DISPLACEMENT
- COMPRESSOR
- COMPRESSOR, LIQUID RING
- COMPRESSOR, RECIPROCATING
- COMPRESSOR, ROTARY SCREW
- COMPRESSOR, ROTARY SCROLL
- FAN, CENTRIFUGAL
- MOTOR, ELECTRIC
- PUMP, CENTRIFUGAL OR OTHER TYPE NOT SPECIFIED
- PUMP, CENTRIFUGAL SUBMERGED
- PUMP, DIAPHRAGM METERING, MOTOR DRIVEN
- PUMP, DIAPHRAGM METERING, SOLENOID DRIVEN
- PUMP, DOUBLE DIAPHRAGM
- PUMP, DRUM
- PUMP, PERISTALTIC
- PUMP, PLUNGER
- PUMP, POSITIVE DISPLACEMENT
- PUMP, PROGRESSING CAVITY
- PUMP, ROTARY
- PUMP, SCREW (LIFT)
- PUMP, SUBMERSIBLE
- PUMP, VERTICAL

WATER & WASTEWATER MECHANICAL EQUIPMENT SYMBOLS

- BAR SCREEN, MANUAL
- BAR SCREEN, MECHANICAL
- BASIN, RECTANGULAR
- BELT FILTER PRESS
- CENTRIFUGE
- DISSOLVED AIR FLOTATION (DAF) THICKENER
- FLARE, GAS; WASTE GAS BURNER
- GRAVITY BELT THICKENER
- GRAVITY FILTER
- GRIT BASIN
- GRIT CLASSIFIER
- GRIT COLLECTOR, VORTEX TYPE
- GRIT CONCENTRATOR
- GRIT CONCENTRATOR & DEWATERING SCREW
- OZONE GENERATOR
- OZONE GENERATOR WITH POWER SUPPLY
- SEDIMENTATION BASIN, CIRCULAR
- SEDIMENTATION BASIN, RECTANGULAR W/SETTLING PLATES AND SOLIDS COLLECTOR
- SEDIMENTATION BASIN, RECTANGULAR W/ SOLIDS COLLECTOR
- SLUDGE GRINDER, CHANNEL MOUNTED
- SLUDGE GRINDER, INLINE
- SOLIDS COLLECTOR
- THICKENER, GRAVITY
- UV, W/HORIZONTAL BULBS

PRIMARY ELEMENT & FITTING SYMBOLS

- CAP
- COUPLING
- DIAPHRAGM SEAL
- DIAPHRAGM SEAL, ANNULAR TYPE
- DRAIN, BELL-UP TYPE
- DRAIN, FUNNEL TYPE
- EXPANSION LOOP
- FLAME ARRESTER
- FLAME CHECK
- FLANGE
- FLEXIBLE CONNECTION
- FLOW CONDITIONER
- HORN OR SIREN
- HOSE CONNECTION
- IN-LINE TYPE ULTRASONIC FLOWMETER (SINGLE OR MULTI-PATH)
- INSTRUMENT PURGE OR FLUSHING DEVICE
- LEVEL SENSOR, CONDUCTANCE TYPE (LE / CON)
- LEVEL SENSOR, GUIDED WAVE RADAR TYPE (LE / GWR)
- LEVEL SENSOR, PRESSURE SENSING TYPE (LE / DP)
- LEVEL SENSOR, RADAR TYPE (LIT / RAD)
- LEVEL SENSOR, ULTRASONIC TYPE (LE / US)
- MOISTURE SEPARATOR
- PLUG
- PRIMARY FLOW ELEMENT, AVERAGING PITOT TYPE
- PRIMARY FLOW ELEMENT, CORIOLIS MASS FLOWMETER
- PRIMARY FLOW ELEMENT, FLUME
- PRIMARY FLOW ELEMENT, MAGNETIC (M)
- PRIMARY FLOW ELEMENT, ORIFICE PLATE
- PRIMARY FLOW ELEMENT, THERMAL DISPERSION FLOWMETER (ΔT)
- PRIMARY FLOW ELEMENT, TURBINE OR PROPELLER-TYPE
- PRIMARY FLOW ELEMENT, VENTURI TUBE, FLOW NOZZLE, OR FLOW TUBE. * SEE MEASUREMENT SYMBOL NOTATIONS LIST
- PRIMARY FLOW ELEMENT, WEIR
- QUICK CONNECT (Q)
- REDUCER - CONCENTRIC
- REDUCER - ECCENTRIC
- ROTAMETER (FG)
- SEDIMENT TRAP
- SIGHTGLASS (LG)
- STRAINER, BASKET TYPE
- STRAINER, Y TYPE
- SUCTION DIFFUSER
- SURGE CHAMBER
- TRAP (T)
- UNION
- VENT
- VENT, SCREENED

CHEMICAL FEED EQUIPMENT SYMBOLS

- AUTOMATIC SWITCHOVER (AS)
- CALIBRATION COLUMN
- CHLORINE DIOXIDE (CO_2) VAPORIZER
- CYLINDER, GAS
- DIFFUSER, CHANNEL
- DIFFUSER, INLINE
- DIFFUSER, POLYMER INJECTION RING
- DIFFUSER, TANK
- DOUBLE CONTAINED PIPING
- DRIP LEG HEATER
- DRY CHEMICAL FEEDER
- EMERGENCY COMBINATION SHOWER AND EYEWASH FOUNTAIN
- EMERGENCY EYEWASH FOUNTAIN
- EMERGENCY SHOWER
- EVAPORATOR
- EXPANSION TANK OR FUNNEL
- GAS FEEDER
- INJECTOR/EDUCTOR
- LIME SLAKER, PASTE TYPE
- PRESSURE BUILDING COIL
- PULSATION DAMPENER
- RUPTURE DISK
- SPECTACLE FLANGE, BLIND, CLOSED
- SPECTACLE FLANGE, BLIND, OPEN
- TON CONTAINER (ton cap)
- TOTE
- VAPOR SUPERHEATER
- WEIGH SCALE

VALVE & GATE SYMBOLS

- BACKFLOW PREVENTER
- CHLORINE VACUUM REGULATOR ASSEMBLY (M)
- EXPLOSION RELIEF
- GATE, SLUICE OR SLIDE
- VALVE, AIR RELEASE
- VALVE, AIR VACUUM BREAK
- VALVE, ANGLE
- VALVE, BALL
- VALVE, BUTTERFLY
- VALVE, CHECK
- VALVE, CHECK W/STOP
- VALVE, CHLORINE WITH YOKE
- VALVE, COMBINATION AIR RELEASE AND VACUUM BREAK
- VALVE, DIAPHRAGM
- VALVE, DIVERTER
- VALVE, DIVERTER ASSEMBLY
- VALVE, ECCENTRIC PLUG
- VALVE, FLAP GATE
- VALVE, FOUR FUNCTION
- VALVE, FOUR WAY
- VALVE, GATE OR OTHER TWO-WAY TYPE NOT OTHERWISE IDENTIFIED
- VALVE, GLOBE
- VALVE, KNIFE GATE
- VALVE, MUD
- VALVE, NEEDLE
- VALVE, NON-ECCENTRIC PLUG
- VALVE, PINCH
- VALVE, PRESSURE AND VACUUM RELIEF
- VALVE, PRESSURE REDUCING
- VALVE, PRESSURE REDUCING (SELF ACTUATING TYPE)
- VALVE, PRESSURE RELIEF
- VALVE, PRESSURE SUSTAINING
- VALVE, PRESSURE SUSTAINING (SELF ACTUATING TYPE)
- VALVE, RELIEF, PILOT ACTUATED
- VALVE, ROTARY, GENERIC
- VALVE, SET STOP
- VALVE, SLEEVE
- VALVE, TELESCOPING
- VALVE, THERMAL SHUTOFF
- VALVE, THREE WAY
- VALVE, V-PORT BALL
- VALVE, VACUUM RELIEF
- VALVE, VENTED BALL

VALVE AND GATE ACTUATOR SYMBOLS

- AIR CYLINDER ACTUATOR (P)
- AIR CYLINDER ACTUATOR - DOUBLE ACTING (P / DA)
- AIR CYLINDER ACTUATOR - SPRING CLOSE (P / SC)
- AIR CYLINDER ACTUATOR - SPRING OPEN (P / SO)
- AIR-OIL CYLINDER ACTUATOR (P/O)
- DIAPHRAGM, PRESSURE BALANCED
- DIAPHRAGM, SPRING, OR OTHERWISE UNSPECIFIED
- ELECTRIC-HYDRAULIC (E/H)
- FLOAT OPERATED FOR VALVE
- HYDRAULIC CYLINDER ACTUATOR (H)
- INTELLIGENT ELECTRIC ACTUATOR (M)
- LOADING/BACK PRESSURE FOR VALVE
- MANUAL
- QUICK CLOSING FOR VALVE
- QUICK OPENING FOR VALVE
- SOLENOID (S)
- SOLENOID - MANUAL RESET (S / R)
- SOLENOID - REMOTE RESET (S / R)
- SPRING OR WEIGHT FOR RELIEF VALVE OR LOADED FOR SAFETY VALVE
- STANDARD ELECTRIC ACTUATOR (M / SM)
- VANE TYPE PNEUMATIC ACTUATOR (P / V)

MATERIAL HANDLING EQUIPMENT SYMBOLS

- BIN, LIVE BOTTOM
- BIN, SLIDING FRAME
- BIN ACTIVATOR
- BIN/HOPPER, CLOSED TOP
- BIN/HOPPER, OPEN TOP
- CONVEYOR, BELT
- CONVEYOR, SCREW
- CONVEYOR, VIBRATORY
- CYCLONE SEPARATOR
- DUMPSTER
- DUST COLLECTOR
- GRINDER
- HORIZONTAL BAR SCREEN
- INSULATION
- INSULATION, W/ HEAT TRACING
- MIXER, BLENDER
- MIXER, PUGMILL
- PISTON CAKE PUMP, DOUBLE (H)
- PISTON CAKE PUMP, SINGLE (H)
- SCREEN, DOUBLE VIBRATORY
- SCREEN, SINGLE VIBRATORY
- TARGET BOX

GENERAL NOTES

1. IN GENERAL, THE P&ID SYMBOLS AND DEVICE IDENTIFICATIONS ARE BASED ON INTERNATIONAL SOCIETY OF AUTOMATION, STANDARD PRACTICE ANSI/ISA-5.1 (2022). SOME MODIFICATIONS, ADDITIONS, AND ALTERATIONS HAVE BEEN MADE AS NEEDED TO ACCOMMODATE THE PROJECT REQUIREMENTS.
2. SOME CONTROL AND INTERLOCK REQUIREMENTS WHICH CAN BE MORE CLEARLY ILLUSTRATED ON SCHEMATIC DRAWINGS HAVE BEEN OMITTED FROM THE P&ID DRAWINGS.
3. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	VVJ, BLB
DETAILED:	VDM
CHECKED:	JSM, MLM
APPROVED:	BLB
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

INSTRUMENTATION

P&ID - LEGEND AND ABBREVIATIONS I

000-I-001

19 OF 82

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FILE: C:\USERS\CHA080677\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\CLEARWELL\000-I-001.DWG
PD1000
D1000

INSTRUMENT AND I/O ABBREVIATIONS
MEANINGS OF IDENTIFICATION LETTERS

LETTER	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	VARIABLE MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT OR ACTIVE FUNCTION	FUNCTION MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	CLOSE
D	USER'S CHOICE	DIFFERENTIAL			DEVIATION
E	VOLTAGE (EMF)		SENSOR, PRIMARY ELEMENT		
F	FLOW, FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, GAUGE, VIEWING DEVICE		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER		SCAN		
K	TIME OR TIME-SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	USER'S CHOICE	MOMENTARY			MIDDLE OR INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE OR TOTALIZE	INTEGRATE OR TOTALIZE		
R	RADIATION		RECORD		RUN
S	SPEED OR FREQUENCY	SAFETY		SWITCH	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	
V	VIBRATION OR MECHANICAL ANALYSIS			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL, PROBE		
X	UNCLASSIFIED	X-AXIS	ACCESSORY DEVICES OR UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		AUXILIARY DEVICES	
Z	POSITION, DIMENSION	Z-AXIS		DRIVE, ACTUATOR OR FINAL CTRL ELEMENT	

GENERAL NOTES

1. IN GENERAL, THE P&ID SYMBOLS AND DEVICE IDENTIFICATIONS ARE BASED ON INTERNATIONAL SOCIETY OF AUTOMATION, STANDARD PRACTICE ANSI/ISA-5.1 (2022). SOME MODIFICATIONS, ADDITIONS, AND ALTERATIONS HAVE BEEN MADE AS NEEDED TO ACCOMMODATE THE PROJECT REQUIREMENTS.
2. SOME CONTROL AND INTERLOCK REQUIREMENTS WHICH CAN BE MORE CLEARLY ILLUSTRATED ON SCHEMATIC DRAWINGS HAVE BEEN OMITTED FROM P&ID DRAWINGS.
3. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT. PIPING AND EQUIPMENT LEGEND APPLIES TO P&ID SHEETS.

PIPELINE MATERIAL CODE ABBREVIATIONS

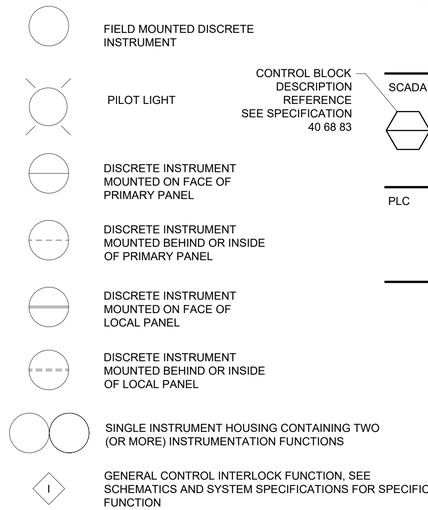
PIPE MATERIAL		SPECIFICATION NO.
BR	BRASS	40 05 41
CBCP	CONCRETE BAR-WRAPPED STEEL CYLINDER PIPE	40 05 39.16
CCFP	CENTRIFUGALLY CAST FIBERGLASS PIPE	40 05 36.11
CCP	CONCRETE CULVERT PIPE	33 42 16
CI	CAST IRON SOIL PIPE	22 13 16
CMP	CORRUGATED METAL PIPE	33 42 14
CPVC	CPVC	40 05 32
CS	MISCELLANEOUS STEEL PIPE	40 05 24.43
CSG	GALVANIZED STEEL PIPE	40 05 24.43
CSP	COMPOSITE SEWER PIPE	40 05 43
CU	COPPER TUBING	40 05 17
DIP	DUCTILE IRON PIPE	40 05 19
FRP	FRP	40 05 32
FRPA	FRP EXHAUST AIR PIPE	40 05 36.11
HDPE	HDPE PRESSURE PIPE	40 05 33.11
HS	HOSE	40 05 41
LHCP	LOW-HEAD CONCRETE PRESSURE	40 05 39.18
LWSP	LIGHT WALL STEEL PIPE	40 05 24.14
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE	40 05 39.14
PE	POLYETHYLENE	40 05 32
PP	POLYPROPYLENE	40 05 32
PVC	PVC	40 05 32
PVCFJ	PVC FUSED JOINT PIPE	40 05 31.13
PVCPP	PVC PRESSURE PIPE	40 05 31.12
PVCSP	PVC SEWER PIPE	40 05 31.16
PVDF	PVDF	40 05 32
RCP	CONCRETE SEWER PIPE	40 05 39.24
RPT	REINFORCED PLASTIC TUBING	40 05 32
SP	STEEL PIPE	40 05 24
SS	STAINLESS STEEL PIPE	40 05 23
TG	TEMPERED GLASS	40 05 41
VCP	VITRIFIED CLAY PIPE	40 05 44

1. ABBREVIATION EXTENSIONS ARE ADDED AS NEEDED TO IDENTIFY THE MATERIAL SUB-CLASSIFICATION IN THE SPECIFICATION, SUCH AS "SS-1" FOR DIGESTER GAS PIPING.

INSTRUMENT AND I/O ABBREVIATION DEFINITIONS

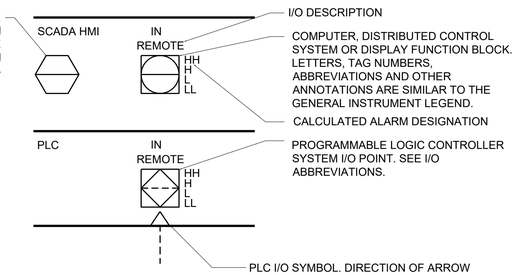
AAH	ANALYZER ALARM HIGH
AAHH	ANALYZER ALARM HIGH-HIGH
AAL	ANALYZER ALARM LOW OR STROBE ALARM LIGHT
AALL	ANALYZER ALARM LOW-LOW
AAX	ALARM HORN
AE	ANALYZER SENSOR
AI	ANALYZER INDICATION
AIT	ANALYZER INDICATING TRANSMITTER
ASH	ANALYZER SWITCH HIGH
ASHH	ANALYZER SWITCH HIGH-HIGH
CB	CONTROL BLOCK REFERENCE (SCADA LEVEL)
FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FC	FLOW CONTROLLER
FE	PRIMARY FLOW ELEMENT/SENSOR
FG	FLOW SIGHT GAUGE
FI	FLOW DIGITAL INDICATOR (LED OR SCREEN)
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FQG	FLOW TOTALIZING GAUGE
FQIT	FLOW TOTALIZING INDICATING TRANSMITTER
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
FY	FLOW SIGNAL CONVERTER, REPEATER, OR ISOLATOR
HIC	HAND INDICATING CONTROLLER
HMS	MOMENTARY PUSHBUTTON OR SELECTOR SWITCH
HS	HAND SWITCH
IAH	CURRENT ALARM HIGH (MOTOR OVERLOAD)
IE	CURRENT ELEMENT/SENSOR
ISH	CURRENT SWITCH HIGH USED TO DETECT HIGH TORQUE
JA	POWER FAILURE ALARM
JI	POWER INDICATOR
JIT	POWER INDICATING TRANSMITTER
JL	POWER INDICATING LIGHT
KQI	TIME TOTALIZING INDICATOR
LAH	LEVEL ALARM HIGH
LAHH	LEVEL ALARM HIGH-HIGH
LAL	LEVEL ALARM LOW
LALL	LEVEL ALARM LOW-LOW
LE	PRIMARY LEVEL ELEMENT/SENSOR
LG	LEVEL SIGHT GAUGE
LI	LEVEL INDICATOR (LED OR SCREEN)
LIT	LEVEL INDICATING TRANSMITTER
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH-HIGH
LSL	LEVEL SWITCH LOW
LSLL	LEVEL SWITCH LOW LOW
LY	LEVEL SIGNAL CONVERTER, ISOLATOR, OR REPEATER
OAH	TORQUE ALARM HIGH
OAHH	TORQUE ALARM HIGH HIGH
OSH	TORQUE SWITCH HIGH
OSHH	TORQUE SWITCH HIGH-HIGH
PAH	PRESSURE ALARM HIGH
PAHH	PRESSURE ALARM HIGH-HIGH
PAL	PRESSURE ALARM LOW
PALL	PRESSURE ALARM LOW-LOW
PDAH	DIFFERENTIAL PRESSURE ALARM HIGH
PDAHH	DIFFERENTIAL PRESSURE ALARM HIGH-HIGH
PDG	DIFFERENTIAL PRESSURE GAUGE
PDI	DIFFERENTIAL PRESSURE INDICATOR (LED OR SCREEN)
PDIT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER
PDSH	DIFFERENTIAL PRESSURE SWITCH HIGH
PDSHH	DIFFERENTIAL PRESSURE SWITCH HIGH-HIGH
PDSL	DIFFERENTIAL PRESSURE SWITCH LOW
PDSLL	DIFFERENTIAL PRESSURE SWITCH LOW-LOW
PE	PRESSURE SENSOR
PG	PRESSURE GAUGE
PI	PRESSURE INDICATOR (LED OR SCREEN)
PIT	PRESSURE INDICATING TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
SC	SPEED CONTROL
SI	SPEED INDICATION (LED OR SCREEN)
SIT	SPEED INDICATING TRANSMITTER
SSL	SPEED SWITCH LOW
TAH	TEMPERATURE ALARM HIGH
TAHH	TEMPERATURE ALARM HIGH-HIGH
TAL	TEMPERATURE ALARM LOW
TDI	DIFFERENTIAL TEMPERATURE INDICATOR (LED OR SCREEN)
TDIT	DIFFERENTIAL TEMPERATURE TRANSMITTER
TE	TEMPERATURE SENSOR/RESISTANCE TEMPERATURE DETECTOR
TG	TEMPERATURE GAUGE
TI	TEMPERATURE INDICATOR (LED OR SCREEN)
TIT	TEMPERATURE INDICATING TRANSMITTER
TSH	TEMPERATURE SWITCH HIGH
TSHH	TEMPERATURE SWITCH HIGH HIGH
TSL	TEMPERATURE SWITCH LOW
UA	MULTIVARIABLE/COMMON ALARM/COMMON FAULT
UCR	RUN COMMAND
UCS	STOP COMMAND
VAH	VIBRATION ALARM HIGH
WE	PRIMARY WEIGHT SENSOR/LOAD CELL
WG	WEIGHT GAUGE
WIT	WEIGHT INDICATING TRANSMITTER
YA	GENERAL ALARM EVENT
YI	EVENT INDICATION (LED OR SCREEN)
YIR	RUNNING INDICATION
YIS	STOPPED INDICATION
YL	EVENT INDICATING LIGHT
YLR	RUNNING INDICATING LIGHT
YLS	STOPPED INDICATING LIGHT
ZCC	CLOSE COMMAND
ZCO	OPEN COMMAND
ZI	POSITION INDICATOR
ZIC	CLOSED INDICATION
ZIO	OPEN INDICATION
ZIT	POSITION INDICATING TRANSMITTER
ZLC	CLOSED INDICATING LIGHT
ZLO	OPEN INDICATING LIGHT
ZSC	CLOSED POSITION SWITCH
ZSO	OPEN POSITION SWITCH
ZT	POSITION TRANSMITTER

GENERAL INSTRUMENT SYMBOLS



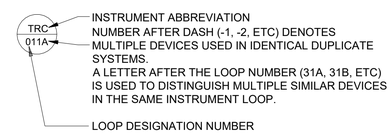
DIGITAL SYSTEMS INTERFACE SYMBOLS

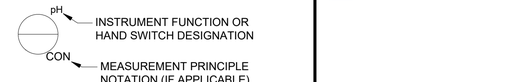
NOTE: REFER TO DETAILED SYSTEM SPECIFICATIONS FOR FUNCTIONAL DESCRIPTION. ALSO SEE I/O SCHEDULES FOR COMPLETE INPUT AND OUTPUT LISTINGS.



- DISCRETE INPUT
- DISCRETE OUTPUT
- ANALOG INPUT
- ANALOG OUTPUT
- PULSE INPUT

INSTRUMENTATION SYMBOLOGY AND DESIGNATIONS





FUNCTION DESIGNATIONS AND ABBREVIATIONS

MEASUREMENT PRINCIPLE NOTATIONS

CON	CONDUCTANCE
DP	DIFFERENTIAL PRESSURE SENSING
FLN	FLOW NOZZLE
FLT	FLOW TUBE
GWR	GUIDED WAVE RADAR
RAD	RADAR
US	ULTRASONIC
VENT	VENTURI TUBE

CALCULATED ALARM DESIGNATIONS

H	HIGH
HH	HIGH-HIGH
L	LOW
LL	LOW-LOW

INDICATING LIGHT/ALARM DESIGNATIONS

OVRLD	OVERLOAD
TRQ HI	TORQUE HIGH
TRQ HI-HI	TORQUE HIGH HIGH

INSTRUMENT FUNCTIONS

Δ	SUBTRACT (DIFFERENCE)
Σ	ADD OR SUM (ADD AND SUBTRACT)
√‾	EXTRACT SQUARE ROOT
÷	DIVIDE
>	HIGH-SELECT
<	LOW-SELECT
×	MULTIPLY
∫	INTEGRATE (TIME INTEGRAL)
CH4	METHANE
CL2	CHLORINE RESIDUAL
CO2	CARBON DIOXIDE
COND	CONDUCTIVITY
DO	DISSOLVED OXYGEN
DWPT	DEWPOINT
F(X)	CHARACTERIZE SIGNAL
H2S	HYDROGEN SULFIDE
K	GAIN OR ATTENUATE (INPUT:OUTPUT)
-K	GAIN AND REVERSE
LEL	LOWER EXPLOSIVE LIMIT
MCC	MOTOR CONTROL CENTER
MLSS	MIXED LIQUOR SUSPENDED SOLIDS
NH4	AMMONIUM
O2	OXYGEN (PURITY)
O3	OZONE
pH	pH
TSS	TOTAL SUSPENDED SOLIDS

HAND SWITCH DESIGNATIONS

FR	FORWARD-REVERSE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
LOA	LOCAL-OFF-AUTO
LOR	LOCAL-OFF-REMOTE
LR	LOCAL REMOTE
OC	OPEN-CLOSE
OCA	OPEN-CLOSE-AUTO
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OSC	OPEN-STOP-CLOSE

TRANSDUCER & CONVERTER DESIGNATION

E	VOLTAGE
FSK	FREQUENCY SHIF KEYING
H	HYDRAULIC
I	CURRENT
P	PNEUMATIC PULSE
PD	PULSE DURATION
PF	PULSE FREQUENCY
R	RESISTANCE (ELECTRICAL)

EXAMPLE: I/P = CURRENT TO PNEUMATIC TRANSDUCER

POWER SUPPLY ABBREVIATIONS

120V POWER SUPPLY SOURCE LABEL. USED ONLY WHERE NECESSARY TO HELP CLARIFY AN INSTRUMENT OR SYSTEM FUNCTION.

120V	120VAC
AS	AIR SUPPLY
ES	ELECTRIC SUPPLY
GS	GAS SUPPLY
HS	HYDRAULIC SUPPLY
NS	NITROGEN SUPPLY
SS	STEAM SUPPLY
WS	WATER SUPPLY

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	VVJ, BLB
DETAILED:	VDM
CHECKED:	JSM, MLM
APPROVED:	BLB
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

INSTRUMENTATION

P&ID - LEGEND AND ABBREVIATIONS II

000-I-002

20 OF 82

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FDT1000
D1000

SYSTEM CODE ABBREVIATIONS

ACE	ACETIC ACID
ACT	ACETYLENE
AER	AERATION SYSTEM
AIR	AIR, AERATION OR PROCESS
ALS	ALUMINUM SULFATE
ARG	ARGON
ARW	AIR WASH
AS	ANTI-SEALANT
ASH	ASH
BAL	BALLASTED FLOCCULATION
BIO	BIOSOLIDS
BIT	BIOTOWER
BLS	BLENDED SLUDGE
BNR	BNR
BRN	BRINE
BWH	BACKWASH FOR MEMBRANE OR FILTER
CA	CITRIC ACID
CACL	CALCIUM HYPOCHLORITE
CAH	LIME, HYDRATED
CAI	COMPRESSED AIR, INSTRUMENT
CAO	LIME, QUICKLIME
CAS	CARBON SLURRY
CATS	CALCIUM THIOSULFATE
CDW	CONDENSATE WATER
CEB	CHEMICAL ENHANCED BACKWASH FOR MEMBRANE
CEN	CENTRATE
CI	CORROSION INHIBITOR
CIP	CLEAN IN PLACE
CL2	CHLORINE
CLO2	CHLORINE DIOXIDE
CMS	COMPRESSED AIR, SERVICE
CO2	CARBON DIOXIDE
COA	COAGULATION
COLW	COOLING WATER
CUS	COPPER SULFATE
DAF	DISSOLVED AIR FLOTATION
DCB	DISINFECTION CONTACT BASIN
DCL	DECHLORINATION
DEIW	DEIONIZED WATER
DET	DETERGENT
DGA	DIGESTION, AEROBIC
DGM	DIGESTER GAS MIXING
DGG	DIGESTER GAS
DGS	DIGESTER SLUDGE
DIG	DIGESTION, ANAEROBIC
DRN	DRAINAGE
DW	DISTILLED WATER
DWT	DEWATERING
EFP	EFFLUENT PUMPING
EQB	EQUALIZATION BASIN
EXH	ENGINE EXHAUST
FE	FILTER EFFLUENT
FEC	FERRIC CHLORIDE
FES	FERRIC SULFATE
FLC	FLOCCULATION
FLT	FILTRATION
FO	FUEL OIL
FRC	FERROUS CHLORIDE
FRS	FERROUS SULFATE
FUE	DIESEL FUEL
FW	FIRE WATER
GAC	GRANULAR ACTIVATED CARBON
GOX	GASEOUS OXYGEN
GRS	GREASE
GRT	GRIT
GSL	GASOLINE
GWD	GROUNDWATER DRAINAGE
HCL	HYDROCHLORIC ACID
HCO3	CARBONIC ACID
HEL	HELIUM
HFL	HYDRAULIC FLUID
HFS	HYDROFLUOSILICIC ACID (FLUORIDE)
HSO4	SULFURIC ACID
HW	HOT OR HEATING WATER
HYD	HYDROGEN
IMLR	INTERNAL MIXED LIQUOR RECYCLE
INC	INCINERATION
INFP	INFLUENT PUMPING
INT	INTAKE
IRW	IRRIGATION WATER
KMN	POTASSIUM PERMANGANATE
LAG	LAGOON STORAGE
LAP	LAND APPLICATION
LIM	LIME, STABILIZATION
LOX	LIQUID OXYGEN
LPG	LP GAS OR PROPANE GAS
MEG	METHANE GAS
MEM	MEMBRANE
MGOH	MAGNESIUM HYDROXIDE
MTH	METHANOL
ML	MIXED LIQUOR
NAC	SODA ASH
NAF	SODIUM FLUORIDE
NAL	SODIUM ALUMINATE
NAOH	SODIUM HYDROXIDE
NAM	SODIUM ALUMINATE
NASF	SODIUM SILICOFLUORIDE
NAX	SODIUM HEXAMETAPHOSPHATE
NBC	SODIUM BICARBONATE
NCL	SODIUM CHLORIDE
NCL2	SODIUM CHLORITE
NG	NATURAL GAS
NH3	ANHYDROUS AMMONIA
NHOH	AQUA AMMONIA
NHS	SODIUM BISULFITE
NIO	NITROUS OXIDE
NIT	NITROGEN
NOCL	SODIUM HYPOCHLORITE
NPW	NON-POTABLE WATER
NSO4	AMMONIUM SULFATE
ODC	ODOR CONTROL
OIL	OIL
OZD	OZONE DESTRUCT
OZN	OZONE
OZW	OZONATED WATER
PAC	POWDERED ACTIVATE CARBON
PACL	POLYALUMINUM CHLORIDE
PAR	PRE-AERATION
PE	PRIMARY EFFLUENT
PER	HYDROGEN PEROXIDE
PEW	PLANT EFFLUENT WATER
PO4	PHOSPHORIC ACID
POLY	POLYMER
PPP	PHOSPHATE
PRC	PRIMARY CLARIFICATION
PRS	PRIMARY SLUDGE
PSC	PRIMARY SCUM
PSD	PRESEDIMENTATION
PW	POTABLE WATER
RAS	RETURN ACTIVATED SLUDGE
RCS	RECIRCULATED SLUDGE
RCW	RECLAIMED WATER
REF	REFRIGERANT
RES	RESIDUALS
ROS	REVERSE OSMOSIS
RW	RAW WATER
RWP	RAW WATER PUMPING
RWS	RAW WATER STORAGE
SCL	SECONDARY CLARIFICATION
SCR	SCREENINGS
SEP	SEPTAGE
SET	SETTLED WATER
SEW	SEWAGE
SO2	SULFUR DIOXIDE
SSC	SECONDARY SCUM
STM	STEAM
STS	STORM SEWER
STW	STORM WATER
SW	SURFACE WASH
SWT	SEAL WATER
TERT	TERTIARY TREATMENT
TF	TRICKLING FILTER
THCK	THICKENING
TPRS	THICKENED PRIMARY SLUDGE
TW	TREATED WATER
TWAS	THICKENED WASTE ACTIVATED SLUDGE
UV	ULTRAVIOLET
VAC	VACUUM
WAS	WASTE ACTIVATED SLUDGE
WW	WASH WATER
WWP	RAW WASTEWATER PUMPING
WWT	WET WEATHER TREATMENT
WWW	WASTE WASH WATER
ZOP	ZINC ORTHOPHOSPHATE

PROCESS CODE ABBREVIATIONS

ACE_X	ACETIC ACID
ACT_X	ACETYLENE
AER_X	AERATION SYSTEM
AIR_X	AIR, AERATION OR PROCESS
ALS_X	ALUMINUM SULFATE
ARG_X	ARGON
ARW_X	AIR WASH
AS_X	ANTI-SEALANT
ASH_X	ASH
BAL_X	BALLASTED FLOCCULATION
BIO_X	BIOTOWER
BIT_X	BLENDED SLUDGE
BLS_X	BNR
BNR_X	BIOSOLIDS
BRN_X	BRINE
BWH_X	BACKWASH FOR MEMBRANE OR FILTER
CA_X	CITRIC ACID
CACL_X	CALCIUM HYPOCHLORITE
CAH_X	LIME, HYDRATED
CAI_X	COMPRESSED AIR, INSTRUMENT
CAO_X	LIME, QUICKLIME
CAS_X	CARBON SLURRY
CATS_X	CALCIUM THIOSULFATE
CDW_X	CONDENSATE WATER
CEB_X	CHEMICAL ENHANCED BACKWASH FOR MEMBRANE
CEN_X	CENTRATE
CI_X	CORROSION INHIBITOR
CIP_X	CLEAN IN PLACE
CL2_X	CHLORINE
CLO2_X	CHLORINE DIOXIDE
CMS_X	COMPRESSED AIR, SERVICE
COA_X	COAGULATION
CO2_X	CARBON DIOXIDE
COLW_X	COOLING WATER
CUS_X	COPPER SULFATE
DAF_X	DISSOLVED AIR FLOTATION
DCB_X	DISINFECTION CONTACT BASIN
DCL_X	DECHLORINATION
DEIW_X	DEIONIZED WATER
DET_X	DETERGENT
DGA_X	DIGESTION, AEROBIC
DGG_X	DIGESTER GAS
DGM_X	DIGESTER GAS MIXING
DGS_X	DIGESTER SLUDGE
DIG_X	DIGESTION, ANAEROBIC
DRN_X	DRAINAGE
DW_X	DISTILLED WATER
DWT_X	DEWATERING
EFP_X	EFFLUENT PUMPING
EQB_X	EQUALIZATION BASIN
EXH_X	ENGINE EXHAUST
FE_X	FILTER EFFLUENT
FEC_X	FERRIC CHLORIDE
FES_X	FERRIC SULFATE
FLC_X	FLOCCULATION
FLT_X	FILTRATION
FO_X	FUEL OIL
FRC_X	FERROUS CHLORIDE
FRS_X	FERROUS SULFATE
FUE_X	DIESEL FUEL
FW_X	FIRE WATER
FWE_X	FINISHED WATER EFFLUENT
GAC_X	GRANULAR ACTIVATED CARBON
GOX_X	GASEOUS OXYGEN
GRS_X	GREASE
GRT_X	GRIT
GSL_X	GASOLINE
GWD_X	GROUNDWATER DRAINAGE
HCL_X	HYDROCHLORIC ACID
HCO3_X	CARBONIC ACID
HEL_X	HELIUM
HFL_X	HYDRAULIC FLUID
HFS_X	HYDROFLUOSILICIC ACID (FLUORIDE)
HSO4_X	SULFURIC ACID
HW_X	HOT OR HEATING WATER
HYD_X	HYDROGEN
IMLR_X	INTERNAL MIXED LIQUOR RECYCLE
INC_X	INCINERATION
INFP_X	INFLUENT PUMPING
INT_X	INTAKE
IRW_X	IRRIGATION WATER
KMN_X	POTASSIUM PERMANGANATE
LAG_X	LAGOON STORAGE
LAP_X	LAND APPLICATION
LIM_X	LIME STABILIZATION
LOX_X	LIQUID OXYGEN
LPG_X	LP GAS OR PROPANE GAS
MEG_X	METHANE GAS
MEM_X	MEMBRANE
MGOH_X	MAGNESIUM HYDROXIDE
ML_X	MIXED LIQUOR
MTH_X	METHANOL
NAC_X	SODA ASH
NAF_X	SODIUM FLUORIDE
NAL_X	SODIUM ALUMINATE
NAM_X	SODIUM ALUMINATE
NAOH_X	SODIUM HYDROXIDE
NASF_X	SODIUM SILICOFLUORIDE
NAX_X	SODIUM HEXAMETAPHOSPHATE
NBC_X	SODIUM BICARBONATE
NCL_X	SODIUM CHLORIDE
NCL2_X	SODIUM CHLORITE
NG_X	NATURAL GAS
NH3_X	ANHYDROUS AMMONIA
NHOH_X	AQUA AMMONIA
NHS_X	SODIUM BISULFITE
NIO_X	NITROUS OXIDE
NIT_X	NITROGEN
NOCL_X	SODIUM HYPOCHLORITE
NPW_X	NON-POTABLE WATER
NSO4_X	AMMONIUM SULFATE
ODC_X	ODOR CONTROL
OIL_X	OIL
OZD_X	OZONE DESTRUCT
OZN_X	OZONE
OZW_X	OZONATED WATER
PAC_X	POWDERED ACTIVATE CARBON
PACL_X	POLYALUMINUM CHLORIDE
PAR_X	PRE-AERATION
PE_X	PRIMARY EFFLUENT
PER_X	HYDROGEN PEROXIDE
PEW_X	PLANT EFFLUENT WATER
PO4_X	PHOSPHORIC ACID
POLY_X	POLYMER
PPP_X	PHOSPHATE
PRC_X	PRIMARY CLARIFICATION
PRS_X	PRIMARY SLUDGE
PSC_X	PRIMARY SCUM
PSD_X	PRESEDIMENTATION
PW_X	POTABLE WATER
RAS_X	RETURN ACTIVATED SLUDGE
RCS_X	RECIRCULATED SLUDGE
RCW_X	RECLAIMED WATER
REF_X	REFRIGERANT
RES_X	RESIDUALS
ROS_X	REVERSE OSMOSIS
RW_X	RAW WATER
RWP_X	RAW WATER PUMPING
RWS_X	RAW WATER STORAGE
SCL_X	SECONDARY CLARIFICATION
SCR_X	SCREENINGS
SEP_X	SEPTAGE
SET_X	SETTLED WATER
SEW_X	SEWAGE
SO2_X	SULFUR DIOXIDE
SSC_X	SECONDARY SCUM
STM_X	STEAM
STS_X	STORM SEWER
STW_X	STORM WATER
SW_X	SURFACE WASH
SWT_X	SEAL WATER
TERT_X	TERTIARY TREATMENT
TF_X	TRICKLING FILTER
THCK_X	THICKENING
TPRS_X	THICKENED PRIMARY SLUDGE
TW_X	TREATED WATER
TWAS_X	THICKENED WASTE ACTIVATED SLUDGE
UV_X	ULTRAVIOLET
VAC_X	VACUUM
WAS_X	WASTE ACTIVATED SLUDGE
WW_X	WASH WATER
WWP_X	RAW WASTEWATER PUMPING
WWT_X	WET WEATHER TREATMENT
WWW_X	WASTE WASH WATER
ZOP_X	ZINC ORTHOPHOSPHATE

X = PROCESS CODE SUFFIX USED TO FURTHER SPECIFY A PROCESS STREAM (I.E. CL2_G FOR CHLORINE GAS OR CL2_S FOR CHLORINE SOLUTION)

FUNCTION CODE ABBREVIATIONS

AB	AERATION BLOWER
AC	AIR COMPRESSOR, ANALYZER CLEANING SYSTEM
ACD	AERATOR, COARSE BUBBLE DIFFUSED
ACMB	ACTIVATION CHAMBER
AD	AIR DRYER
AEFD	AERATOR, FINE PORE DIFFUSED
AES	AERATOR, SURFACE
AF	AIR FILTER
AFC	AFTERCOOLER
AFD	ADJUSTABLE FREQUENCY DRIVE
AFS	AERATOR, FLOATING SURFACE
AR	AIR RECEIVER OR REGULATOR
AS	AIR SEPARATOR
AST	AIR STRIPPER
B	BIN (STORAGE - ALL TYPES)
BA	BIN ACTIVATOR
BDZ	BULLDOZER
BFP	BACKFLOW PREVENTER
BFPS	BELT FILTER PRESS
BFV	VALVE, BUTTERFLY
BFVI	VALVE, INDUSTRIAL BUTTERFLY
BL	BLOWER, POSITIVE DISPLACEMENT
BLR	BOILER
BLV	VALVE, BALL MISCELLANEOUS
BLW	BLOWER, CENTRIFUGAL
BNR	BASIN, BNR
BSNA	BASIN, AERATION
BSNC	BASIN, CHLORINE CONTACT
BSNO	BASIN, OXIC
BSNS	BASIN, SEDIMENTATION
BSNX	BASIN, ANOXIC/OXIC
CAB	COVER, ALUMINUM DOME BASIN
CCLM	CALIBRATION COLUMN
CDG	COVER, GAS HOLDER
CFD	COVER, FIXED DIGESTER
CFG	CENTRIFUGE
CFL	COVER, FLOATING DIGESTER
CGR	CLASSIFIER, GRIT
CGS	CHLORINE GAS SCRUBBER
CHF	CHEMICAL FEEDER
CMB	COVER, MEMBRANE
CML	COMPRESSOR, LIQUID RING
CMP	COMPRESSOR
CMPS	COMPRESSOR, STEAM
CMR	COMPRESSOR, ROTARY SCREW
COB	CONVEYOR, BELT
COS	CONVEYOR, SCREW
CRG	CRANE, GANTRY
CRJ	CRANE, JIB
CRN	CRANE
CRP	CRANE, PORTABLE GANTRY
CRT	CRANE, TRAVELING BRIDGE
CTR	CONTAINER, PROCESS
CUSP	CONTROL UNIT, SAMPLE PREP
CV	VALVE, CHECK
CW	CLEARWELL
CYG	CYLINDER, GAS
CYLC	CYLINDER, CHLORINE
DAF	DISSOLVED AIR FLOTATION THICKENER
DCTS	DUCT, SCREENED
DFB	DIFFUSER BANK
DFP	DIFFUSER, PIPELINE
DFT	DIFFUSER, TANK
DGAP	DIGESTER, ANAEROBIC PRIMARY
DGAS	DIGESTER, ANAEROBIC SECONDARY
DGE	DIGESTER, AEROBIC
DIF	DIFFUSER, CHANNEL
DPS	DIAPHRAGM SEAL
DSUV	DISINFECTION UNIT, UV
DUC	DUST COLLECTOR
DWS	DEWATERING SCREW
EDC	EDUCTOR
EEWF	EMERGENCY EYE WASH FOUNTAIN
EQPB	EQUIPMENT, BUILDING SERVICES
EQPE	ELECTRICAL EQUIPMENT, GENERAL
EQPG	EQUIPMENT, GENERAL OR UNSPECIFIED
ESEW	EMERGENCY SHOWER AND EYEWASH
ESHR	EMERGENCY SHOWER
EXC	EXPANSION CHAMBER
EV	EVAPORATOR
FAN	FAN, CENTRIFUGAL
FAR	FLAME ARRESTER
FAX	FAN, AXIAL FLOW
FC	FLAME CHECK
FD	FLOOR DRAIN
FGP	FILTER, GAS PARTICULATE
FL	FORKLIFT
FLC	FILTER, CARTRIDGE TYPE
FLCH	FLOCCULATOR, HORIZONTAL
FLCV	FLOCCULATOR, VERTICAL
FLG	FLARE, GAS
FLM	FLUME, PARSHALL
FLT	FILTER, UNDERDRAINS OR PRESSURE
FLXC	FLEXIBLE CONNECTOR
FMSP	FOAM SEPARATOR
FS	FLOW SPLITTER
FST	FENCE STIRRER
FSW	FILTER, SURFACE WASH EQUIPMENT
FTNG	FITTING, MISCELLANEOUS
FTSL	FILTER/SILENCER
GBT	GRAVITY BELT THICKENER
GEN	GENERATOR, ENGINE (BACKUP POWER)
GFD	GAS FEEDER
GFL	GATE, FLAP
GRB	GRIT BASIN, VORTEX TYPE
GRC	GRIT SCREW CONCENTRATOR
GRD	GRINDER PULVERIZER
GRI	GRINDER, INLINE SEWAGE
GSD	GATE, SLIDE
GSL	GATE, SLUICE
GVT	GRAVITY THICKENER
GWH	GAS WATER HEATER
GWR	GATE, WEIR
HEX	HEAT EXCHANGER
HSC	HOIST, CHAIN
HST	HOIST
HSW	HOIST, WIRE ROPE
HYC	HYDROCYCLONE
HYDF	HYDRANT, FIRE
HYDW	HYDRANT, WALL
IMX	MIXER, VERTICAL
INJ	INJECTOR, CHEMICAL
LS	LIME SLAKER
M	MOTOR
MBMF	MEMBRANE, MICROFILTRATION
MBNF	MEMBRANE, NANOFILTRATION
MBR	MEMBRANE
MBRO	MEMBRANE, REVERSE OSMOSIS
MBUF	MEMBRANE, ULTRAFILTRATION
MCSP	MODULE CARRIER, SAMPLE PREP
MFL	MIXER, FLOCCULATION
MH	MANHOLE
MXC	MIXER, CARBON
MXI	MIXER, IN-LINE
MXP	MIXER, SUBMERSIBLE, PROP OR BLENDER
MXPG	MIXER, PUGMILL
MXR	MIXER, RAPID
MXS	MIXER, STATIC
ODU	OZONE DESTRUCT UNIT
OGEN	OZONE GENERATOR
OPSU	OZONE POWER SUPPLY UNIT
ORD	OVERFLOW ROOF DRAIN
P	PUMP, POSITIVE DISPLACEMENT, ROTARY, DRUM OR BELL MOUNTED
PAD	PUMP, AIR DIAPHRAGM
PBC	PRESSURE BUILDING COIL
PCL	PUMP, CENTRIFUGAL
PCLR	PRIMARY CLARIFIER
PCN	PARTICLE COUNTER
PD	PULSATION DAMPENER
PDM	PUMP, DIAPHRAGM METERING
PHE	PUMP, HORIZONTAL END SUCTION
PHW	PUMP, HOT OR HEATING WATER
PINJ	POLYMER INJECTOR RING
PIPE	PIPE
PLT	PELLETIZER
PNS	PENSTOCK
PP	PACKAGED PLANT
PPC	PUMP, PROGRESSING CAVITY
PPL	PUMP, PLUNGER
PPS	PUMP, PERISTALTIC
PRV	VALVE, PRESSURE RELIEF
PSC	PUMP, HORIZONTAL SPLIT CASE
PSCH	PUMP, SUBMERSIBLE CHOPPER
PSE	PUMP, SCREW ENCLOSED
PSO	PUMP, SCREW OPEN
PSP	PUMP, SUMP
PSS	PUMP, SUBMERSIBLE SUMP
PST	PLATE SETTLER
PV	VALVE, ECCENTRIC PLUG
PV	VALVE, NON-ECCENTRIC PLUG
PVD	PUMP, VERTICAL DIFFUSION VANE
PVE	PUMP, VERTICAL END SUCTION
PVW	PUMP, VERTICAL WET PIT
RCO	RESIDUAL COLLECTOR
RD	RUPTURE DISK
RM	ROTAMETER
RSV	RESERVOIR
SAMP	SAMPLER
SBL	SOLIDS BLENDER, INLINE
SC	SCALE, WEIGHT
SCB	SCRUBBER
SCC	SLUDGE COLLECTOR, CIRCULAR
SCFC	SLUDGE COLLECTOR, FLOC-CLARIFYING
SCL	SCALE
SCLC	SLUDGE COLLECTOR, CROSS
SCLR	SECONDARY CLARIFIER
SCRB	SCREEN, MANUAL OR MECH CLEANED BAR
SCRH	SCREEN, HORIZONTAL
SCRI	SCREEN, INLINE SLUDGE
SCRS	SCREEN, STEP
SCRT	SCREEN, TRAVELING WATER
SCRV	SCREEN, VIBRATORY
SCSC	SLUDGE COLLECTOR, SOLIDS CONTACT
SCSE	SLUDGE COLLECTOR, SEC CLARIFIERS
SCSL	SLUDGE COLLECTOR, STRAIGHT LINE
SCW	SCUM WEIR, ROTATING
SEP	SEPARATOR, MOISTURE OR CYCLONE
SG	SIGHT GAUGE
SGR	SLUDGE GRINDER, INLINE OR CHANNEL
SGT	SIGHT GLASS, TALL
SIL	SILENCER
SILC	SILENCER, CONE-TYPE
SMC	SCUM COLLECTOR
SPMP	PUMP, SUBMERSIBLE
SRCH	SURGE CHAMBER
STR	STRAINER
STRB	STRAINER, BASKET TYPE
STRY	STRAINER, Y TYPE
TB	TURBINE
TBC	TURBINE COMPRESSOR
TBE	TURBINE ENGINE
TCC	TANK, CHLORINE CONTACTOR
TCN	TANK, AMMONIA STORAGE
TCP	TANK, METHANOL
TCR	TANK, CRYOGENIC STORAGE
TDW	TANK, DOUBLE WALL
TNK	TANK, GENERAL OR UNSPECIFIED
TNKC	TANK, FRP CHEMICAL STORAGE
TRK	TRUCK
TRP	TRAP, DRIP
TRPS	TRAP, SEDIMENT
TSA	TANK, STORAGE, ABOVE GROUND
TSE	TANK, ELEVATED STORAGE
TSMP	TANK, SAMPLER
TSW	TANK, STEEL WATER
TX	TANK, EXPANSION
UPS	UNINTERRUPTIBLE POWER SUPPLY
UVR	UV REACTOR
V	VALVE, GENERAL OR UNSPECIFIED
VACT	VALVE ACTUATOR
VAG	VALVE, ANGLE
VAP	VAPORIZER
VAR	VALVE, AIR RELEASE
VAVB	VALVE, AIR VACUUM BREAK
VBA	VALVE, AWWA BALL
VBF	VALVE, AWWA BUTTERFLY
VBFP	VALVE, BACKFLOW PREVENTER
VCAV	VALVE, COMBINATION AIR RELEASE AND VACUUM BREAK
VCN	VALVE, CONE
VD	VAVLE, DIVERTER
VDG	VALVE, DIAPHRAGM OPERATED
VER	VALVE, EXPLOSION RELIEF
VFD	VARIABLE FREQUENCY DRIVE
VFG	VALVE, FLAP GATE
VFW	VALVE, FOUR WAY
VG	VALVE, GATE
VGD	VALVE, DOUBLE DISC GATE
VGL	VALVE, GLOBE
VGR	VALVE, RESILIENT SEATED GATE
VKG	VALVE, KNIFE GATE
VMD	VALVE, MUD
VMR	VALVE, MATERIAL HANDLING ROTARY
VND	VALVE, NEEDLE
VNTS	VENT, SCREENED
VP	VALVE, PROCESS
VPN	VALVE, PINCH
VPO	VALVE, PISTON OPERATED
VPRD	VALVE, PRESSURE REDUCING
VPS	VALVE, PRESSURE SUSTAINING
VPT	VALVE, PILOT
VPVR	VALVE, PRESSURE/VACUUM RELIEF
VRG	VACUUM REGULATOR
VS	VALVE, SAFETY
VSL	VALVE, SOLENOID
VSLB	VESSEL, BOOT
VSLV	VALVE, SLEEVE
VTLS	VALVE, TELESCOPING
VTS	VALVE, THERMAL SHUTOFF
VTW	VALVE, THREE WAY
VVB	VALVE, VACUUM BREAKER
VVP	VALVE, V-PORT BALL
VVR	VALVE, VACUUM RELIEF
WC	WEIR, CIPOLLETTI
WLHC	WELL, HORIZONTAL COLLECTOR
WLV	WELL, VERTICAL
WR	WEIR, RECTANGULAR
WV	WEIR, V-NOTCH

AREA CODE ABBREVIATIONS

45	16 MG CLEARWELL

Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	VVJ, BLB
DETAILED:	VDM
CHECKED:	JSM, MLM
APPROVED:	BLB
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

INSTRUMENTATION

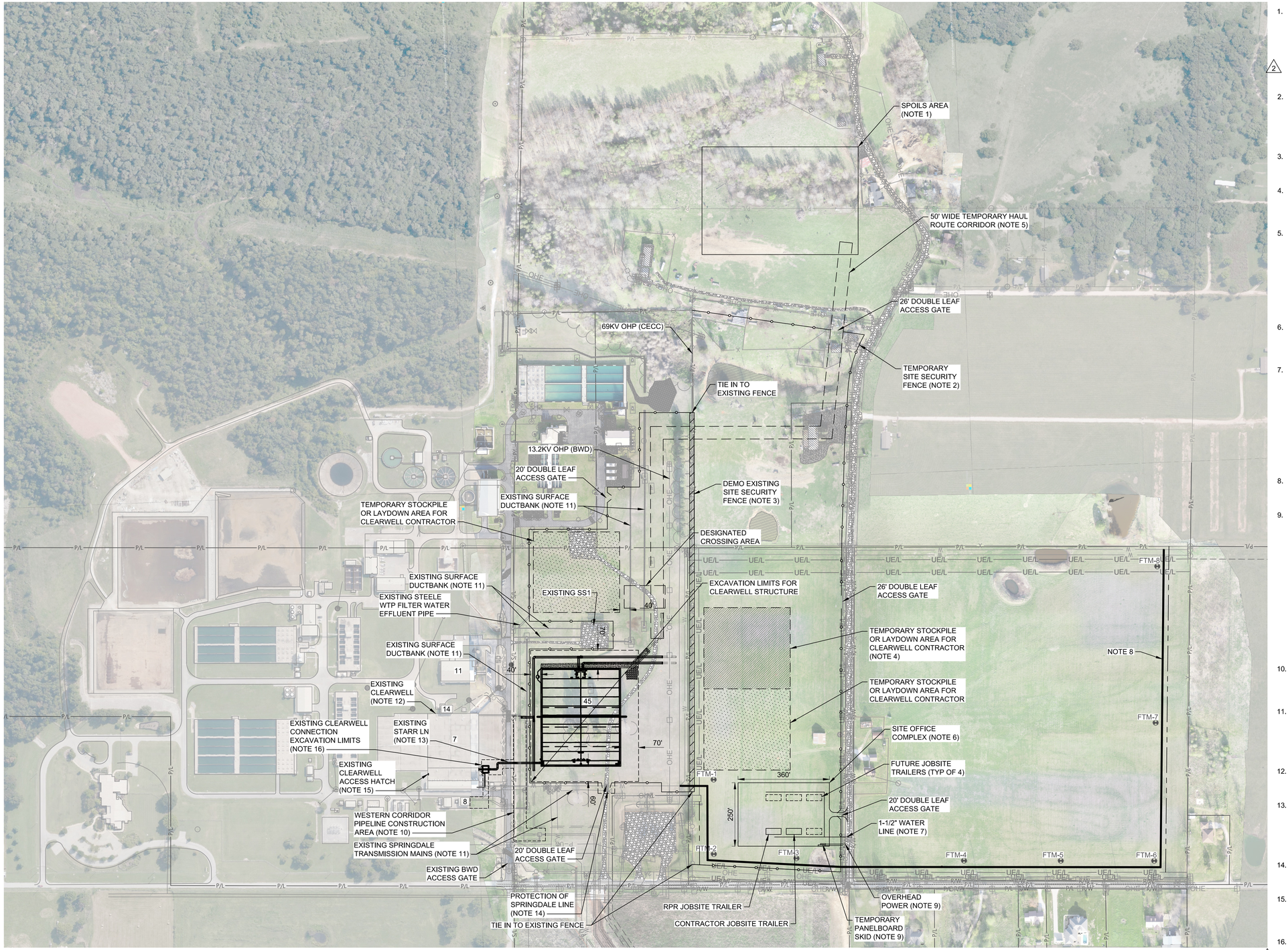
P&ID - LEGEND AND ABBREVIATIONS III

000-I-003

21 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FILE: C:\USERS\CHA086877\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\CLEARWELL\000-I-003.DWG
ET11000
D11000



NUMBER	FACILITY	AREA INDEX NAME
7	EXISTING	CLEARWELLS 1 - 3 AND TREATED WATER PUMP STATION
8	EXISTING	TREATED WATER PUMP STATION ELECTRICAL BUILDINGS/METER VAULTS
11	EXISTING	TECHNICAL SERVICE BUILDING/LABORATORY
14	EXISTING	FLUORIDE BUILDING
45	NEW	**16 MG CLEARWELL (CLEARWELLS 4-5), TREATED WATER INTERCONNECT FLOW METER VAULT (CONTRACT 23-3) & 16 MG CLEARWELL GROUNDWATER DRAINAGE MANHOLE**

NOTES:

1. CONTRACTOR SHALL CLEAR TREES FROM SPOILS AREA AND STRIP TOPSOIL PRIOR TO DEPOSITING SPOILS FROM THE CLEARWELL EXCAVATION. SPOILS SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION AND SHALL BE GRADED TO DRAIN NORTH. AT THE COMPLETION OF SPOILS DEPOSITION WITHIN THIS AREA, ALL SLOPES SHALL BE GRADED NO STEEPER THAN 4:1. △2
2. CONTRACTOR SHALL PROVIDE TEMPORARY SITE SECURITY FENCE WHICH WILL BECOME PROPERTY OF THE OWNER AT PROJECT COMPLETION AND SHALL NOT BE REMOVED. FENCE SHALL BE 8'-0" HIGH CHAINLINK WITH DRIVEN POSTS SPACED AT 8' MAXIMUM.
3. CONTRACTOR SHALL INSTALL THE TEMPORARY SITE SECURITY FENCE PRIOR TO DEMOLITION OF THE EXISTING SECURITY FENCE.
4. TEMPORARY STOCKPILE OR LAYDOWN AREA ONLY AVAILABLE FOR USE UNTIL DECEMBER 31, 2025, AND SHALL BE RETURNED TO ORIGINAL OR IMPROVED CONDITION.
5. TEMPORARY HAUL ROUTE FROM CLEARWELL TO SPOILS AREA ONLY AVAILABLE FOR USE UNTIL DECEMBER 31, 2025. ALL SPOILS HAULING TO THE SPOILS SITE SHALL FOLLOW THIS CORRIDOR. CONTRACTOR SHALL PROVIDE PROTECTION FOR BURIED PIPELINES AND DUCTBANKS INCLUDING CRANEMATS, TIMBERS, OR OTHER SUITABLE MEANS. CONTRACTOR SHALL PROVIDE WARNING SIGNAGE ON BOTH SIDES OF THE OVERHEAD POWER LINES.
6. CONTRACTOR SHALL DEVELOP THE SITE OFFICE COMPLEX. STRIP TOP 6" OF EARTH, COMPACT SUBGRADE, INSTALL TYPE A FILTER FABRIC, AND INSTALL 8" THICK LAYER OF 2" CRUSHED ROCK.
7. CONTRACTOR SHALL COORDINATE WITH SPRINGDALE WATER UTILITIES FOR 1-1/2" WATER CONNECTION AND METER. CONTRACTOR SHALL EXTEND 1-1/2" SCH 40 PVC LINE FROM CONNECTION TO SWU MAIN TO THE LOCATION OF THE RESIDENT PROJECT REPRESENTATIVE TRAILER, CONTRACTORS JOB SITE TRAILER, AND PROVIDE FOUR STUB UPS FOR FUTURE CONTRACTOR CONNECTIONS. MATERIALS AND METHODS OF CONSTRUCTION FOR THE WATER LINE SHALL CONFORM TO SWU STANDARDS AND REQUIREMENTS.
8. CONTRACTOR SHALL CONFINE SITE DISTURBANCE FOR FAYETTEVILLE PIPELINE WORK TO 30FT FROM THE CENTERLINE OF PIPE.
9. CONTRACTOR TO PROVIDE SERVICE DROP FROM CECC 7620V OVERHEAD POWER LINE FOR TEMPORARY POWER TO TEMPORARY 120/240V 400A PANELBOARD SKID. PANELBOARD SHALL HAVE A MAIN BREAKER AND A MINIMUM OF EIGHT FEEDER BREAKERS. CONTRACTOR SHALL PROVIDE CONDUIT AND CABLE FROM METER SOCKET TO PANELBOARD SKID AND FROM PANELBOARD SKID TO THE RPR AND CONTRACTOR JOBSITE TRAILER. ADDITIONAL CONTRACTORS FOR SEPARATE PROJECTS WILL REQUIRE ACCESS AND CONNECTION TO THE PANELBOARD FOR THEIR TEMPORARY POWER. ALL CONSTRUCTION FOR TEMPORARY POWER SHALL CONFORM TO NEC REQUIREMENTS AND CECC REQUIREMENTS. ALL TEMPORARY POWER FACILITIES SHALL BECOME PROPERTY OF THE OWNER AT THE END OF THE PROJECT.
10. CONTRACTOR SHALL COORDINATE SITE ACCESS, PIPELINE CROSSINGS, AND PIPE CONNECTIONS WITH BWD AND THALLE REGARDING THE WESTERN CORRIDOR PIPELINE CONSTRUCTION ONSITE.
11. CONTRACTOR SHALL NOT STORE ANY MATERIALS ABOVE EXISTING UTILITIES INCLUDING BURIED PIPING OR DUCTBANK. CONTRACTOR SHALL PROVIDE PROTECTION OF EXISTING UTILITIES WHERE CROSSING OR EXCAVATING NEAR UTILITIES IS REQUIRED.
12. CONTRACTOR SHALL PLACE SPOILS A MINIMUM OF 40FT AWAY FROM THE EXISTING CLEARWELL AND WETWELL.
13. CONTRACTOR SHALL COORDINATE CROSSING OF STARR LN WITH OWNER AND ENGINEER. CONTRACTOR WILL BE REQUIRED TO PROVIDE CONCRETE JERSEY BARRIERS ON BOTH SIDES OF STARR LN FOR THE DURATION THAT THE CROSSING IS OPEN.
14. CONTRACTOR TO PROTECT EXISTING SPRINGDALE LINE AND ENSURE STRUCTURAL SUPPORT N/S OF ROAD IS NOT LOST AT ANY TIME.
15. 6' X 3' ACCESS HATCH TO BE USED FOR CLOSURE PLATE INSTALLATION FOR EXISTING CLEARWELL PIPE CONNECTION. REFER TO 045-M-502, 045-S-503, AND 045-S-504.
16. CONTRACTOR SHALL NOT EXCAVATE BEYOND THE EXTENTS OF THE CONCRETE WALL BOSS AGAINST THE EXISTING CLEARWELL STRUCTURE. △1

△2
17. CONTRACTOR SHALL PROVIDE TEMPORARY 24-INCH CMP FOR ANY NEW CONSTRUCTION ACCESS OFF OF EXISTING ROADS TO MAINTAIN DRAINAGE COURSE.

200' 100' 0 200' 400'
SCALE 1"=200'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25	ISSUED PER ADDENDUM NO. 2
1	01/08/25	ISSUED PER ADDENDUM NO. 1

REVISIONS AND RECORD OF ISSUE

DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

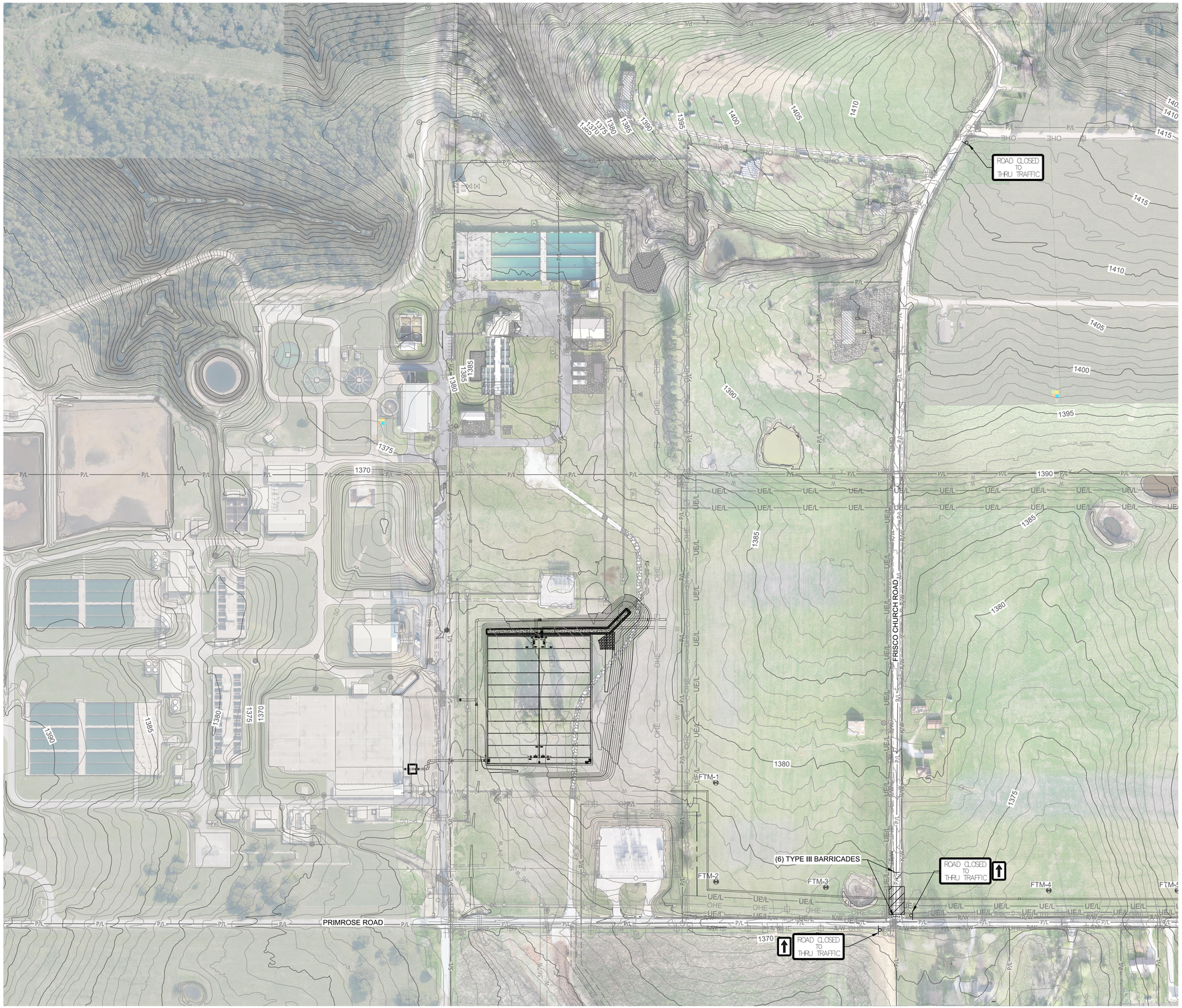
CIVIL

GENERAL ARRANGEMENT AND CIVIL SITE WORK

000-C-100

22 OF 82

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NOTES:

1. TRAFFIC CONTROL WILL BE DONE IN ACCORDANCE WITH BENTON COUNTY REQUIREMENTS.
2. CONTRACTOR TO COORDINATE SIGNAGE & SIGNAGE LOCATIONS WITH BENTON COUNTY.
3. CONTRACTOR TO MAINTAIN SIGNAGE DURING CONSTRUCTION.
4. CONTRACTOR TO BUDGET FOR ADDITIONAL SIGNAGE THAT MAY BE NECESSARY DURING CONSTRUCTION AS A RESULT OF CONSTRUCTION OPERATIONS.

LEGEND:

- CONSTRUCTION AREA
- SIGN
- TYPE III BARRICADE

150' 75' 0 150' 300'

SCALE 1"=150'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

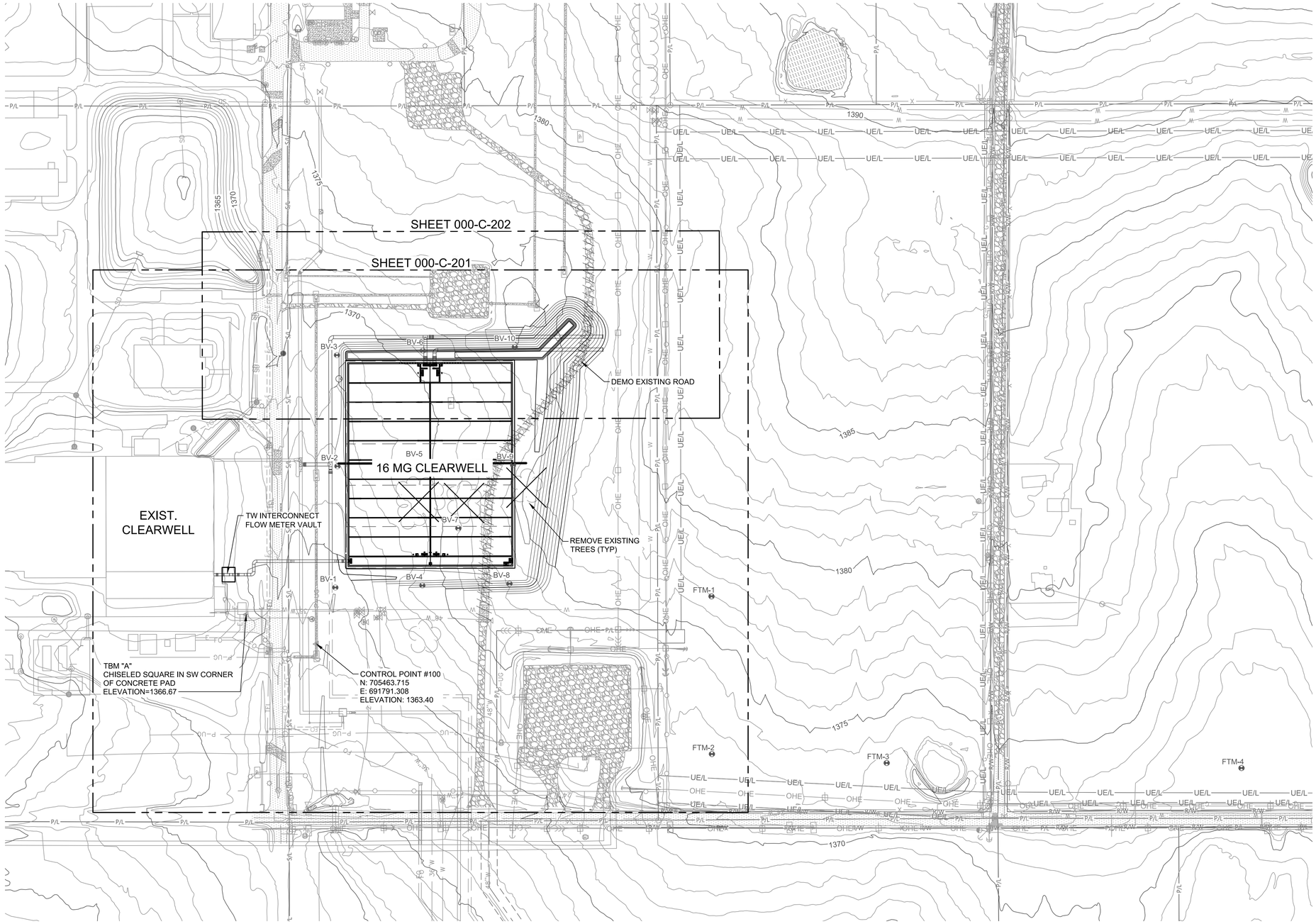
DESIGNED:	JRC
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

FRISCO CHURCH ROAD
TRAFFIC CONTROL PLAN

000-C-150



100' 50' 0 100' 200'

SCALE 1"=100'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION
PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

OVERALL SITE
GRADING PLAN

000-C-200

24 OF 82

EXISTING ELECTRICAL DUCTBANK AND VAULT (1)

EXISTING BWD SWITCHING STATION 1 (1)

EXISTING ELECTRICAL DUCTBANK (1)

FL EL: 1358.82

EL: 1364.57

N: 705078.52
E: 692300.40
EL: 1369.50

16 MG CLEARWELL

EXIST.
CLEARWELL

A 000-C-507 SILT FENCE

EXISTING 69KV OVERHEAD POWER (CECC)

EXISTING 13.2KV OVERHEAD POWER (BWD)

TW INTERCONNECT FLOW METER VAULT

N: 705609.47
E: 691939.58
EL: 1367.75

N: 705634.47
E: 691913.49
EL: 1367.75

N: 705399.05
E: 691933.18
EL: 1369.50

EL: 1366.50

EL: 1366.50

TBM "A"
CHISELED SQUARE IN SW
CORNER OF CONCRETE PAD
ELEVATION=1366.67

SEDIMENT BARRIER C 000-C-507

B 000-C-507 CONCRETE WASHOUT

CONTROL POINT #100
N: 705463.715
E: 691791.308
ELEVATION: 1363.40

D 000-C-507 STABILIZED CONSTRUCTION ENTRANCE

SEDIMENT BARRIER C 000-C-507

Water Valve Vault
Rim=1362.16

FTM-1

FTM-2

Starr Lane

-25.0%
-0.5%
-16.7%
-0.6%
-16.7%
-0.8%
-1.0%
-0.6%

SHEET KEY NOTES (#):

1. CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.
2. TOP OF CLEARWELL SLAB SHALL BE A MINIMUM OF 3 FEET ABOVE FINISHED GRADE.

50' 25' 0 50' 100'
SCALE 1"=50'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

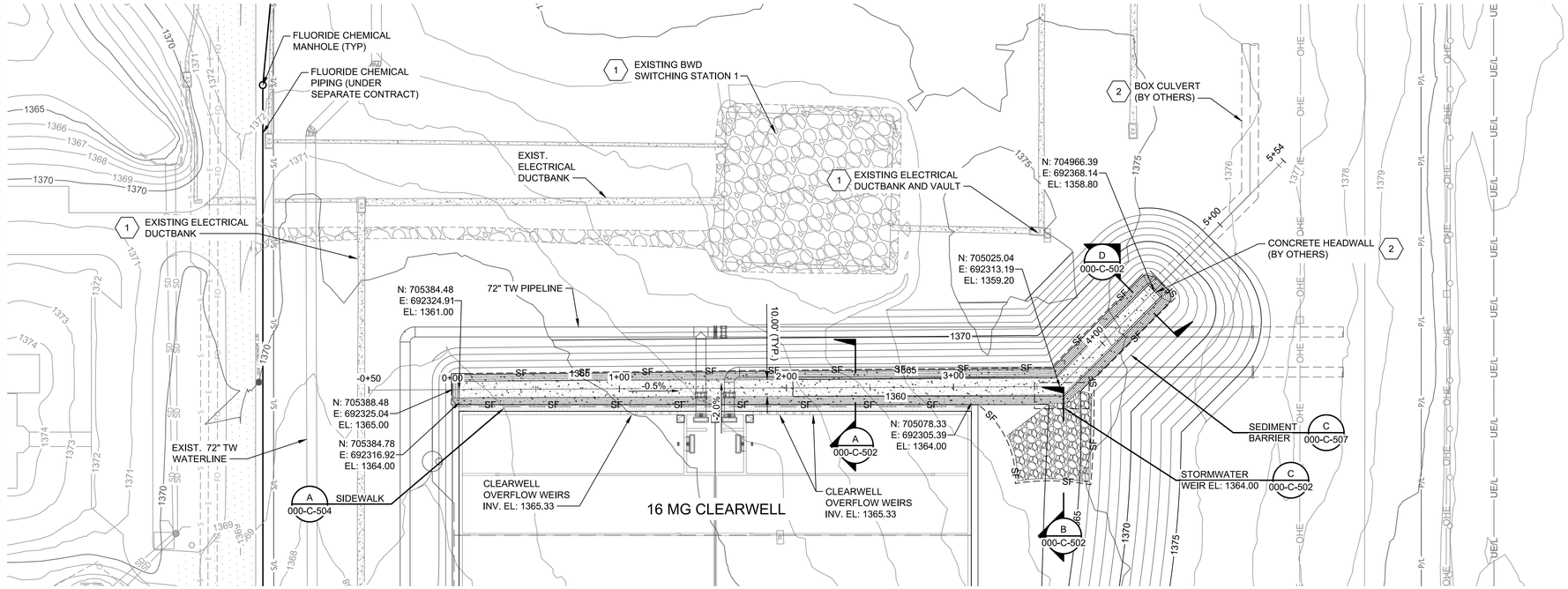
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CIVIL

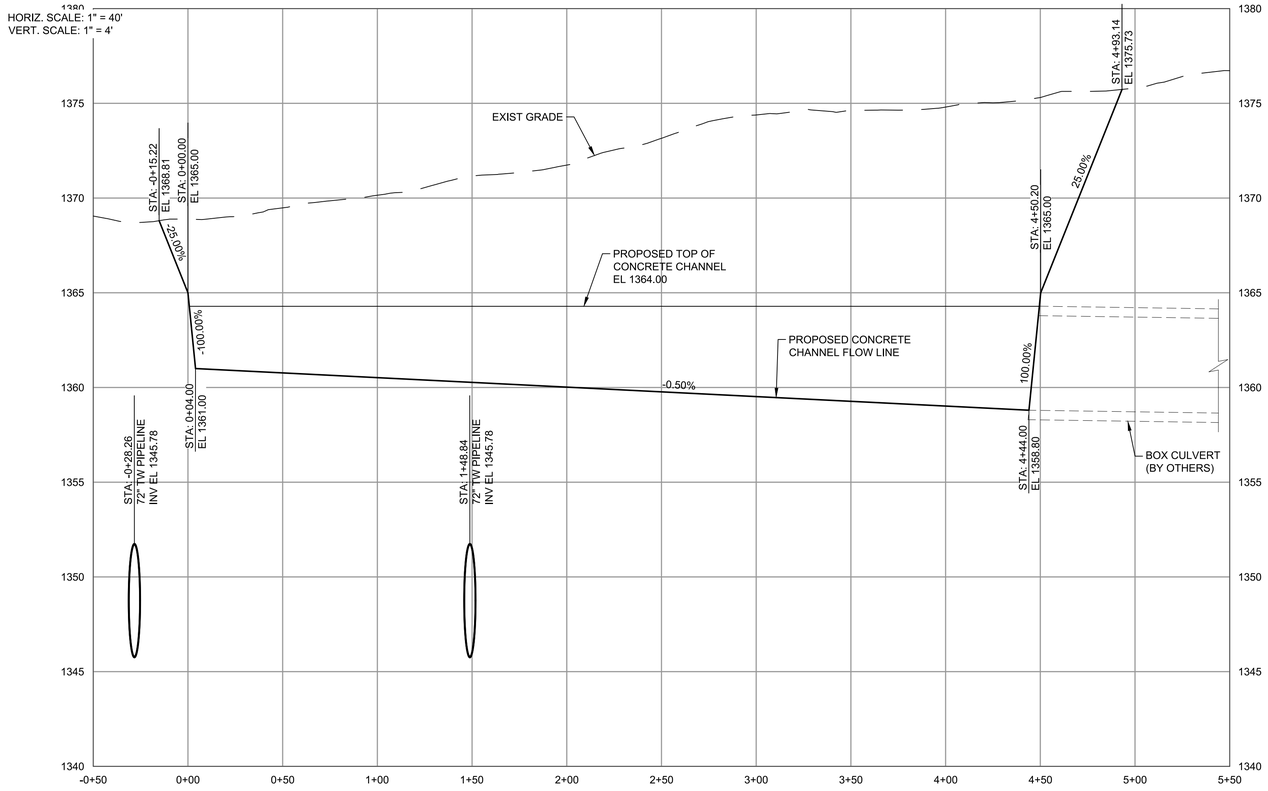
PARTIAL GRADING AND EROSION CONTROL PLAN - CLEARWELL AND FLOW METER VAULT

000-C-201

25 OF 82



PLAN VIEW STA STA 0+00 TO 6+00



PROFILE VIEW STA 0+00 TO 6+00

SHEET KEY NOTES (#):

1. CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.
2. CONCRETE HEADWALL AND BOX CULVERT TO BE INSTALLED BY THE STARR WTP EXPANSION PROJECT CONTRACTOR.
3. PRIOR TO INSTALLING THE 10 FEET OF CONCRETE CHANNEL LINER IMMEDIATELY UPSTREAM OF THE HEADWALL, CONTRACTOR TO COORDINATE WITH STARR WTP EXPANSION CONTRACTOR TO INSTALL HEADWALL AND BOX CULVERT CONNECTION. AFTER HEADWALL IS INSTALLED BY OTHERS, CONTRACTOR TO POUR FINAL SECTION OF CONCRETE CHANNEL.

40' 20' 0 40' 80'
SCALE 1"=40'

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

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CIVIL

PARTIAL GRADING AND EROSION CONTROL PLAN AND PROFILE - CLEARWELL OVERFLOW

000-C-202

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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PRT1000
DT1000

GENERAL KEY NOTES (#):

1. FLUORIDE CHEMICAL DUCTBANK PER SEPARATE CONTRACT.

FLUORIDE CHEMICAL MANHOLE (TYP) (BY OTHERS) (1)

FLUORIDE CHEMICAL PIPING (BY OTHERS) (1)

EXISTING ELECTRICAL DUCTBANK

EXISTING SWITCHING STATION 1

BOX CULVERT (BY OTHERS)

72" TW TO CLEARWELL

72" TW FROM STARR WTP

SHEET 000-C-303

SHEET 000-C-302

SHEET 000-C-304

16 MG CLEARWELL

CARROLL ELECTRIC EASEMENT

72" TW PIPELINE FROM FUTURE 80 MGD PLANT

EXISTING 69KV OVERHEAD POWER (CECC)

EXISTING FRISCO CHURCH ROAD

EXISTING 36" DIP TRANSMISSION MAIN TO FAYETTEVILLE

EXISTING 42" PCCP TRANSMISSION MAIN TO FAYETTEVILLE

50' CITY OF FAYETTEVILLE RIGHT-OF-WAY

TIE-IN LOCATION, SEE ENLARGED PLAN ON SHEET 001-C-503

SHEET 000-C-314

FUTURE RELOCATED FRISCO CHURCH ROAD (BY OTHERS)

FUTURE 60-FT PROPOSED RIGHT OF WAY

FUTURE 25-FT PROPOSED ELECTRICAL EASEMENT

SHEET 000-C-313

TW INTERCONNECT

TW INTERCONNECT FLOW METER VAULT

NAIL AVENUE

72" TW TO FUTURE WESTERN COORIDOR - PIPELINE

EXISTING 13.2KV OVERHEAD POWER (BWD)

SHEET 000-C-301

SAMPLE PUMP DISCHARGE

SHEET 000-C-305

SHEET 000-C-310

PIPE GALLERY DUPLEX SUMP

EXISTING 42" DIP TRANSMISSION MAIN TO FAYETTEVILLE

EXIST. ELECTRICAL DUCTBANK

FUTURE 60" STEEL WESTERN CORRIDOR PIPELINE

60" STEEL WESTERN CORRIDOR PIPELINE (BY OTHERS)

CARROLL ELECTRIC COOPERATIVE SUBSTATION

NEW 48" FAYETTEVILLE TRANSMISSION MAIN

SHEET 000-C-311

SHEET 000-C-312

EXISTING OVERHEAD POWER LINES

EXISTING TELEPHONE

EXISTING GAS LINE

EXISTING 8" WATER LINE

FUTURE FAYETTEVILLE TRANSMISSION MAIN

PRIMROSE ROAD

OFFSET FROM EXISTING ELECTRICAL EASEMENT

TEE FOR CONNECTION TO FUTURE TRANSMISSION MAIN

CARROLL ELECTRIC EASEMENT

100' 50' 0 100' 200'

SCALE 1"=100'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/20/2024 7:11:46 AM

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FD1000
FD1004

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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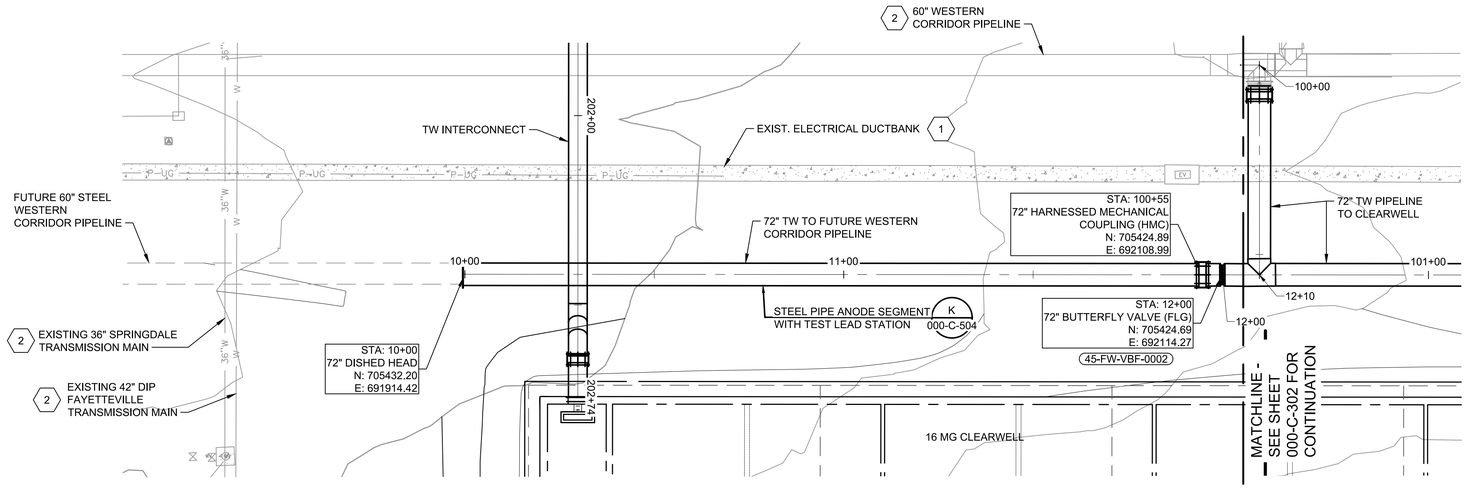
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CIVIL

YARD PIPING - OVERALL SITE

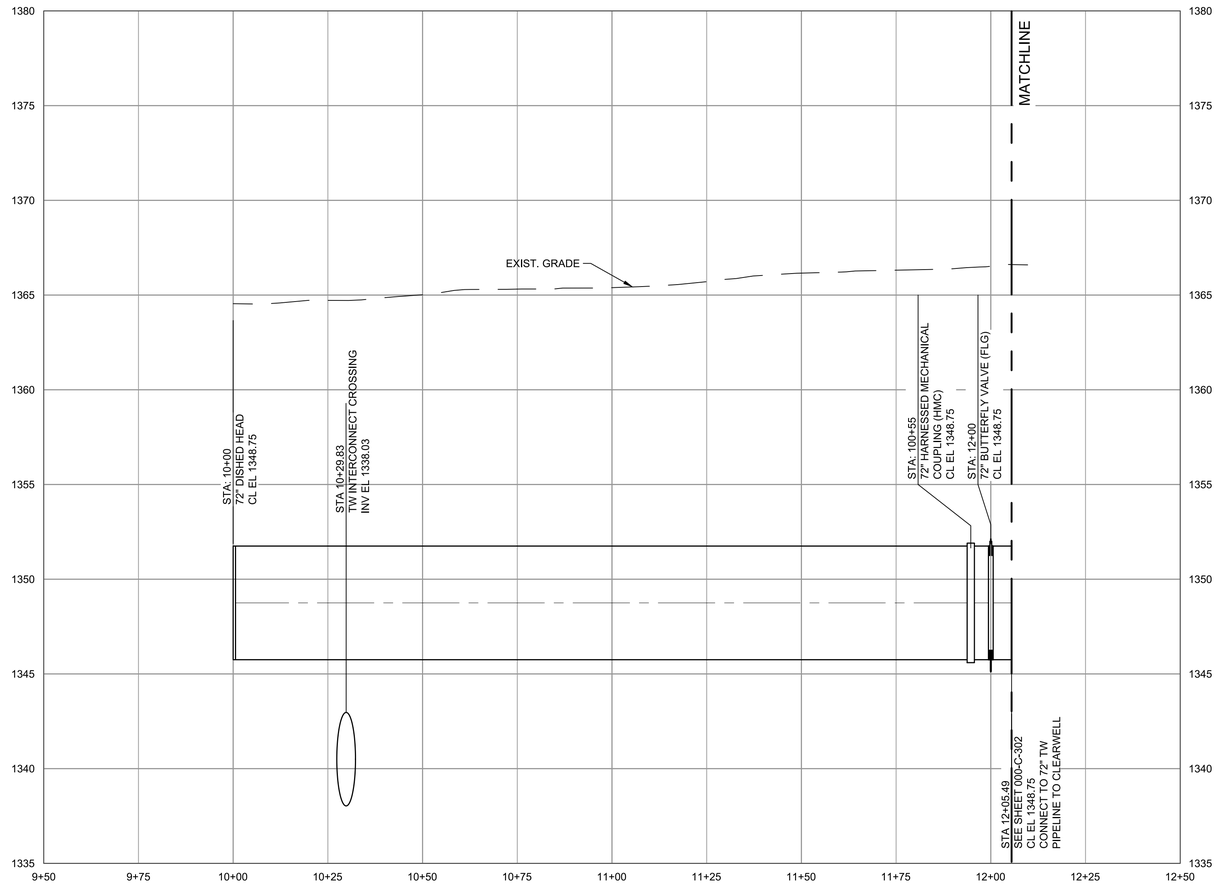
000-C-300

27 OF 82



72" TW CONNECTION TO FUTURE WESTERN CORRIDOR PIPELINE

PLAN VIEW STA 10+00 TO 12+50



TW CONNECTION TO FUTURE WESTERN CORRIDOR PIPELINE

PROFILE VIEW STA 10+00 TO 12+50

20' 10' 0 20' 40'

SCALE 1"=20'

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 4'

SHEET KEY NOTES (#):

1. DUCTBANK MUST REMAIN ACTIVE AT ALL TIMES. CONTRACTOR TO PROTECT, SUPPORT, AND SUSPEND ELECTRICAL DUCTBANK AND VAULTS AS REQUIRED TO EXCAVATE AND INSTALL PIPELINES. EXCEPT FOR LOCATIONS WHERE PROPOSED PIPELINES CROSS THE EXISTING DUCTBANK, CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.
2. CONTRACTOR SHALL LIMIT EXCAVATION NEAR AND PROTECT EXISTING PIPELINES FROM DAMAGE. CONTRACTOR SHALL PROTECT PIPELINES FROM FREEZING AT ALL TIMES DURING CONSTRUCTION.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FDT1000
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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

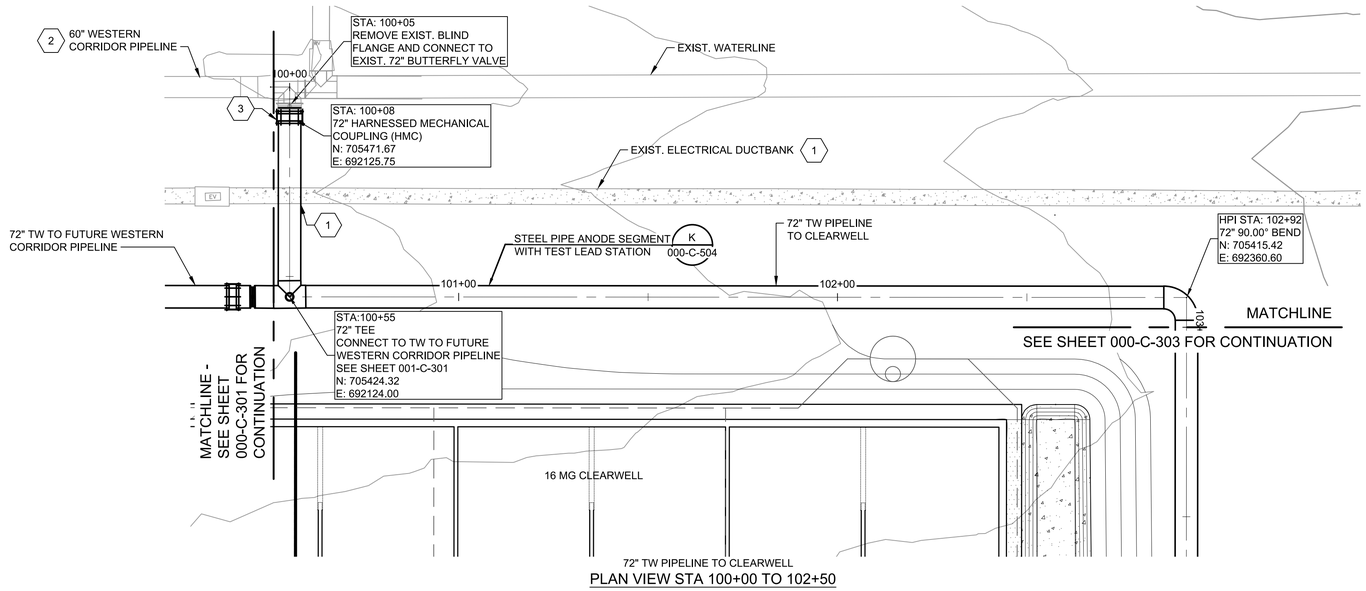
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DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

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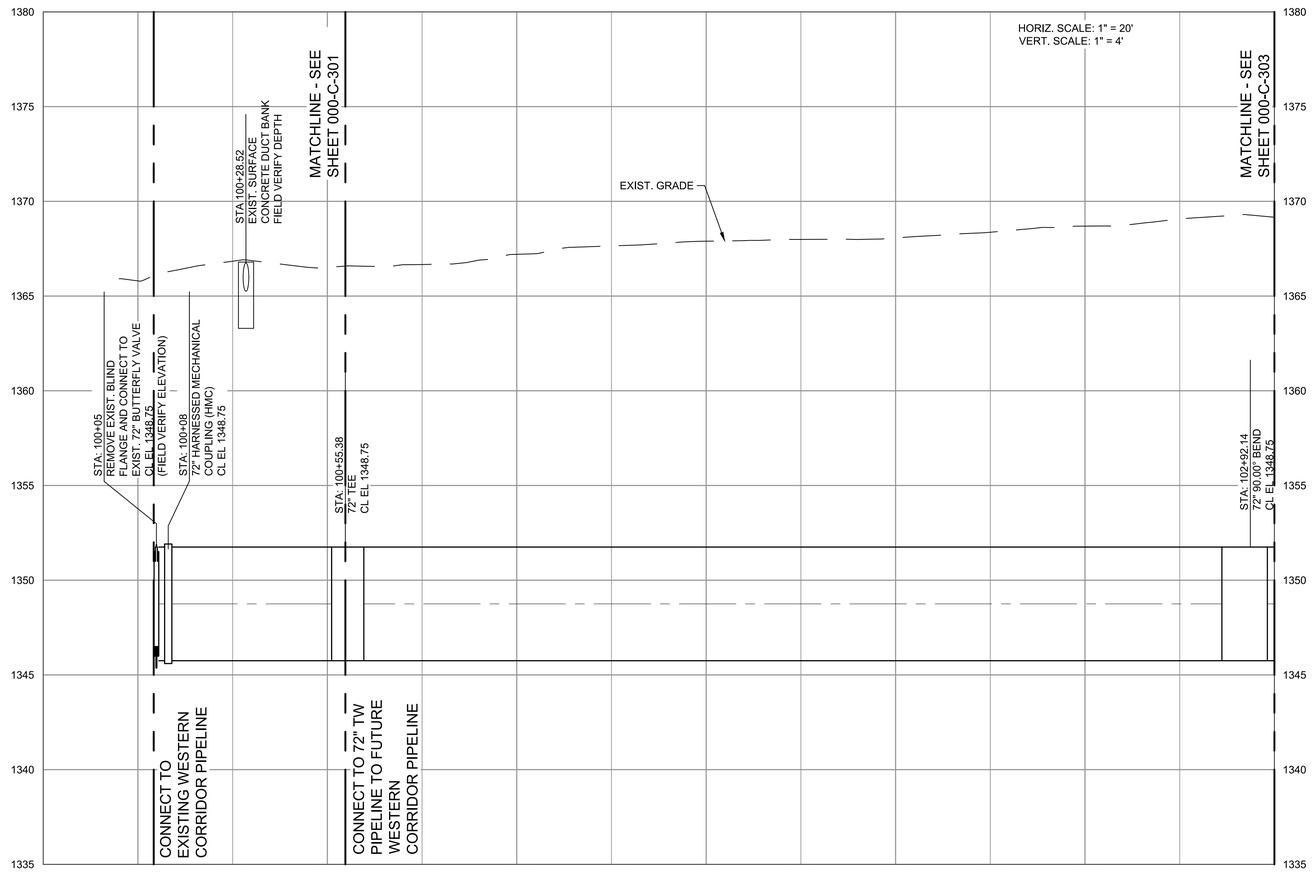
CIVIL

PLAN AND PROFILE
STA 10+00 TO STA 12+50

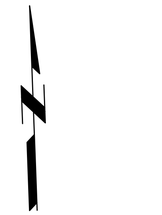
000-C-301



PLAN VIEW STA 100+00 TO 102+50



PROFILE VIEW STA 100+00 TO 105+25



20' 10' 0 20' 40'

SCALE 1"=20'

SHEET KEY NOTES (#):

1. DUCTBANK MUST REMAIN ACTIVE AT ALL TIMES. CONTRACTOR TO PROTECT, SUPPORT, AND SUSPEND ELECTRICAL DUCTBANK AND VAULTS AS REQUIRED TO EXCAVATE AND INSTALL PIPELINES. EXCEPT FOR LOCATIONS WHERE PROPOSED PIPELINES CROSS THE EXISTING DUCTBANK, CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.
2. CONTRACTOR SHALL LIMIT EXCAVATION NEAR AND PROTECT EXISTING PIPELINES FROM DAMAGE. CONTRACTOR SHALL PROTECT PIPELINES FROM FREEZING AT ALL TIMES DURING CONSTRUCTION.
3. CONTRACTOR TO COORDINATE TIMING OF CONNECTION TO WESTERN CORRIDOR PIPELINE WITH INSTALLATION OF TEE AND VALVE BEING INSTALLED AS PART OF THE WESTERN CORRIDOR PIPELINE PROJECT.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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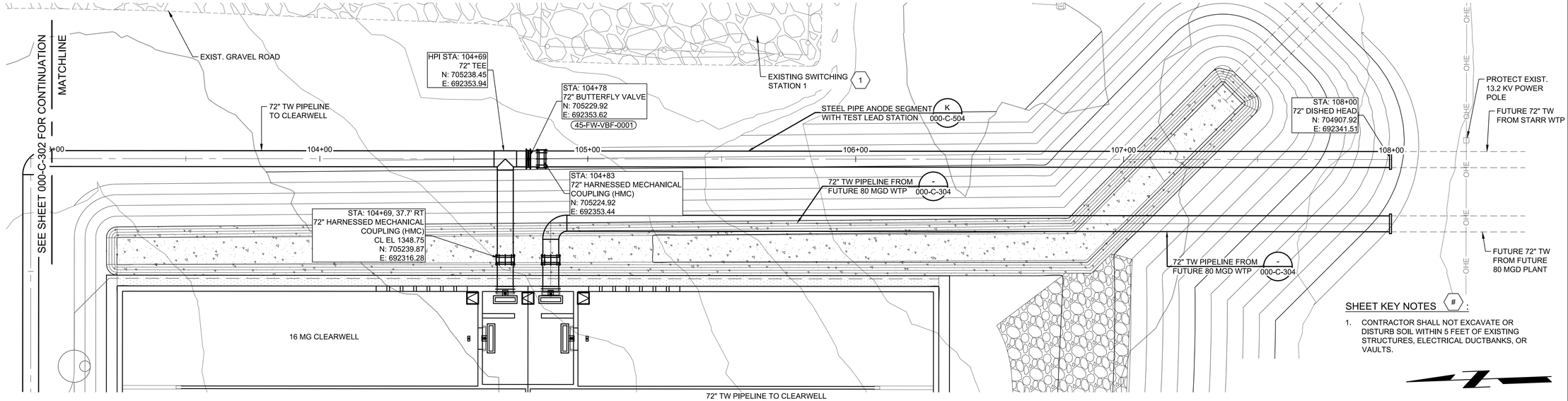
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CIVIL

PLAN AND PROFILE
STA 100+00 TO STA 103+00

000-C-302

29 OF 82

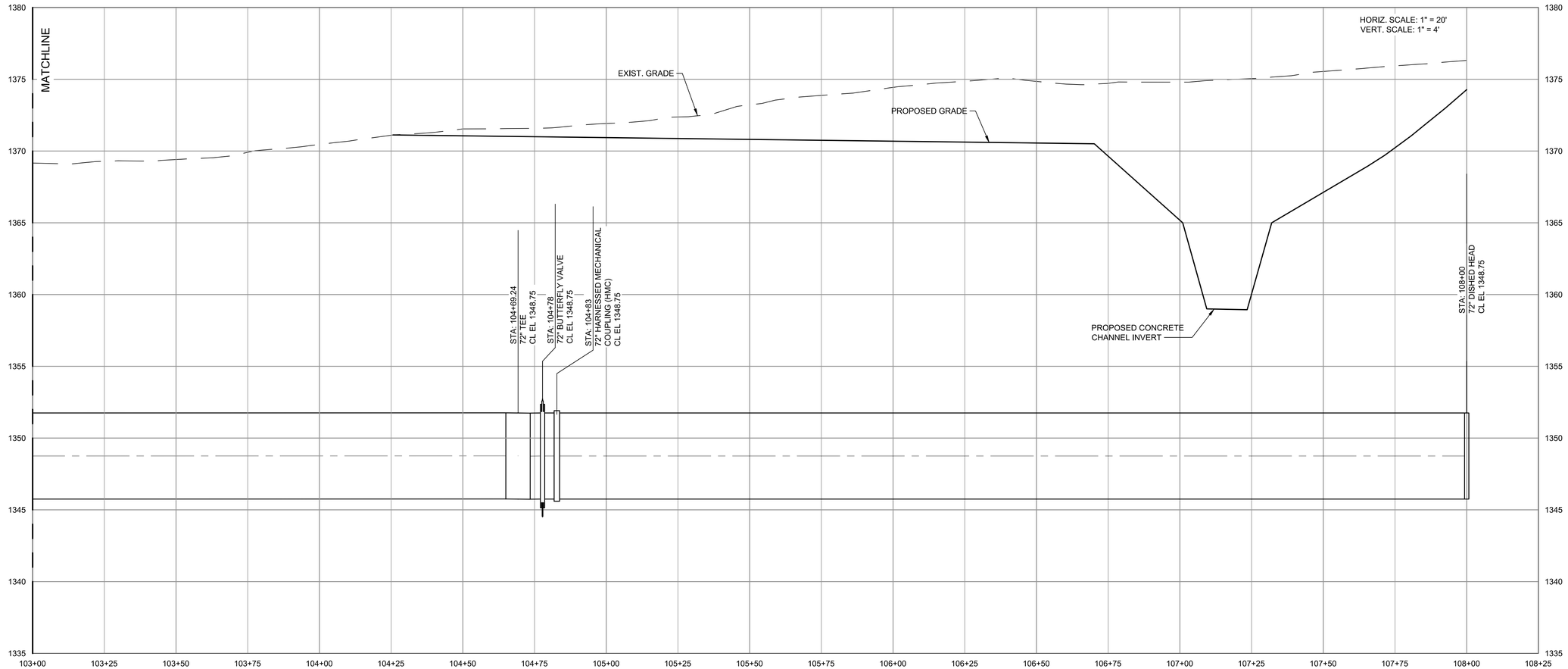


PLAN VIEW STA 103+00 TO 108+00

SHEET KEY NOTES (#):

1. CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.

20' 10' 0 20' 40'
SCALE 1"=20'



72" TW PIPELINE TO CLEARWELL

PROFILE VIEW STA 103+00 TO 108+00

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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D11004

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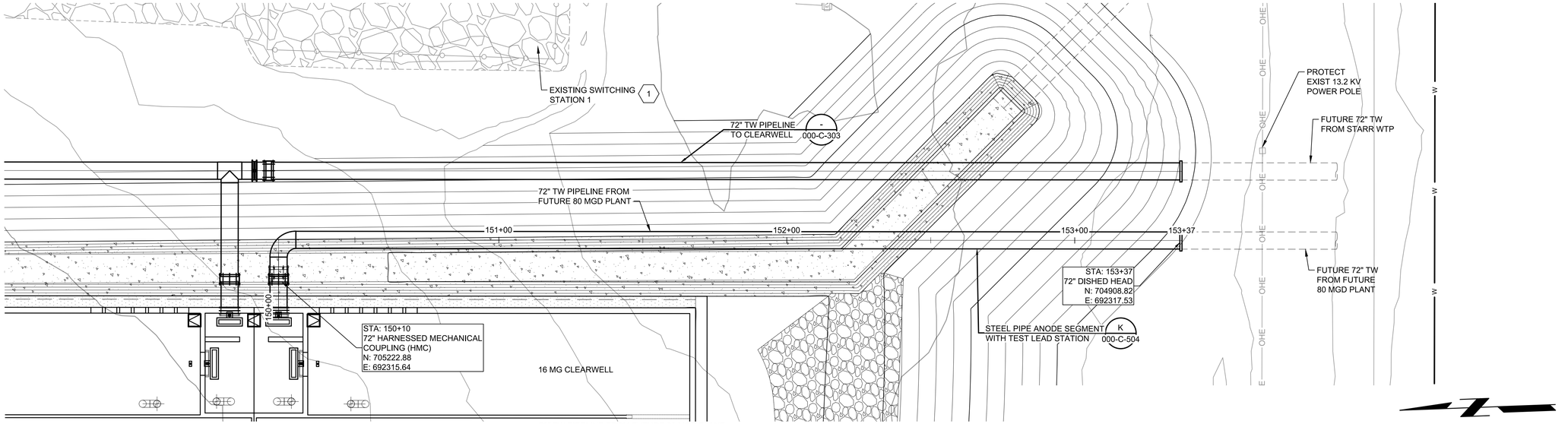
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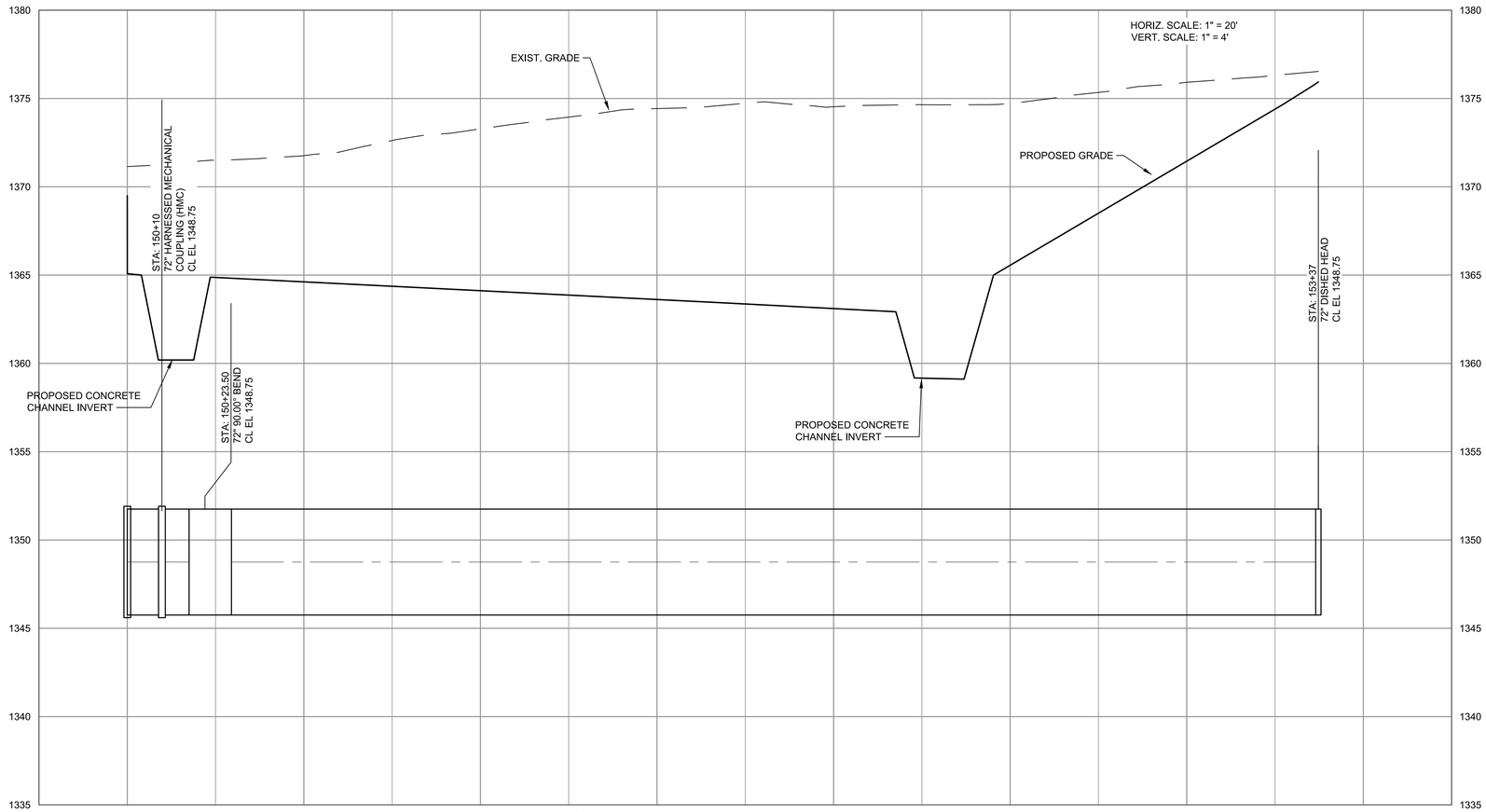
PLAN AND PROFILE
STA 103+00 TO STA 108+00

000-C-303

30 OF 82



PLAN VIEW STA 150+00 TO 153+25



72" TW PIPELINE FROM FUTURE 80 MGD PLANT

PROFILE VIEW STA 150+00 TO 153+25

SHEET KEY NOTES (#):

1. CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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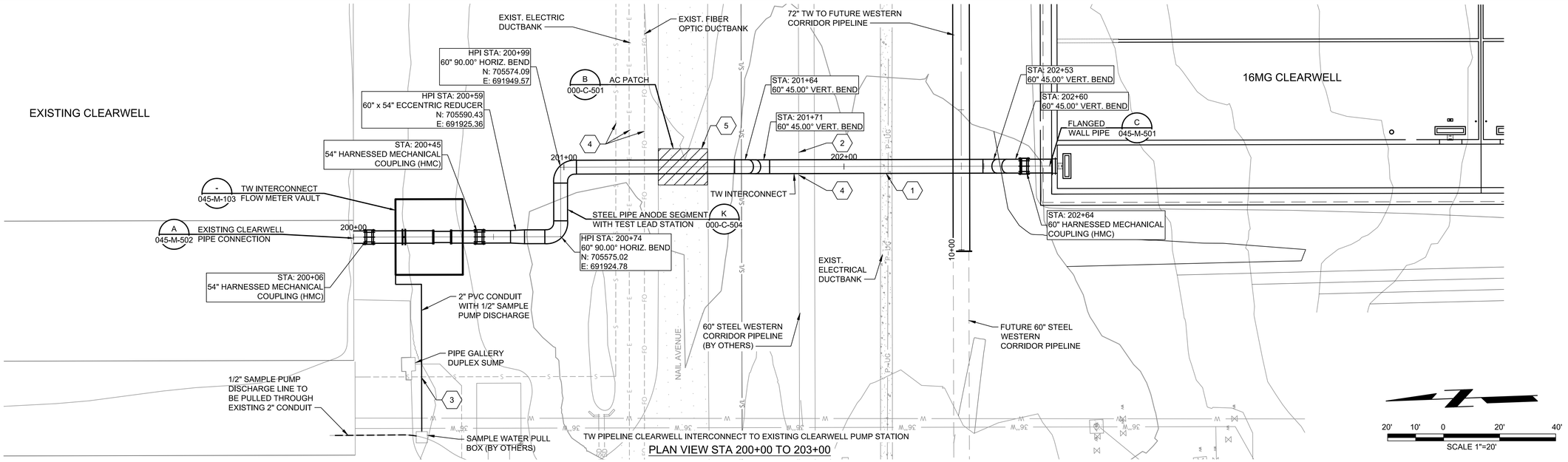
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CIVIL

PLAN AND PROFILE
STA 150+00 TO STA 153+25

000-C-304

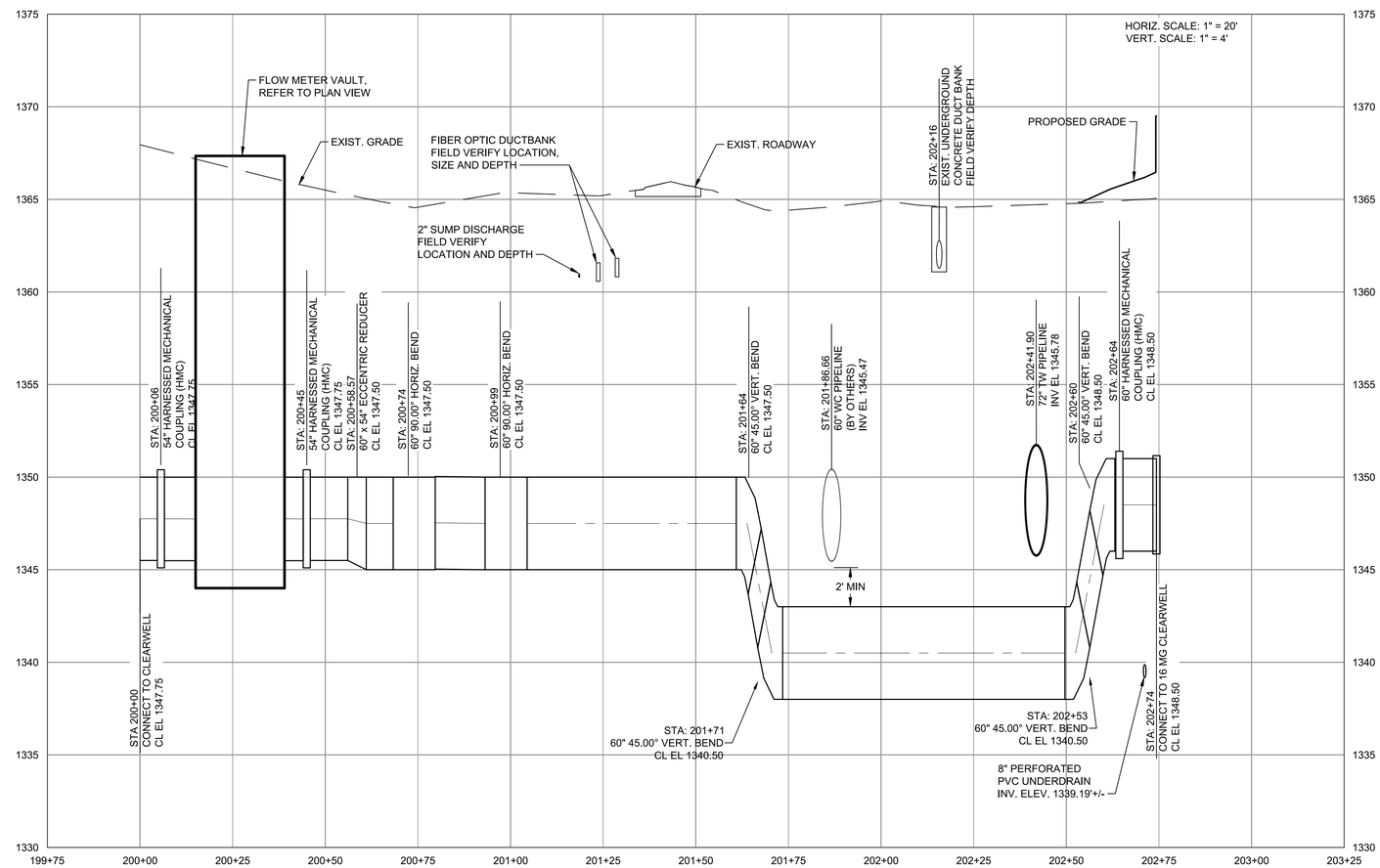
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PLAN VIEW STA 200+00 TO 203+00

20' 10' 0 20' 40'

SCALE 1"=20'



TW PIPELINE CLEARWELL INTERCONNECT TO EXISTING CLEARWELL PUMP STATION

PROFILE VIEW STA 200+00 TO 203+00

SHEET KEY NOTES (#):

1. DUCTBANK MUST REMAIN ACTIVE AT ALL TIMES. CONTRACTOR TO PROTECT, SUPPORT, AND SUSPEND ELECTRICAL DUCTBANK AND VAULTS AS REQUIRED TO EXCAVATE AND INSTALL PIPELINES. EXCEPT FOR LOCATIONS WHERE PROPOSED PIPELINES CROSS THE EXISTING DUCTBANK, CONTRACTOR SHALL NOT EXCAVATE OR DISTURB SOIL WITHIN 5 FEET OF EXISTING STRUCTURES, ELECTRICAL DUCTBANKS, OR VAULTS.
2. CONTRACTOR SHALL LIMIT EXCAVATION NEAR AND PROTECT EXISTING PIPELINES FROM DAMAGE. CONTRACTOR SHALL PROTECT PIPELINES FROM FREEZING AT ALL TIMES DURING CONSTRUCTION.
3. SAMPLE PUMP DISCHARGE LINE TO BE INSTALLED A MINIMUM OF 18" ABOVE TOP OF SUMP PUMP LINE.
4. UTILITIES MUST REMAIN ACTIVE AT ALL TIMES. CONTRACTOR TO PROTECT, SUPPORT, AND SUSPEND ELECTRICAL DUCTBANK, FIBER DUCTBANK, SEWER LINE, AND OTHER UTILITIES AS REQUIRED TO EXCAVATE AND INSTALL PIPELINES.
5. CONTRACTOR TO SUBMIT OUTAGE PLAN FOR ALL TEMPORARY ROAD CLOSURES REQUIRED FOR CONSTRUCTION. OUTAGE PLAN SHALL INCLUDE DURATION OF ROAD CLOSURE (IF REQUIRED), TRAFFIC CONTROL PLAN, PROVISIONS FOR MAINTAINING PLANT ACCESS, AND PLANNED ROAD SAW CUT DIMENSIONS.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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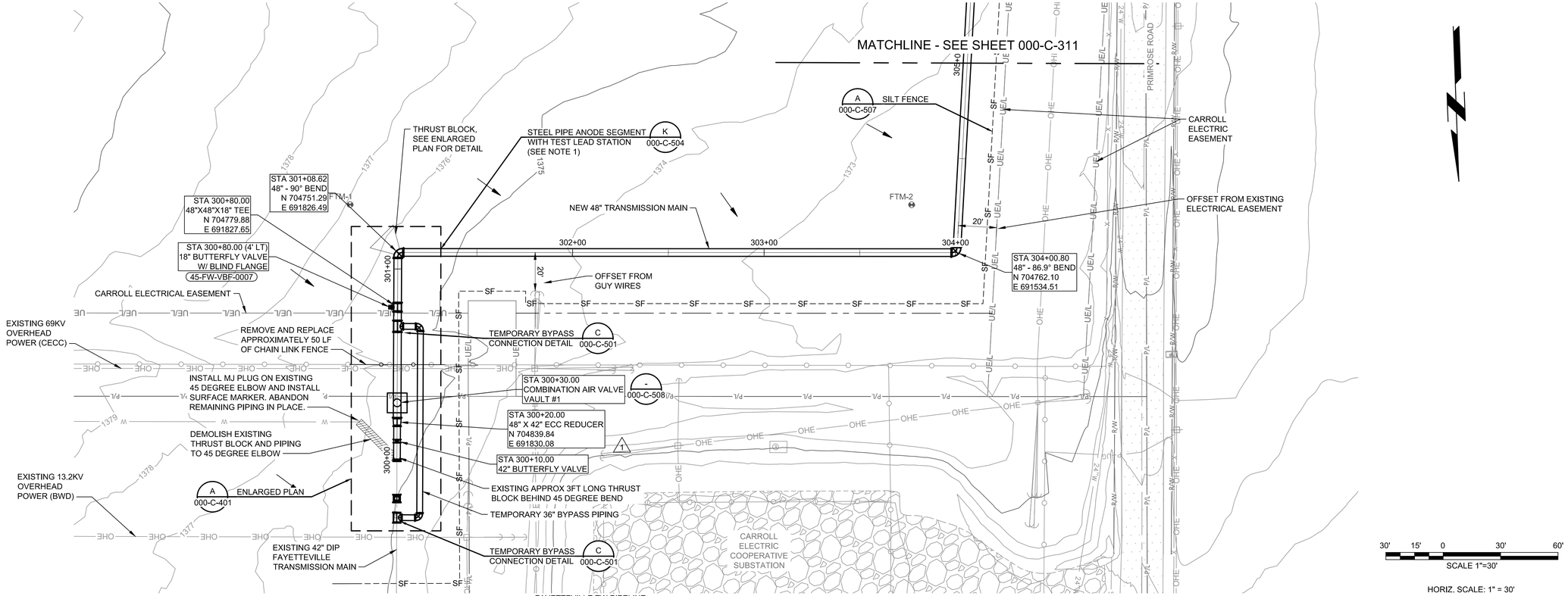
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CIVIL

PLAN AND PROFILE
STA 200+00 TO STA 203+00

000-C-305

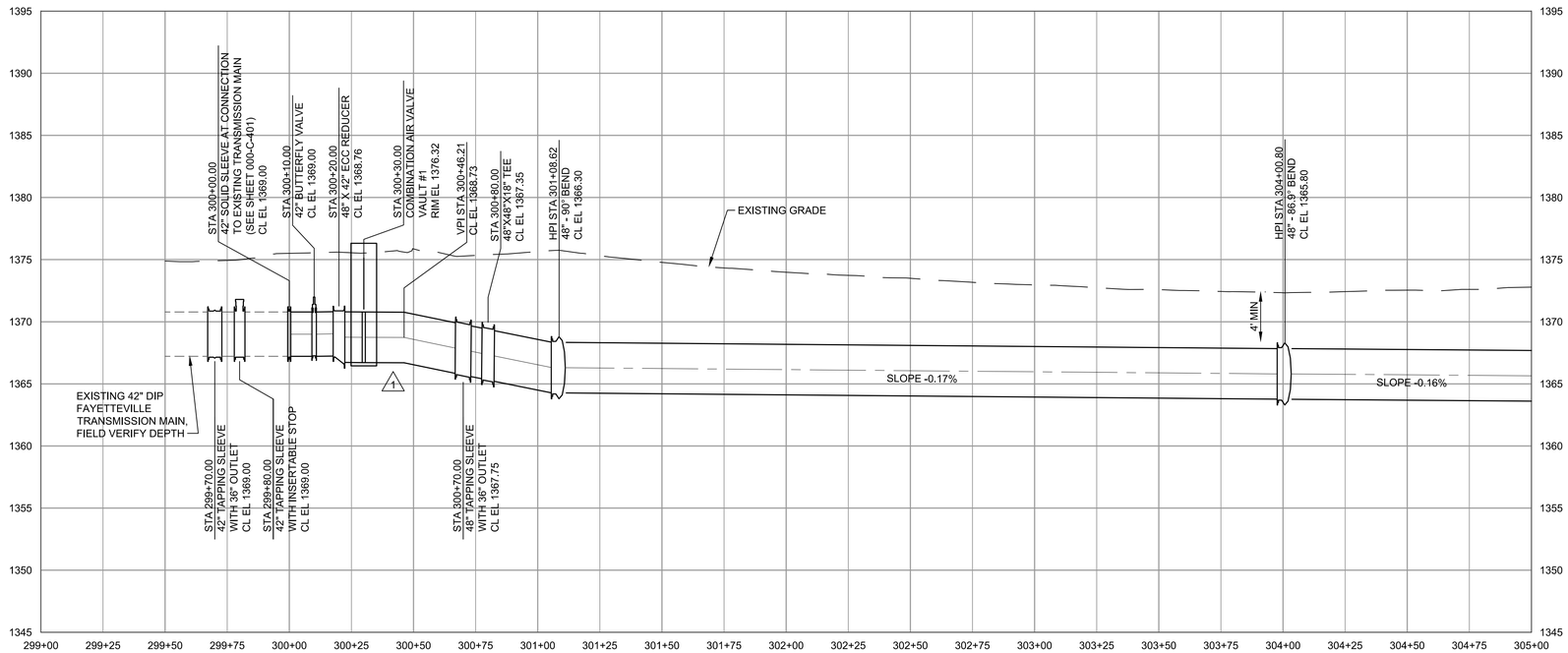
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PLAN VIEW STA 300+00 TO 305+00

30' 15' 0 30' 60'
SCALE 1"=30'

HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 6'



FAYETTEVILLE TW PIPELINE

PROFILE VIEW STA 300+00 TO 305+00

NOTES:

1. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. SEE SPECIFICATION 134713.13 FOR CORROSION PROTECTION REQUIREMENTS.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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D11000

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1	01/08/25	ISSUED PER ADDENDUM NO. 1

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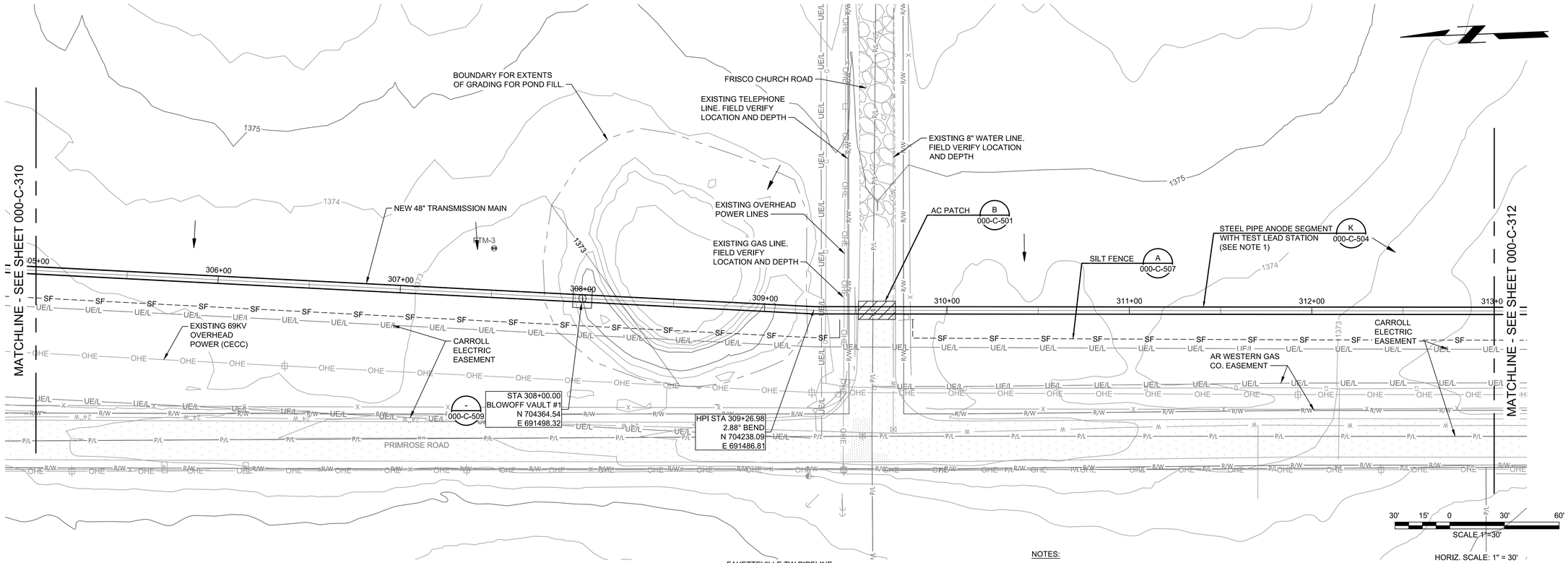
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CIVIL

PLAN AND PROFILE
STA 300+00 TO STA 305+00

000-C-310

33 OF 82

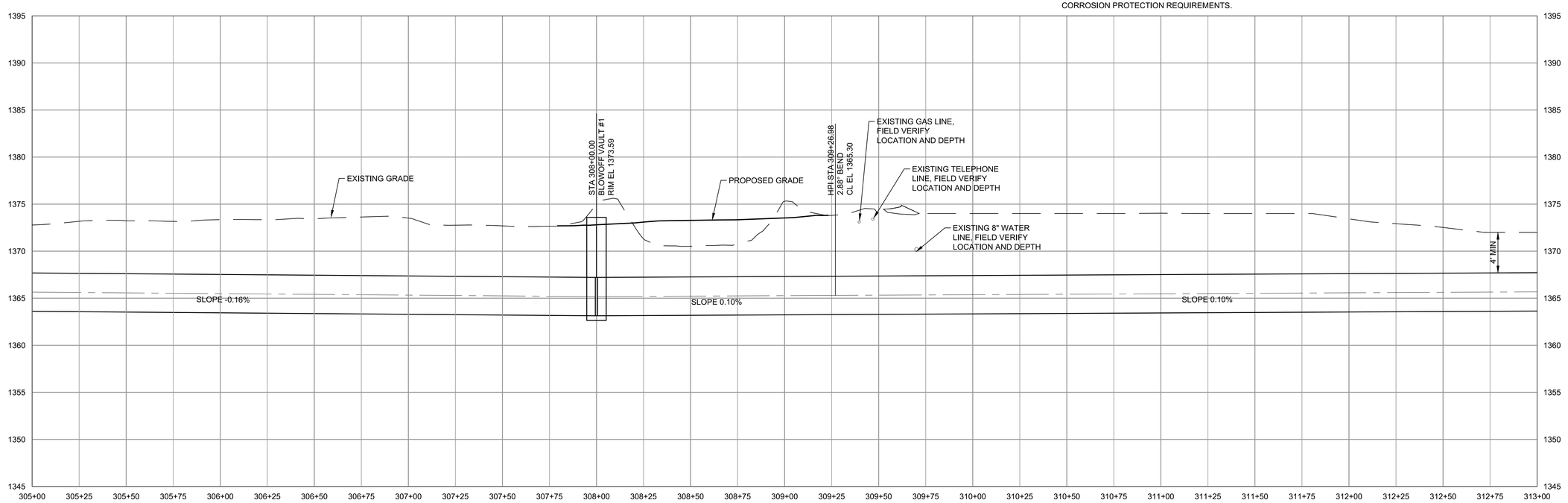


FAYETTEVILLE TW PIPELINE

PLAN VIEW STA 305+00 TO 313+00

NOTES:

1. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. SEE SPECIFICATION 134713.13 FOR CORROSION PROTECTION REQUIREMENTS.



FAYETTEVILLE TW PIPELINE

PROFILE VIEW STA 305+00 TO 313+00

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

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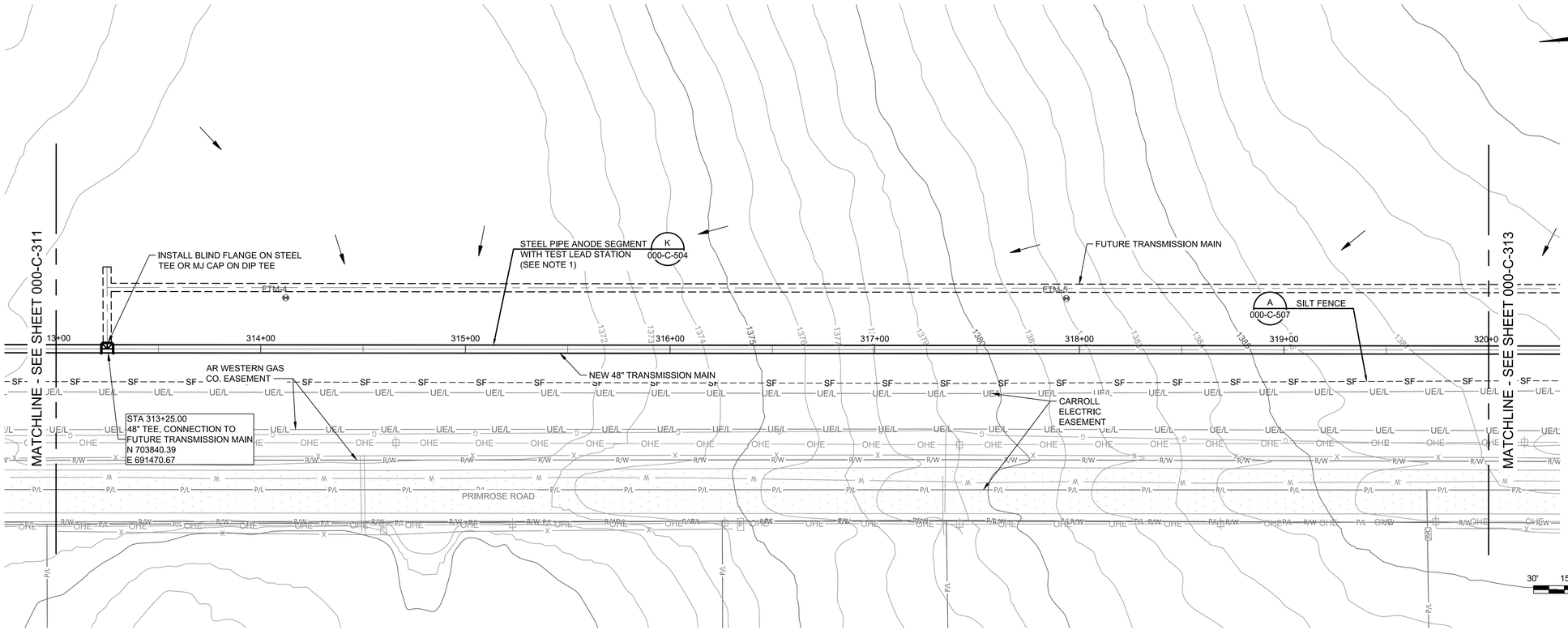
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CIVIL

PLAN AND PROFILE
STA 305+00 TO STA 313+00

000-C-311

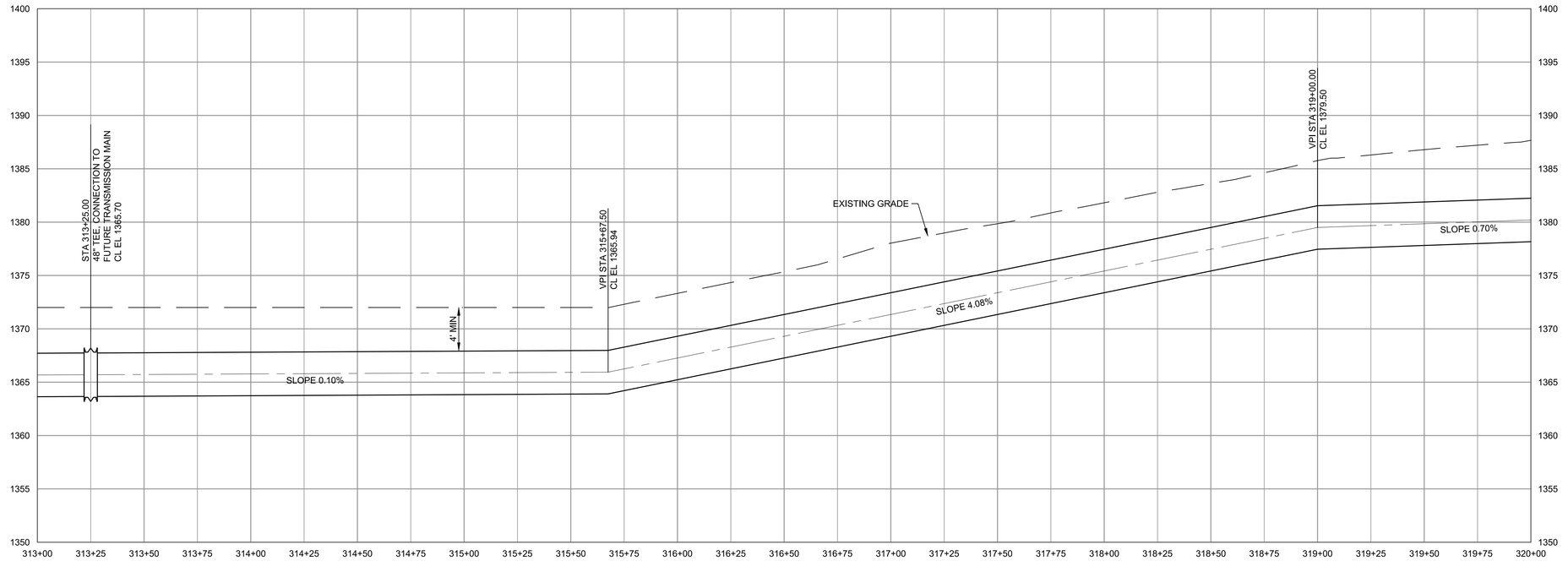
34 OF 82



FAYETTEVILLE TW PIPELINE

PLAN VIEW STA 313+00 TO 320+00

HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 6'



FAYETTEVILLE TW PIPELINE

PROFILE VIEW STA 313+00 TO 320+00

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

NOTES:

1. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. SEE SPECIFICATION 134713.13 FOR CORROSION PROTECTION REQUIREMENTS.

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JRC
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

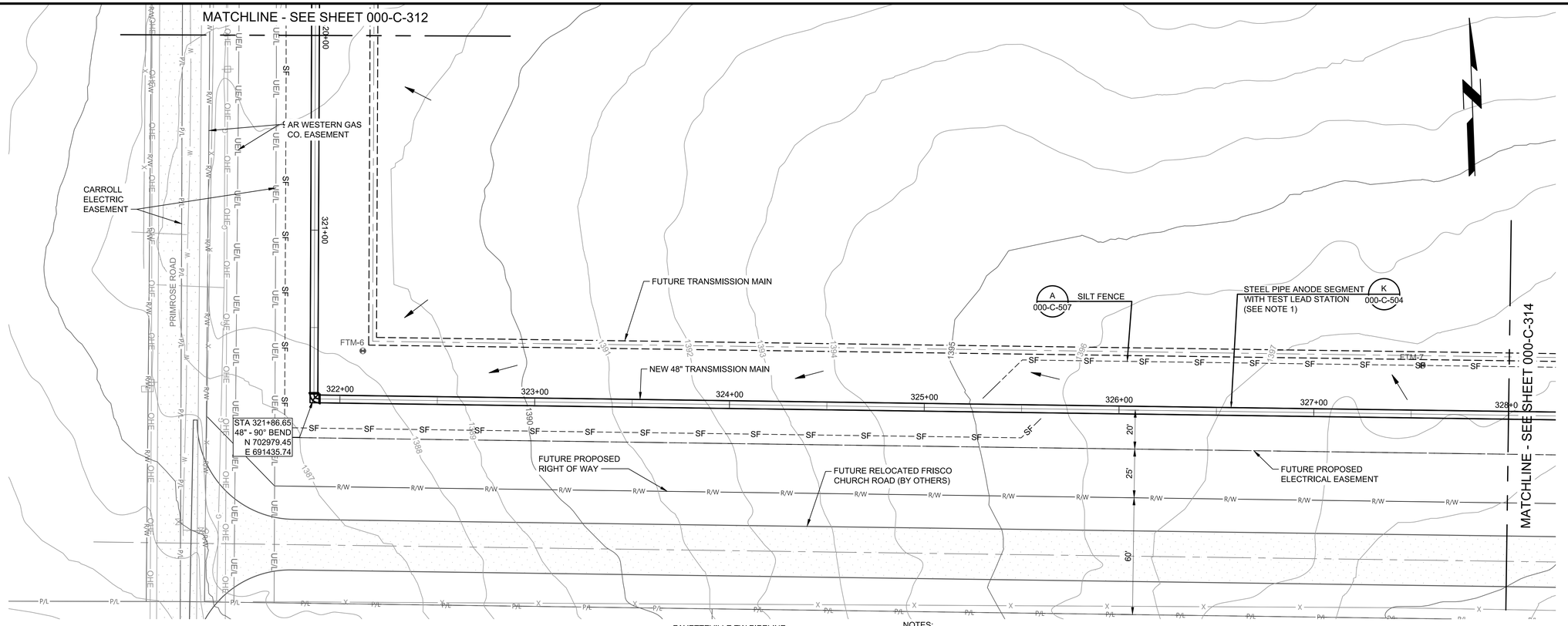
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CIVIL

PLAN AND PROFILE
STA 313+00 TO STA 320+00

000-C-312

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FAYETTEVILLE TW PIPELINE

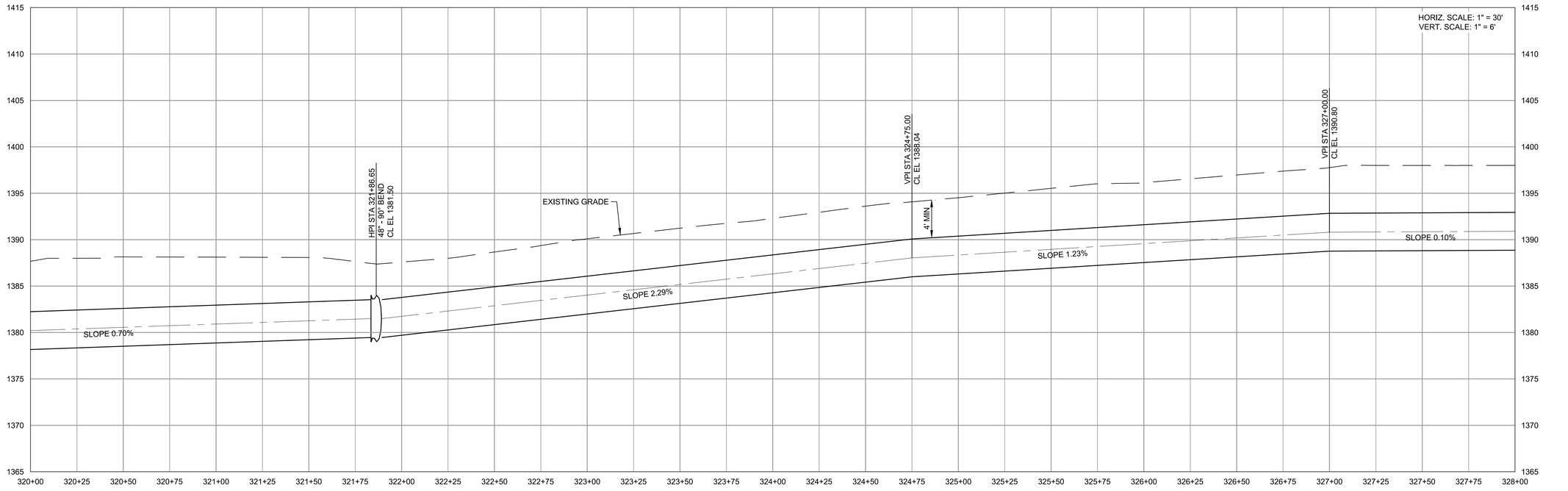
PLAN VIEW STA 320+00 TO 328+00

30' 15' 0 30' 60'

SCALE 1"=30'

NOTES:

1. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. SEE SPECIFICATION 134713.13 FOR CORROSION PROTECTION REQUIREMENTS.



FAYETTEVILLE TW PIPELINE

PROFILE VIEW STA 320+00 TO 328+00

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FD11004

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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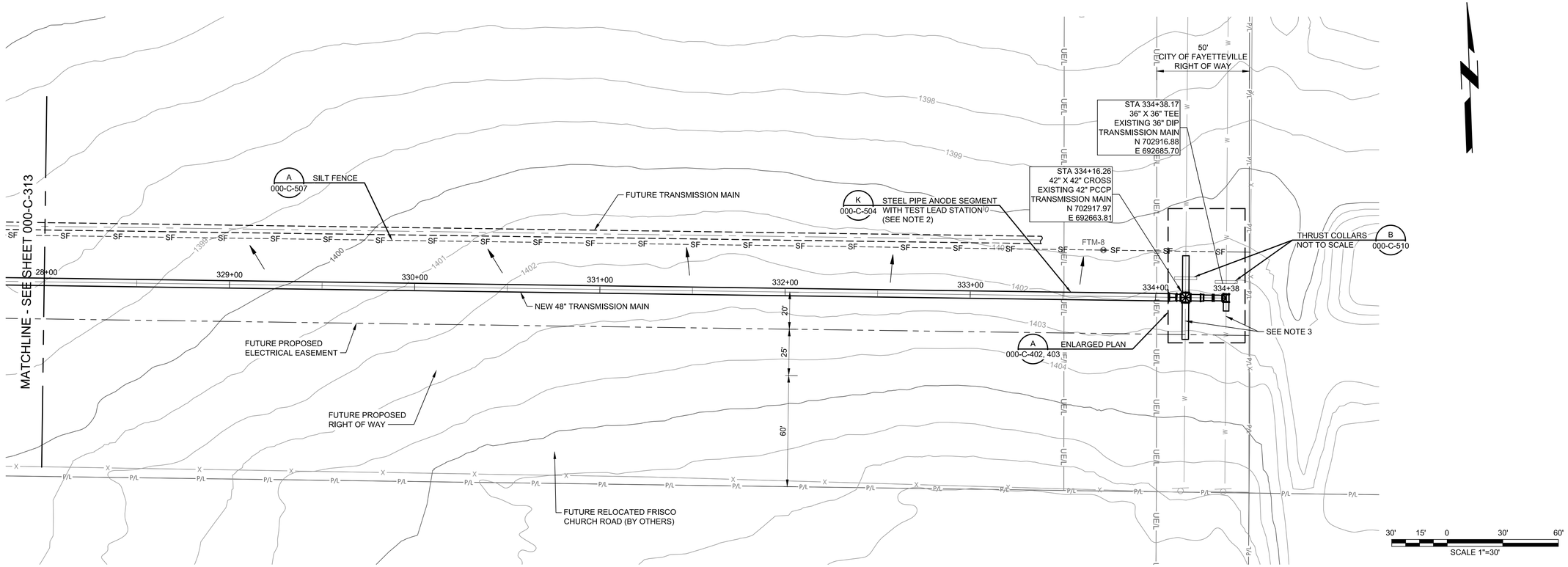
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CIVIL

PLAN AND PROFILE
STA 320+00 TO STA 328+00

000-C-313

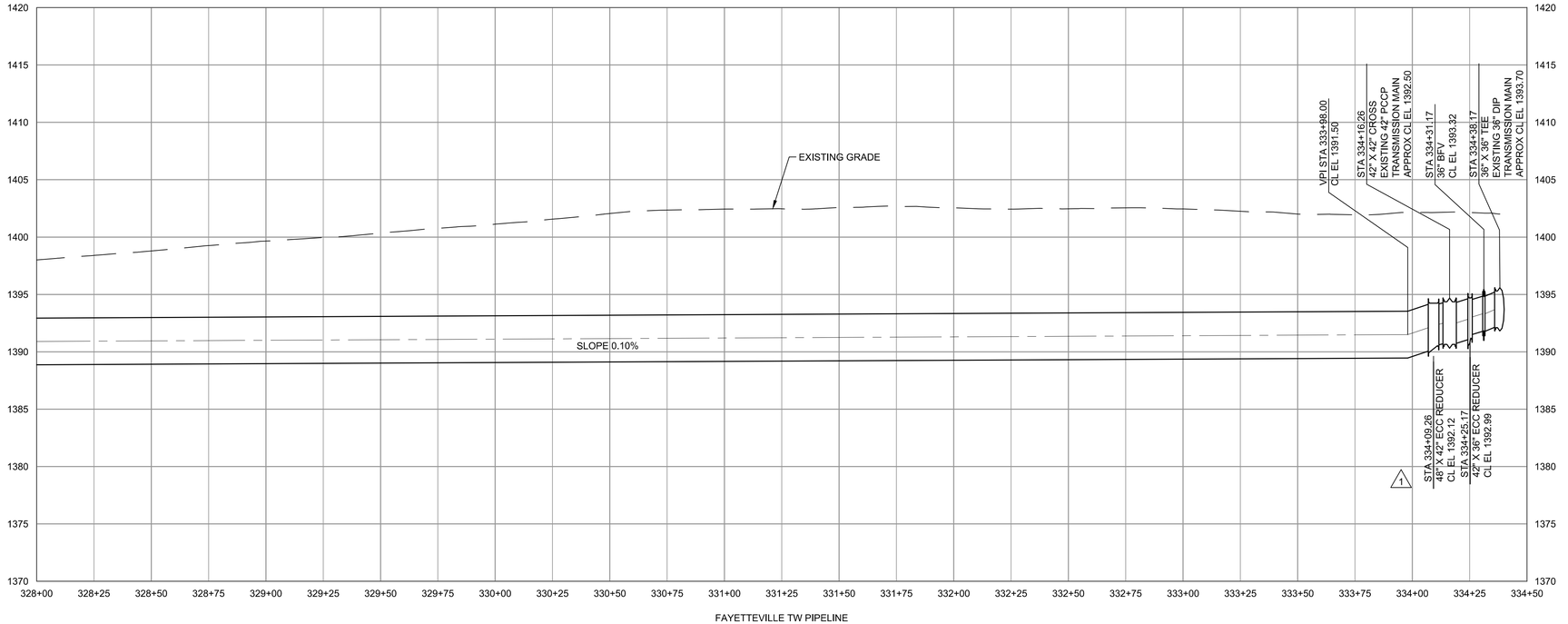
36 OF 82



HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 6'

FAYETTEVILLE TW PIPELINE

PLAN VIEW STA 328+00 TO 334+50



FAYETTEVILLE TW PIPELINE

PROFILE VIEW STA 328+00 TO 334+50

NOTES:

1. CONTRACTOR TO POTHOLE 42" PCCP LINE NEAR CONNECTION POINT TO DETERMINE JOINT LOCATION AND LAY DIRECTION. ADJUST 48" TRANSMISSION MAIN ALIGNMENT TO THE NORTH IF NECESSARY.
2. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. SEE SPECIFICATION 134713.13 FOR CORROSION PROTECTION REQUIREMENTS.
3. CONTRACTOR TO POTHOLE 42" AND 36" PIPING AT TIE-IN LOCATION TO VERIFY ELEVATIONS PRIOR TO INSTALLING NEW PIPING.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

1	01/08/25	ISSUED PER ADDENDUM NO. 1

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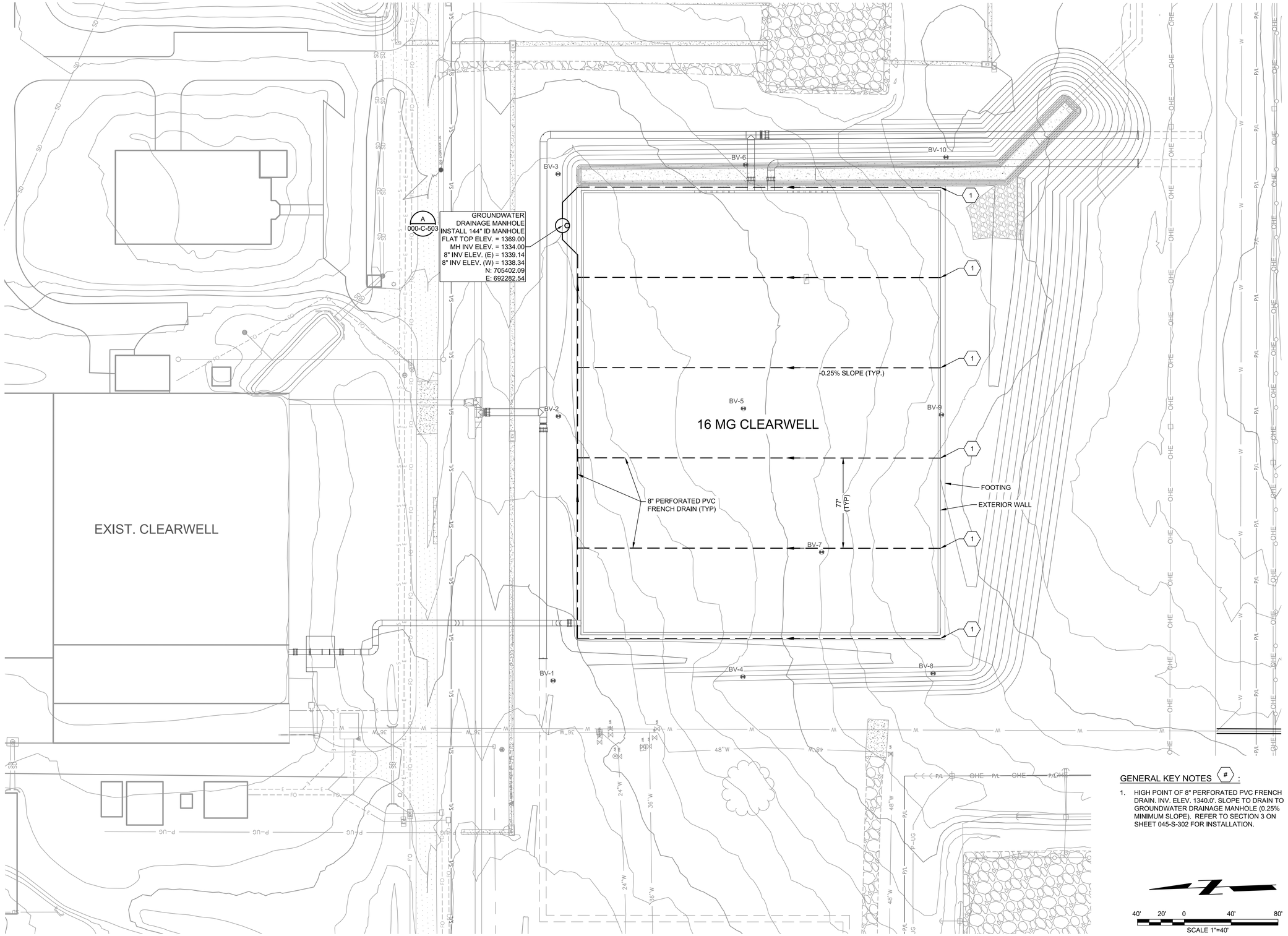
CIVIL

PLAN AND PROFILE
STA 328+00 TO STA 334+50

000-C-314

37 OF 82

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D1:1000



GENERAL KEY NOTES (#):

1. HIGH POINT OF 8" PERFORATED PVC FRENCH DRAIN. INV. ELEV. 1340.0'. SLOPE TO DRAIN TO GROUNDWATER DRAINAGE MANHOLE (0.25% MINIMUM SLOPE). REFER TO SECTION 3 ON SHEET 045-S-302 FOR INSTALLATION.

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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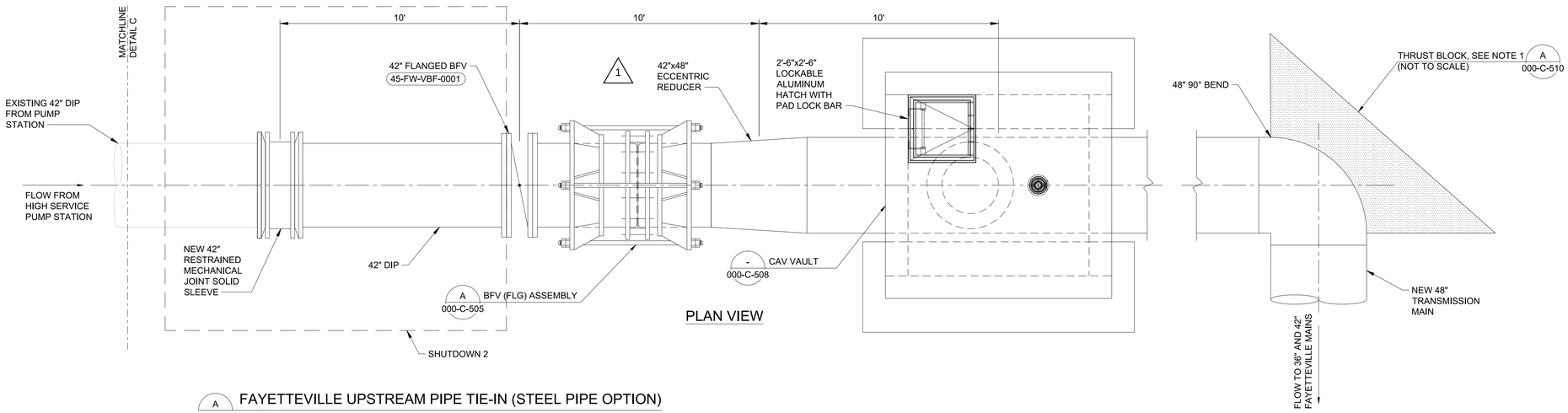
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CIVIL

GROUNDWATER DRAINAGE SYSTEM PLAN

000-C-350

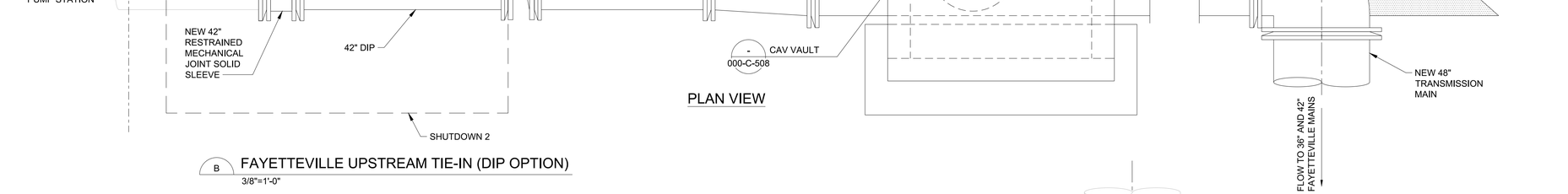
38 OF 82



PLAN VIEW

A FAYETTEVILLE UPSTREAM PIPE TIE-IN (STEEL PIPE OPTION)

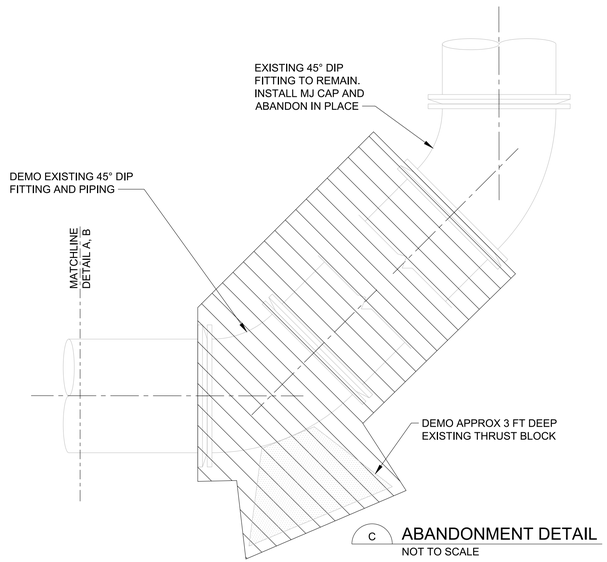
3/8"=1'-0"



PLAN VIEW

B FAYETTEVILLE UPSTREAM TIE-IN (DIP OPTION)

3/8"=1'-0"



C ABANDONMENT DETAIL

NOT TO SCALE

NOTE:
1. DIMENSIONS USED FOR THRUST BLOCK: B=17', h=11'
2. ALL DUCTILE IRON PIPE SHALL BE FULLY RESTRAINED.
3. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. USE TIE-IN DETAIL FROM THIS SHEET WHICH CORRESPONDS TO SELECTED PIPING.
4. SHUTDOWN AND TIE-IN REQUIREMENTS SHALL CONFORM TO "CONNECTIONS TO EXISTING FACILITIES" PARAGRAPHS WITHIN SPECIFICATION SECTION 01 11 13.

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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CIVIL

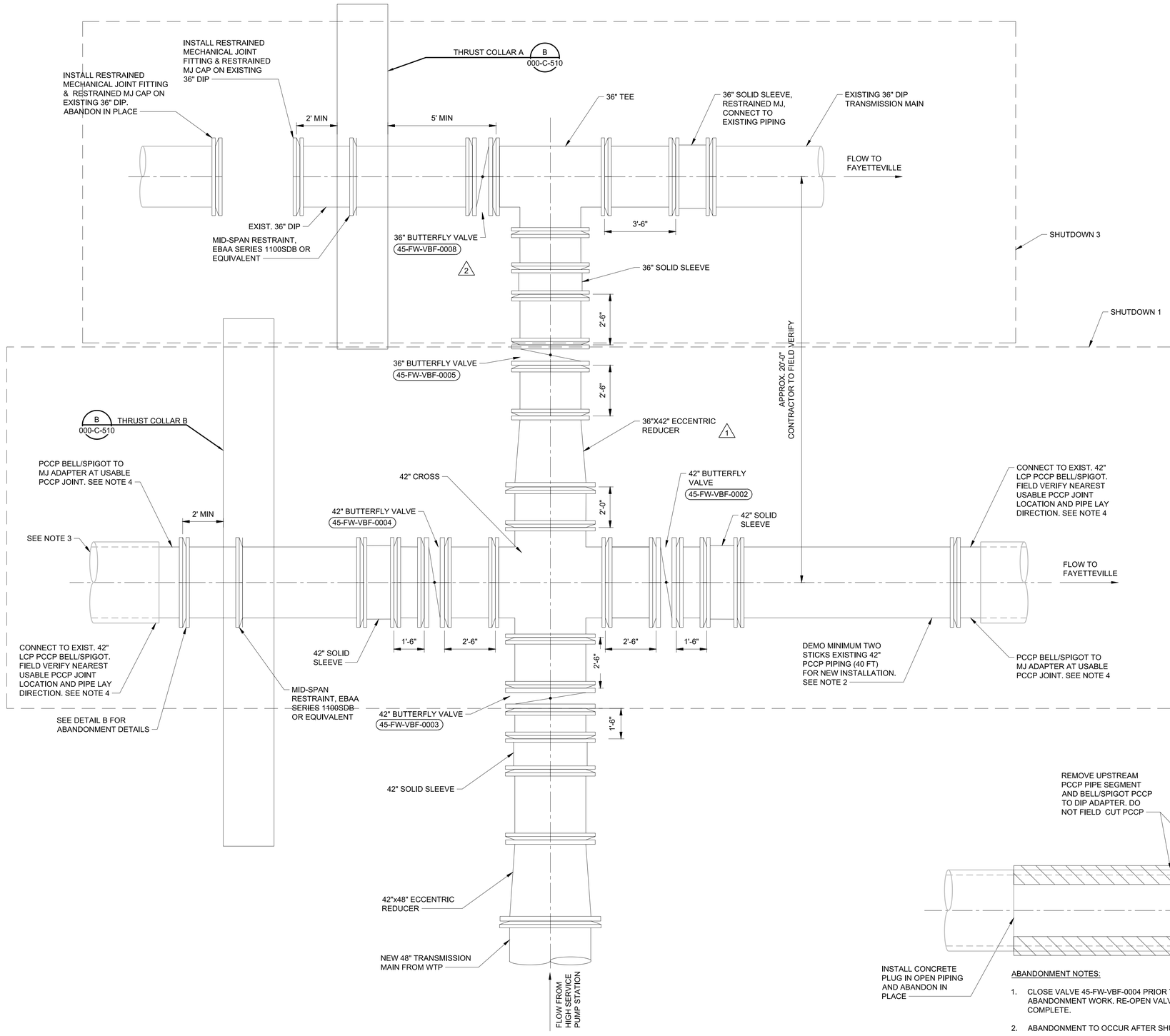
UPSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN

000-C-401

39 OF 82

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D1004



ENLARGED PLAN VIEW

A FAYETTEVILLE DOWNSTREAM TIE-IN (DIP OPTION)

3/8"=1'-0"

NOTE:

1. ALL DUCTILE IRON PIPING SHALL BE FULLY RESTRAINED
2. CONTRACTOR TO SUPPLY ADDITIONAL 40' DIP IN CASE EXISTING PCCP PIPING JOINTS ARE IN POOR CONDITION. PIPING TO BE TURNED OVER TO OWNER AS SPARE PARTS IF NOT REQUIRED TO BE INSTALLED.
3. IMMEDIATELY FOLLOWING SHUTDOWNS 1 – 3, BEGIN ABANDONMENT OF 42" PCCP PIPE BETWEEN UPSTREAM AND DOWNSTREAM TIE-IN POINTS. CLOSE 42" VALVE 45-FW-VBF-0004. DEMOLISH UPSTREAM PCCP PIPE AND BELL/SPIGOT ADAPTER AND INSTALL MJ CAP OR STEEL BLIND FLANGE ON PIPE TO REMAIN. PLACE CONCRETE PLUG OR CAP ON NEAREST UPSTREAM PCCP PIPE SEGMENT TO ABANDON IN PLACE.
4. CONTRACTOR SHALL INSTALL APPLICABLE SPIGOT/BELL ADAPTER PROVIDED BY THOMPSON PIPE GROUP OR APPROVED EQUAL AND CONFORMING TO REQUIREMENTS OF AWWA C301. ADAPTER SHALL CONNECT PCCP TO DIP MJ AND BE INSTALLED PER MANUFACTURER'S DIRECTIONS.
5. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. USE TIE-IN DETAIL FROM THIS SHEET OR 000-C-403 WHICH CORRESPONDS TO SELECTED PIPING.
6. SHUTDOWN AND TIE-IN REQUIREMENTS SHALL CONFORM TO "CONNECTIONS TO EXISTING FACILITIES" PARAGRAPHS WITHIN SPECIFICATION SECTION 01 11 13.

ABANDONMENT NOTES:

1. CLOSE VALVE 45-FW-VBF-0004 PRIOR TO BEGINING ABANDONMENT WORK. RE-OPEN VALVE WHEN WORK IS COMPLETE.
2. ABANDONMENT TO OCCUR AFTER SHUTDOWNS 1-3. SEE NOTE 3.

B ABANDONMENT DETAIL

NOT TO SCALE

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25	ISSUED PER ADDENDUM NO. 2
1	01/08/25	ISSUED PER ADDENDUM NO. 1

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APPROVED:	AJH
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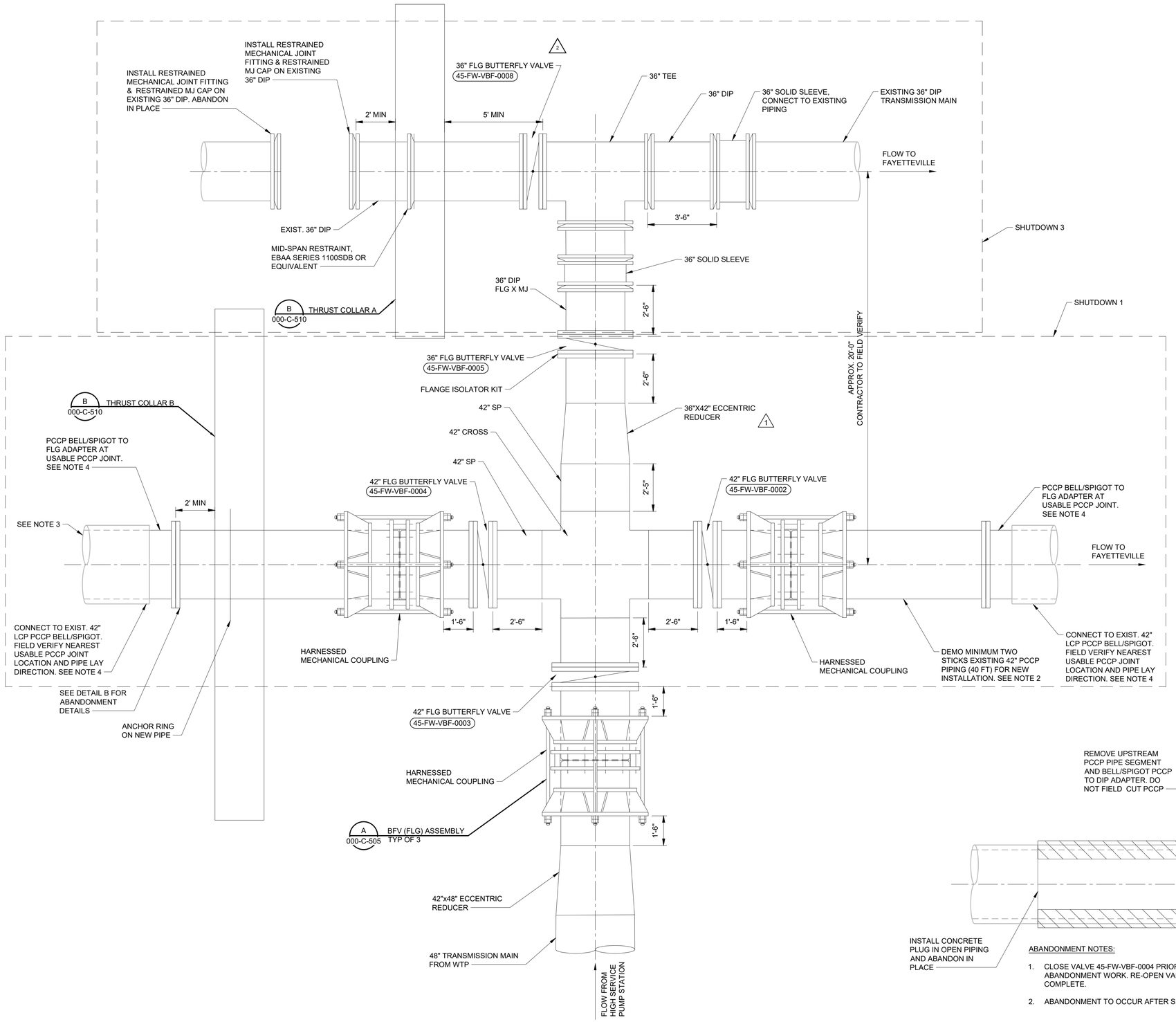
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CIVIL

DOWNSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN (DIP OPTION)

000-C-402

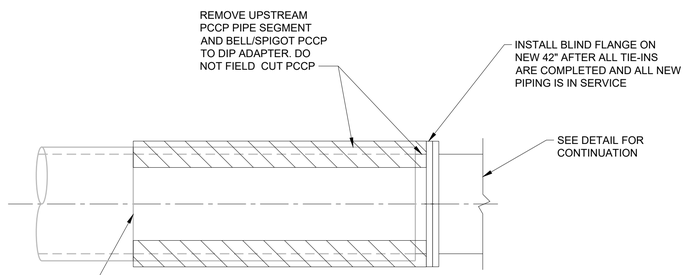
40 OF 82



ENLARGED PLAN VIEW

A FAYETTEVILLE DOWNSTREAM TIE-IN (STEEL PIPE OPTION)

3/8"=1'-0"



ABANDONMENT NOTES:

1. CLOSE VALVE 45-FW-VBF-0004 PRIOR TO BEGINING ABANDONMENT WORK. RE-OPEN VALVE WHEN WORK IS COMPLETE.
2. ABANDONMENT TO OCCUR AFTER SHUTDOWNS 1-3. SEE NOTE 3.

B ABANDONMENT DETAIL

NOT TO SCALE

NOTE:

1. ALL DUCTILE IRON PIPING SHALL BE FULLY RESTRAINED
2. CONTRACTOR TO SUPPLY ADDITIONAL 40' DIP IN CASE EXISTING PCCP PIPING JOINTS ARE IN POOR CONDITION. PIPING TO BE TURNED OVER TO OWNER AS SPARE PARTS IF NOT REQUIRED TO BE INSTALLED.
3. IMMEDIATELY FOLLOWING SHUTDOWNS 1 – 3, BEGIN ABANDONMENT OF 42" PCCP PIPE BETWEEN UPSTREAM AND DOWNSTREAM TIE-IN POINTS. CLOSE 42" VALVE 45-FW-VBF-0004. DEMOLISH UPSTREAM PCCP PIPE AND BELL/SPIGOT ADAPTER AND INSTALL MJ CAP OR STEEL BLIND FLANGE ON PIPE TO REMAIN. PLACE CONCRETE PLUG OR CAP ON NEAREST UPSTREAM PCCP PIPE SEGMENT TO ABANDON IN PLACE.
4. CONTRACTOR SHALL INSTALL APPLICABLE SPIGOT/BELL ADAPTER PROVIDED BY THOMPSON PIPE GROUP OR APPROVED EQUAL AND CONFORMING TO REQUIREMENTS OF AWWA C301. ADAPTER SHALL CONNECT PCCP TO STEEL PIPE FLANGE AND BE INSTALLED PER MANUFACTURER'S DIRECTIONS.
5. TRANSMISSION MAIN PIPING MATERIAL MAY BE EITHER DUCTILE IRON OR STEEL AT CONTRACTOR'S OPTION. USE TIE-IN DETAIL FROM THIS SHEET OR 000-C-402 WHICH CORRESPONDS TO SELECTED PIPING.

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25	ISSUED PER ADDENDUM NO. 2
1	01/08/25	ISSUED PER ADDENDUM NO. 1

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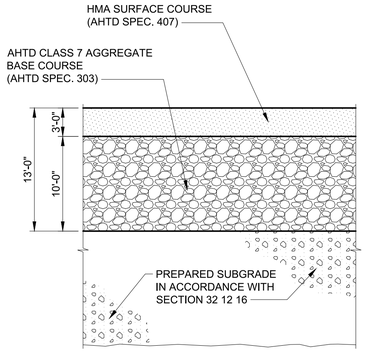
DOWNSTREAM 42" TIE-IN CONNECTION ENLARGED PLAN (STEEL PIPE OPTION)

000-C-403

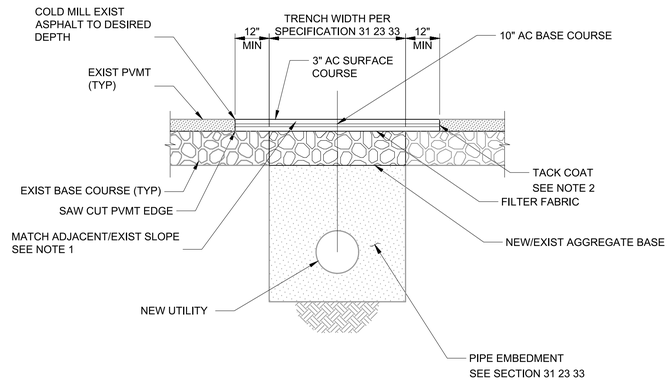
41 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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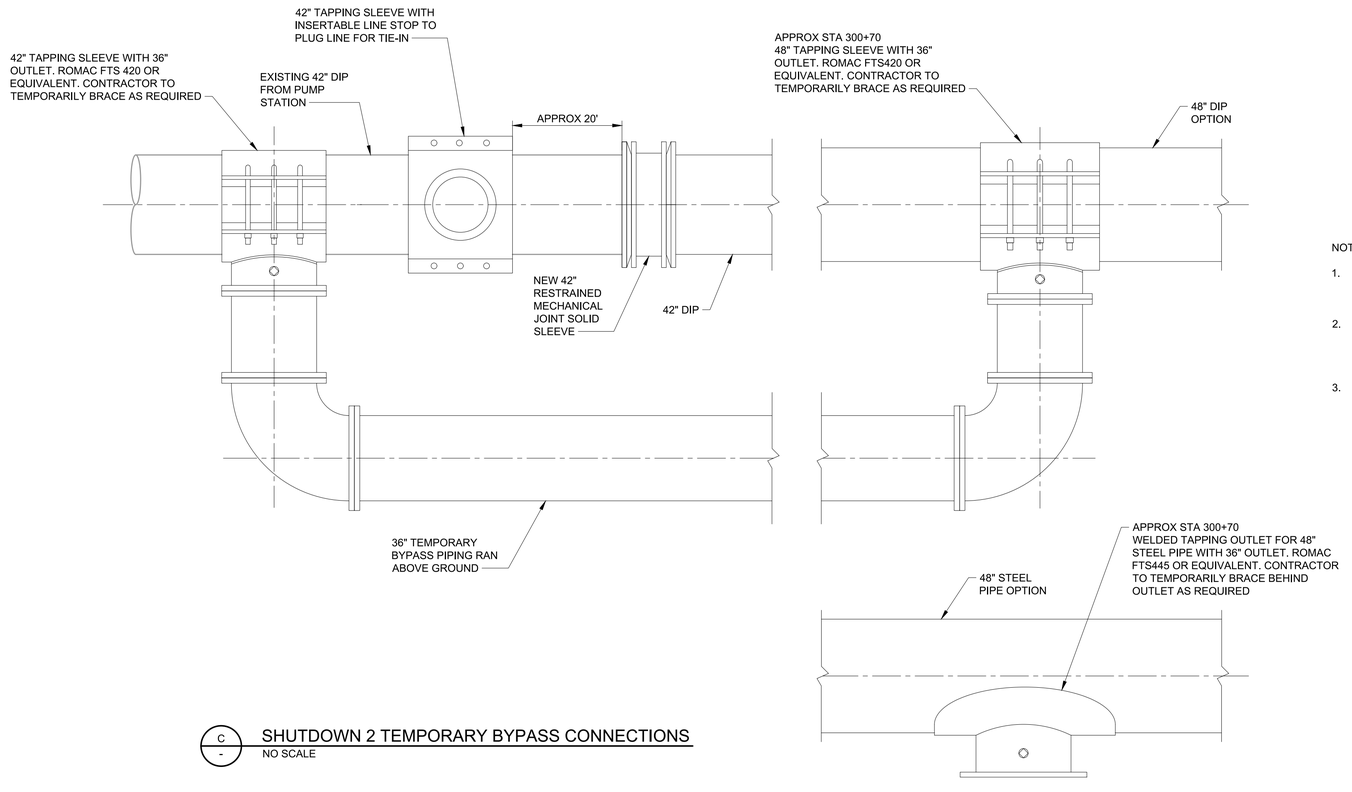
A
-
ASPHALT PAVEMENT
NO SCALE



B
-
AC PAVEMENT PATCH
NO SCALE

NOTES:

1. ALL NEW PAVEMENT SHALL BE TIED INTO EXISTING PAVEMENT OR GRADE SUCH THAT NO WATER WILL BE TRAPPED TO CREATE PONDING BUT WILL PROVIDE POSITIVE DRAINAGE AWAY FROM ALL STRUCTURES AND AWAY FROM ROADWAYS TOWARD STORM SEWER INLETS OR OTHER ACCEPTABLE DRAINAGE COURSE.
2. A TACK COAT SHALL BE APPLIED BETWEEN ALL ASPHALT COURSES AS RECOMMENDED BY THE SUPPLIER.



C
-
SHUTDOWN 2 TEMPORARY BYPASS CONNECTIONS
NO SCALE

NOTES:

1. ALL TAPPIONG SLEEVES, TEMPORARY PIPING, AND APPURTENANCES SHALL BE RATED FOR 250 PSI, NSF 61 CERTIFIED, AND DISINFECTED IN ACCORDANCE WITH SPECIFICATION SECTION 331313.
2. AFTER THE NEW TRANSMISSION MAIN IS CONNECTED, INSTALL COMPLETION PLUGS INTO TAPPING SLEEVES/OUTLETS AND REMOVE INSERTABLE STOP, TEMPORARY VALVES, AND PIPING. INSTALL BLIND FLANGES ON TAPPING SLEEVES AND OUTLETS.
3. CONTRACTOR TO FLOW FILL PIPING WHERE TAPPING SLEEVES OR OUTLETS WERE INSTALLED.

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Beaver Water District

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16 MG CLEARWELL

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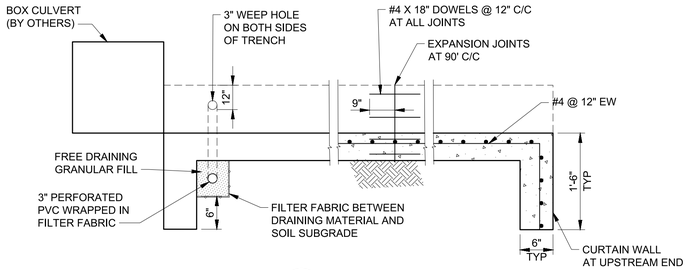
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DETAILS I

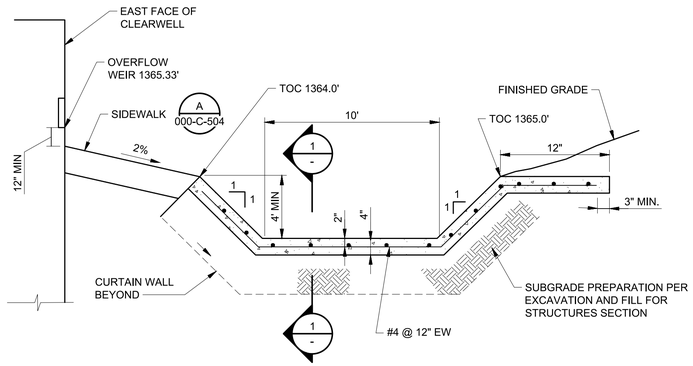
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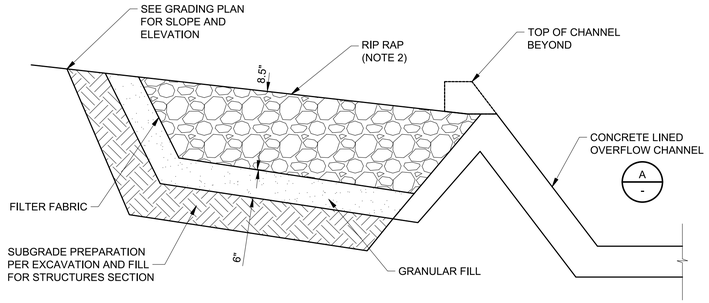
1 - SECTION
NO SCALE



NOTES:

1. SEE SPEC SECTION 03 30 00 FOR CONCRETE MIX DESIGN.
2. CONSTRUCTION JOINTS SHALL BE PLACED EVERY 10'.

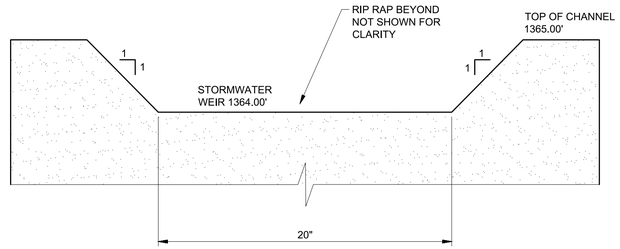
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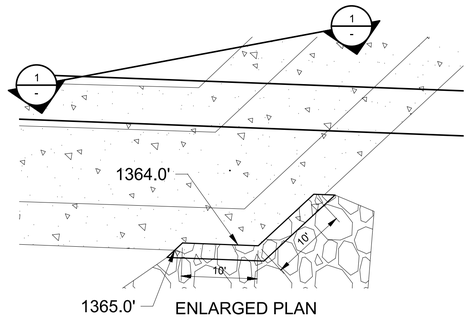
NOTES:

1. FOR RIP RAP AND BEDDING SIZE, SEE SPECIFICATION SECTION 31 25 00.
2. RIP RAP D50 = 4"

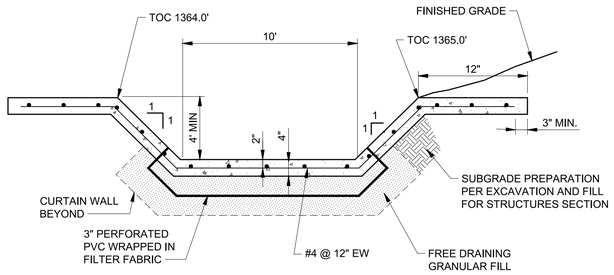
B - RIP RAP AND ARMOR PROTECTION
NO SCALE



1 - SECTION
NO SCALE



C - STORMWATER WEIR DETAIL
1" = 10'



NOTES:

1. SEE SPEC SECTION 03 30 00 FOR CONCRETE MIX DESIGN.
2. CONSTRUCTION JOINTS SHALL BE PLACED EVERY 10'.

D - CONCRETE LINED OVERFLOW CHANNEL WEEP DRAIN DETAIL
NO SCALE

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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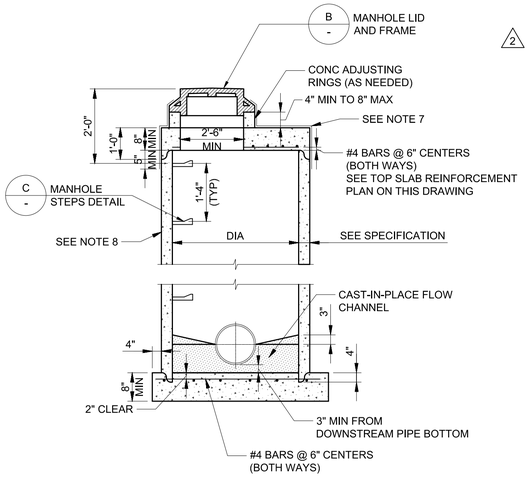
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DETAILS II

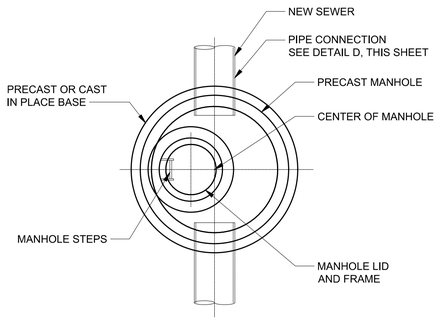
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(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



SECTION



PLAN

NOTES:

2 1. THE INSIDE DIAMETER OF THE MANHOLE SHALL BE 12' UNLESS OTHERWISE NOTED ON THE DRAWING.

2. ALL MANHOLE BASES (PRECAST) SHALL HAVE NO. 4 REINFORCING BARS PLACED ON 12" CENTERS BOTH WAYS.

3. APPROVED GASKET OR CONCRETE MORTAR TO BE USED AROUND PIPE IN KNOCK-OUTS.

4. MINIMUM SLOPES ON THE BOTTOM OF MANHOLE SHALL BE ¼" PER FOOT IN THE DIRECTION OF FLOW.

5. SEE SPECIFICATION SECTION 33 39 13 FOR FURTHER DETAILS.

MANHOLE GENERAL NOTES:

1. ALL MANHOLE RINGS SHALL BE SET IN A MINIMUM OF TWO (2) ROWS OF 3/4 TO 1 INCH PRE-FORMED BUTYL JOIN SEALER.

2. ALL MANHOLE RINGS TO BE PLACED IN PAVEMENT OR IN AREAS TO BE SUBSEQUENTLY PAVED SHALL HAVE "MACHINED HORIZONTAL BEARING SURFACES" AND SHALL COMPLY WITH CLASS #25 AS ESTABLISHED IN ASTM A-48.

3. MAXIMUM GRADE ADJUSTMENT ALLOWABLE IS 8". MINIMUM ALLOWABLE THICKNESS FOR PRECAST CONCRETE GRADE ADJUSTMENT RING IS 4".

4. RISER RINGS:
   A. MANHOLES NOT IN PAVEMENT: ALL MANHOLES SHALL BE PROVIDED WITH RISER RING(S) UNDERNEATH THE CASTING AS SHOWN ON DRAWINGS. A MINIMUM OF ONE (1) 4-INCH RISER RING SHALL BE INSTALLED ON TOP OF THE CONNECTION. IF A GREATER DEPTH OF ADJUSTMENT RINGS IS NECESSARY, A COMBINATION OF 4-INCH AND 6-INCH RISER RINGS MAY BE USED UP TO A MAXIMUM OF 12 INCHES OF RISER RINGS. THE MINIMUM NUMBER OF RISER RINGS REQUIRED TO ACHIEVE THE NECESSARY ADJUSTMENT SHALL BE USED. IF PRECAST CONCRETE RISER RINGS ARE USED, THE JOINTS BETWEEN THE CONE, RISER RINGS, AND CASTING SHALL BE SEALED WITH A DOUBLE BEAD OF PREFORMED BUTYL RUBBER SEALANT. IF RECYCLED RUBBER RISER RINGS ARE USED, THE JOINTS BETWEEN THE CONE, RUBBER RISER RINGS, AND CASTING SHALL BE SEALED WITH THE MANUFACTURER-SUPPLIED SEALANT.
   B. BRICK AND MORTAR ADJUSTMENTS WILL NOT BE ALLOWED.

5. MANHOLE TOP ADJUSTMENTS SHALL BE ACCOMPLISHED BY THE USE OF CONCRETE ADJUSTMENT RINGS.

6. TOP OF MANHOLE CASTING SHALL BE SET FLUSH AND ON SAME SLOPE AS FINISHED SURFACE OR AS DIRECTED BY THE ENGINEER.

7. INSTALLATION OF PIPE OPENINGS: ALL REQUIRED PIPE OPENINGS SHALL BE PLANT CAST IN MANHOLE UNITS. FIELD ALTERATIONS OF OPENINGS WILL BE PERMITTED PROVIDED WALLS ARE SCORED WITH A MASONRY SAW TO A DEPTH SUFFICIENT TO SEVER REINFORCING STEEL. A CHIPPING HAMMER MAY THEN BE USED TO REMOVE THE CONCRETE. MINIMUM DISTANCE BETWEEN ANY TWO ADJACENT PIPES SHALL BE 4".

8. NO DIRECT PAYMENT FOR SHAPING FLOOR OR CONNECTING PIPES AS SHOWN ON PLANS.

A
-
MANHOLE (FLAT TOP)
NO SCALE



B
-
MANHOLE LID AND FRAME
NO SCALE

NOTES:

1. MANHOLE LID AND FRAME SHALL BE AS FOLLOWS:

   LIGHT DUTY: CAST IRON - CLAY & BAILEY "2020", NEENAH "R-1737", EJIW "2810", OR EQUAL.

   HEAVY DUTY (SUBJECT TO VEHICULAR TRAFFIC): CAST IRON - CLAY & BAILEY "2008BV", NEENAH "R-1736", EJIW "1895", OR EQUAL.

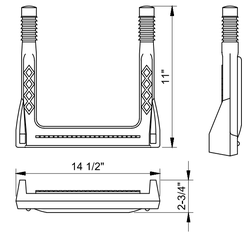
2. DO NOTE LOCATE MANHOLE LID/FRAME IN FLOW PATH.

3. MANHOLE TOP ADJUSTMENTS SHALL BE ACCOMPLISHED BY THE USE OF CONCRETE ADJUSTMENT RINGS.

4. ALL MANHOLE RINGS SHALL BE SET IN A MINIMUM OF TWO (2) ROWS OF 3/4-INCH TO 1-INCH PRE-FORMED BUTYL JOINT SEALER OR CONCRETE MORTAR.

5. MANHOLE FRAME TO BE SET IN GROUT.

6. TOP OF MANHOLE CASTING SHALL BE SET FLUSH AND ON SAME SLOPE AS FINISHED SURFACE UNLESS OTHERWISE INDICATED ON THE DRAWINGS.



NOTES:

1. MANHOLE STEPS SHALL BE CAST IRON; NEENAH FOUNDRY R-1980-J, OR EQUAL.

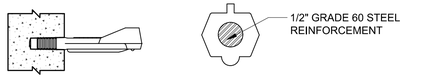
2. MANHOLE STEPS SHALL MEET ASTM C-476, D-4101, A-615, AND AASHTO M-199.

3. MANHOLE STEPS SHALL BE CENTERED BELOW MANHOLE LID OPENING.

4. MANHOLE STEPS SHALL BE PLACED AT A SPACING OF 16 INCH ON CENTER, VERTICALLY, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

5. MANHOLE STEPS TO BE PROVIDED BY AND INSTALLED BY THE PRECAST STRUCTURE MANUFACTURER AT THE MANUFACTURING PLANT.

6. DO NOT LOCATE MANHOLE STEPS IN FLOW PATH.



C
-
MANHOLE STEP DETAIL
NO SCALE

NEW MANHOLE CONNECTION

EXISTING MANHOLE CONNECTION

GENERAL NOTES:

1. ALL REQUIRED PIPE OPENINGS SHALL BE PLANT CAST IN MANHOLES. FIELD ALTERATIONS OF OPENINGS SHALL BE PERMITTED UPON APPROVAL BY ENGINEER. WALLS SHALL BE SCORED WITH A MASONRY SAW TO A DEPTH SUFFICIENT TO SEVER REINFORCEMENT. A CHIPPING HAMMER MAY THEN BE USED TO REMOVE THE CONCRETE CORE. APPROVED GASKET, BOOT, OR CONCRETE MORTAR SHALL BE USED AROUND PIPE IN MANHOLE OPENING.

2. PIPE SHALL EXTEND A MAXIMUM OF 3 INCH INTO THE MANHOLE INTERIOR.

3. CONNECTIONS TO EXISTING BRICK OR BLOCK MANHOLES SHALL BE AS DIRECTED BY ENGINEER.

D
-
PIPE CONNECTIONS AT MANHOLE
NO SCALE

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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D11000
D11004

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25 ISSUED PER ADDENDUM NO. 2

REVISIONS AND RECORD OF ISSUE

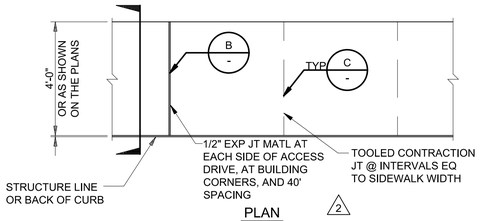
DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

DETAILS III

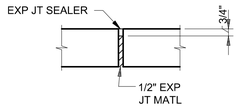
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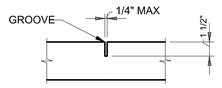
PLAN
3/8"=1'-0"

SECTION
1/2"=1'-0"

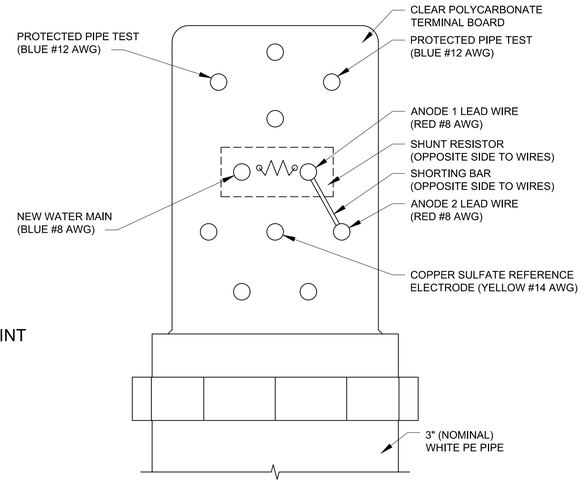
A
-
SIDEWALK
SCALES AS SHOWN



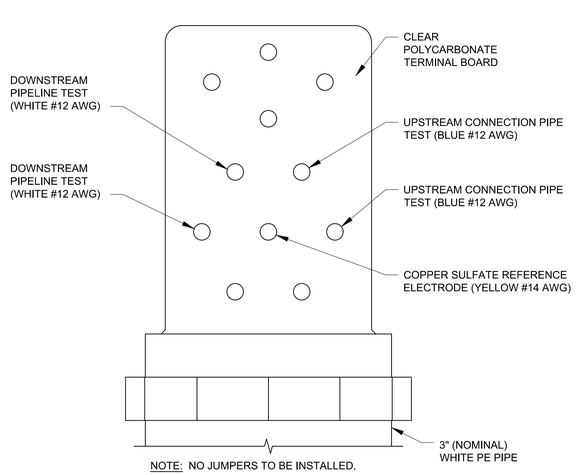
B
-
SIDEWALK EXPANSION JOINT
1 1/2" = 1'-0"



C
-
SIDEWALK TOOLED CONTRACTION JOINT
1-1/2" = 1'-0"

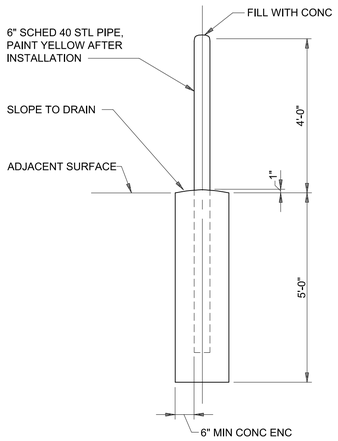


H
-
MULTIPLE ANODE TEST STATION TERMINATION
NO SCALE

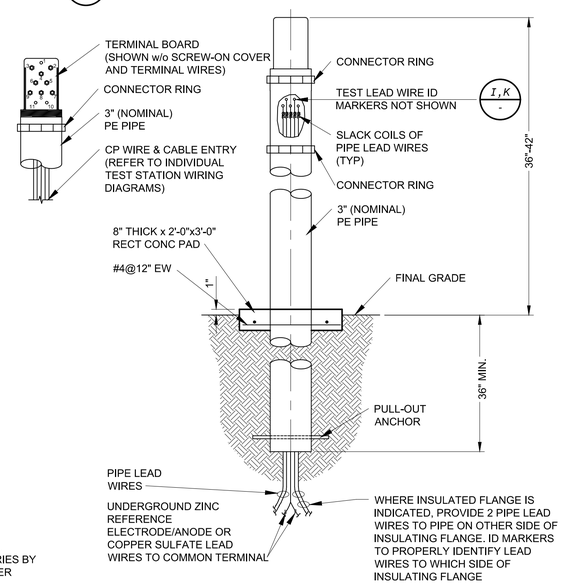


NOTE: NO JUMPERS TO BE INSTALLED.

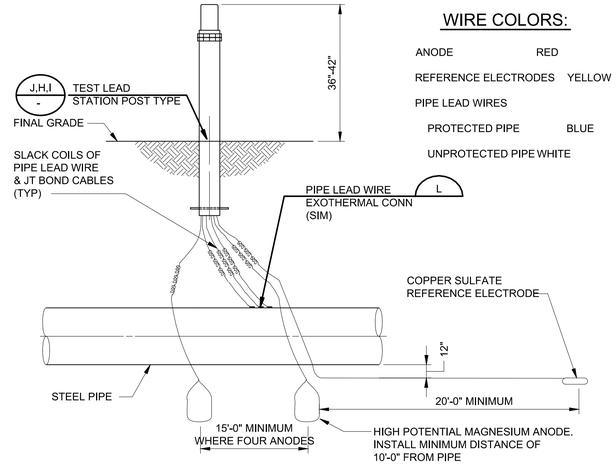
I
-
BURIED INSULATED FLANGE TEST STATION TERMINATION
NO SCALE



D
-
BOLLARD
NO SCALE



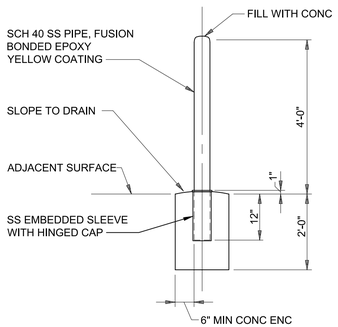
J
-
POST TYPE TEST STATION
NO SCALE



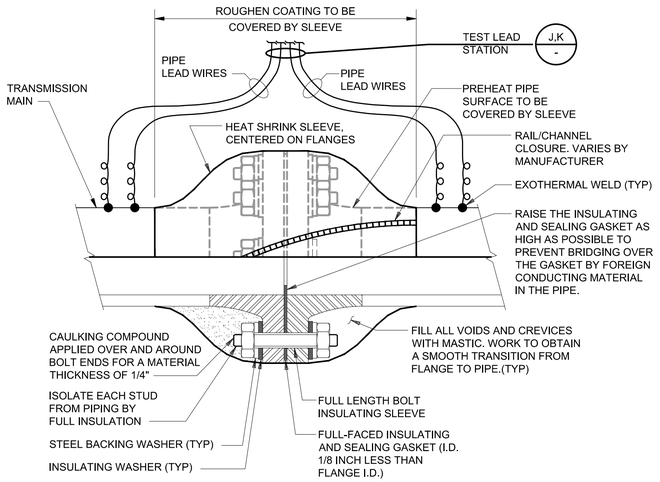
K
-
STEEL PIPE ANODE SEGMENT WITH TEST LEAD STATION
NO SCALE

WIRE COLORS:

ANODE	RED
REFERENCE ELECTRODES	YELLOW
PIPE LEAD WIRES	
PROTECTED PIPE	BLUE
UNPROTECTED PIPE	WHITE

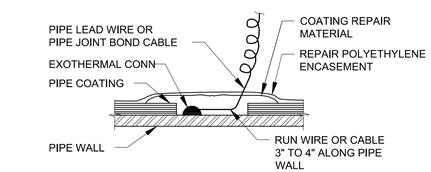


F
-
REMOVABLE BOLLARD
NO SCALE

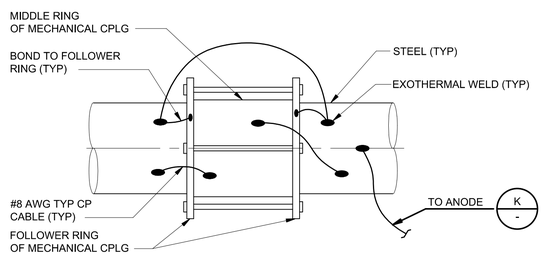


NOTE:
1. WIRE COLORS: ELECTRODE UPSTREAM OF JOINT SHALL BE BLUE. DOWNSTREAM SHALL BE WHITE AND ALL REFERENCE ELECTRODES SHALL BE YELLOW IN COLOR.

G
-
INSULATED FLANGE
NO SCALE



L
-
PIPE LEAD WIRE & PIPE JOINT BOND EXOTHERMAL CONNECTION METHOD
NO SCALE



M
-
JOINT BONDING OF MECHANICAL CPLG
NO SCALE

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 2/10/2025 9:25:01 AM
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FD11000
D11004

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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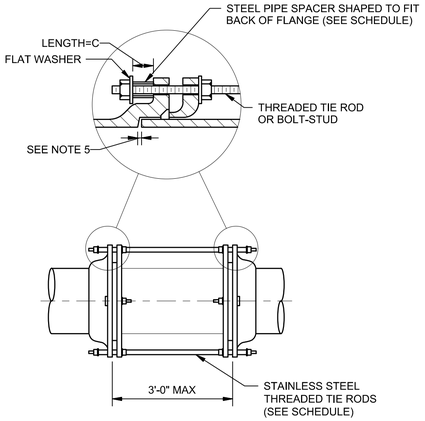
SITE

CIVIL

DETAILS IV

000-C-504

45 OF 82



NOTES:

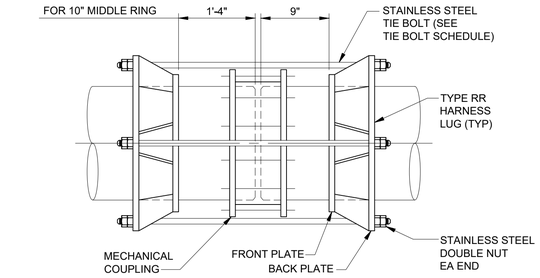
1. PRESSURE SHALL BE THE PRESSURE AT WHICH THE PIPE IS HYDROSTATICALLY TESTED, OR IF THERE IS NO HYDROSTATIC FIELD TEST, IT SHALL BE THE SPECIFIED SHOP TEST PRESSURE.
2. UNLESS OTHERWISE INDICATED, TIE RODS SHALL BE SPACED UNIFORMLY AROUND THE PIPE, BEGINNING WITH THE FIRST TWO AT THE HORIZONTAL CENTERLINE OF THE PIPE, SUBJECT TO THE APPROVAL OF THE ENGINEER.
3. EXCEPT WHERE TIE RODS ARE REQUIRED, BOLTS FOR FOLLOWER RINGS SHALL BE TEE HEAD BOLTS.
4. AT CONTRACTOR'S OPTION, 4" THROUGH 48" MAY BE FURNISHED AS MECHANICAL JOINT STYLE WITH TIE RODS, OR POSITIVE LOCKING SEGMENTS AND/OR RINGS SUCH AS AMERICAN PIPE 14" THROUGH 36" SIZE MAY BE FURNISHED AS FLEX RING STYLE RESTRAINED JOINTS AND 42" THROUGH 64" SIZE MAY BE FURNISHED AS LOC RING STYLE RESTRAINED JOINTS, OR U.S. PIPE "TR-FLEX", OR GRIFFIN PIPE "SNAP-LOCK".

MECHANICAL TIE ROD SCHEDULE

PIPE SIZE (INCHES)	MINIMUM PRESSURE (PSI) (NOTE 1)	TIE RODS		PIPE SPACERS		
		NO. OF RODS (NOTE 2)	DIA OF RODS (INCHES)	DIA OF SPACERS (INCHES)	LENGTH=C (INCHES)	PIPE SCHEDULE
36	250	22	1	1 1/4	4	80
42	250	20	1 1/4	1 1/2	4	80
48	250	28	1 1/4	1 1/2	4	80

A - NO SCALE

DIP MECHANICAL JOINT COUPLING WITH TIE RODS

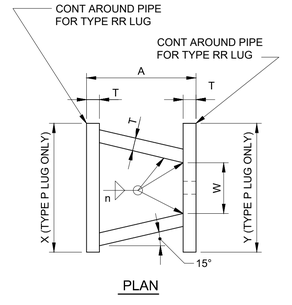


NOTES:

1. THE PIPE FOR LUG DESIGN SHALL INCLUDE WRAPPERS OR PADS OR THE PIPE WALL THICKNESS INCREASED AS REQUIRED TO MEET MINIMUM PIPE THICKNESS IN ACCORDANCE WITH AWWA M-11 DESIGN REQUIREMENTS.
2. WHERE HARNESS LUGS ARE SPECIFIED FOR VERTICAL TURBINE PUMP DISCHARGE OUTLETS, THE NUMBER AND SIZE OF THE TIE RODS FOR THE HARNESS COUPLING MUST EQUAL THE AREA OF THE CONNECTING STEEL PIPE WALL. CONTRACTOR SHALL COORDINATE THIS DESIGN REQUIREMENT WITH THE PUMP AND PIPE MANUFACTURERS.

B - NO SCALE

STEEL PIPE HARNESSED MECHANICAL COUPLING WITH TYPE RR LUGS



PLAN ELEVATION

DIMENSIONS IN INCHES

TIE BOLT DIAMETER	T	A	Y	W	X	HB	E	HF	HOLE DIAMETER
5/8	3/8	5	5	1 3/8	5	3 7/8	3	2	3/4
3/4	3/8	5	5	1 1/2	5	4 1/8	3 1/8	2	7/8
7/8	1/2	5 1/2	5	1 5/8	5	4 1/4	3 1/8	2	1
1	1/2	5 3/4	RING	1 3/4	RING	4 1/2	3 1/4	2	1 1/8
1 1/8	1/2	7	RING	1 7/8	RING	4 3/4	3 5/8	2 1/2	1 1/4
1 1/4	5/8	7 1/2	RING	2	RING	5	3 3/4	2 1/2	1 3/8
1 3/8	5/8	8 3/4	RING	2 1/8	RING	5 3/8	3 3/4	2 1/2	1 1/2
1 1/2	3/4	10	RING	2 1/4	RING	5 1/2	3 7/8	2 1/2	1 5/8
1 5/8	3/4	10 3/4	RING	2 3/8	RING	5 5/8	3 7/8	2 1/2	1 3/4
1 3/4	7/8	12	RING	2 1/2	RING	5 7/8	4	2 1/2	1 7/8
1 7/8	7/8	13	RING	2 5/8	RING	6	4	2 1/2	2
2	1	14	RING	2 3/4	RING	6 1/4	4 1/4	2 1/2	2 1/8
2 1/4	1	15 3/4	RING	3	RING	6 3/4	4 5/16	2 1/2	2 3/8

NOTES:

1. n = PIPE WALL THICKNESS.
2. FOR HARNESS LUG TYPE RR, THE GUSSET PLATES BETWEEN THE FRONT PLATE AND THE BACK PLATE MAY BE PERPENDICULAR TO THE FRONT AND BACK PLATES WITH A MINIMUM CLEAR DISTANCE BETWEEN EACH PAIR OF GUSSET PLATES OF DIMENSION W.

C - NO SCALE

STEEL PIPE HARNESS LUGS

STEEL PIPE TIE BOLT SCHEDULE FOR HARNESSED JOINTS

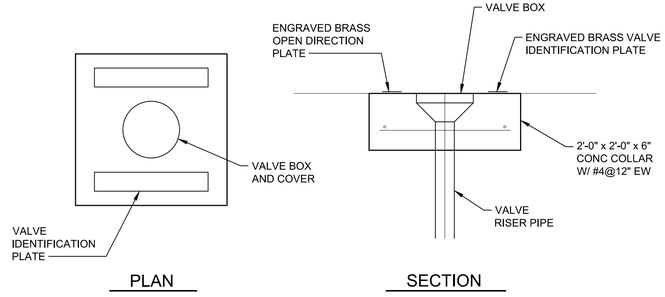
NOMINAL PIPE SIZE (INCHES)	PRESSURE (psi) (NOTE 1)	TIE BOLTS		LUG TYPE
		DIA OF RODS (INCHES)	NO. OF RODS (NOTE 2)	
42	250	1 3/4	6	RR
48	250	2	6	RR
54	50	1 1/8	4	RR
60	50	1 1/4	4	RR
72	50	1 1/4	6	RR
84	50	1 1/2	6	RR

NOTES:

1. PRESSURE SHALL BE THE PRESSURE AT WHICH THE PIPE IS HYDROSTATICALLY TESTED, OR IF THERE IS NO HYDROSTATIC FIELD TEST, IT SHALL BE THE SPECIFIED SHOP TEST PRESSURE.
2. NUMBER OF TIE BOLTS IS BASED ON AN ALLOWABLE STRESS ON NET TENSION AREA OF 40,000 PSI.
3. UNLESS OTHERWISE INDICATED, TIE BOLTS SHALL BE SPACED UNIFORMLY AROUND THE PIPE, BEGINNING WITH THE FIRST TWO AT THE HORIZONTAL CENTERLINE OF THE PIPE, SUBJECT TO THE APPROVAL OF THE ENGINEER.

D - NO SCALE

STEEL PIPE TIE BOLT SCHEDULE FOR HARNESSED JOINTS



PLAN SECTION

E - NO SCALE

BURIED VALVE OPERATOR BOX

2

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25 ISSUED PER ADDENDUM NO. 2

REVISIONS AND RECORD OF ISSUE

DESIGNED:	BGM
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

SITE

CIVIL

DETAILS V

000-C-505

R1-1



R1-2



R2-1



W3-5



R4-1



R4-2



R5-1



R11-2



48"x30"

R11-3a



R11-4



W21-5a



W1-1R



W1-2R



W1-3R



W1-4R



W1-6R



W1-8R



W3-1



W3-2



W4-2R



W5-1



W6-3



W8-7



W9-2R



W13-1



W20-1



W20-2



W20-3



W20-4



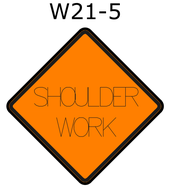
W20-5



W20-7a



W21-5



W24-1R



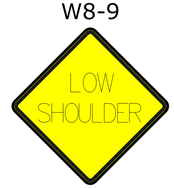
W1-4bR



W8-11



W8-9



KG20-2



OM-3L OM-3R



M4-9R



30"x24"

M4-10R



48"x18"

KI-105a

TRAFFIC CONTROL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE TO FOLLOW ALL NECESSARY PERMITS/REQUIREMENTS FOR OPEN CUTTING ROADWAYS IN BENTON COUNTY. BEAVER WATER DISTRICT HAS OBTAINED THE PERMIT TO OPEN CUT FRISCO CHURCH ROAD.

2. CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS, GUIDELINES, AND SPECIFICATIONS TO CROSS RIGHT-OF-WAY ENTITY HAVING JURISDICTION, CITY, OR COUNTY, AS REQUIRED. REQUIREMENTS MAY BE FOUND AT THE FOLLOWING WEB ADDRESS:

   BENTON COUNTY:
   HTTPS://BENTONCOUNTYAR.GOV/COUNTY-PLANNING/WP-CONTENT/DOCUMENTS/SITES/13/2023/10/2023-EFFECTIVE-BENTON-COUNTY-PLANNING-AND-DEVELOPMENT-REGULATIONS.PDF

3. PROJECT INCLUDES 1 OPEN CUT CROSSING. BELOW FIND A LIST OF ROADWAY CROSSINGS AND ENTITY HAVING JURISDICTION.

CLEARWELL - FAYETTEVILLE LINE ROAD CROSSINGS					
NUMBER	SHEET	STATION	CROSSING DESCRIPTION	BORE OR OPEN CUT	JURISDICTION
1	000-C-305	309+55	FRISCO CHURCH ROAD	OPEN CUT	BENTON COUNTY

4. CONTACT INFORMATION

   BENTON COUNTY
   JAY FRASIER
   479-271-1053
   ROADS@BENTONCOUNTYAR.GOV

   BENTON COUNTY
   MICHAEL BLACKBURN
   479-212-3523
   MICHAEL.BLACKBURN@BENTONCOUNTYAR.GOV

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JRC
DETAILED:	RCB
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

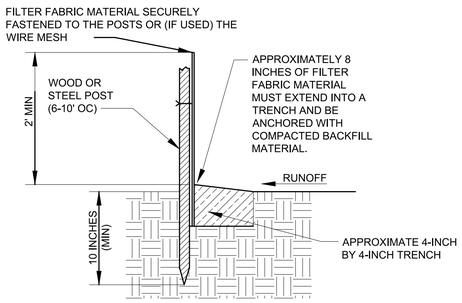
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CIVIL

TRAFFIC CONTROL DETAILS AND NOTES

000-C-506

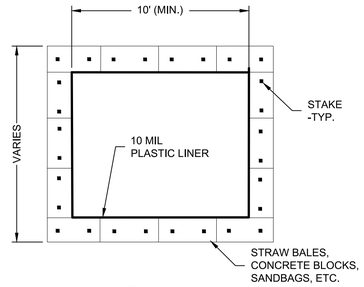
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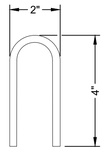
A - SILT FENCE DETAIL
NO SCALE

NOTES:

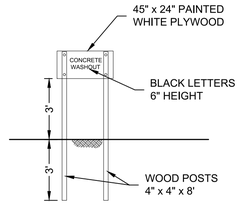
1. ACTUAL LAYOUT LOCATIONS & NUMBER OF WASH-OUTS TO BE DETERMINED BY CONTRACTOR IN FIELD.
2. THE CONCRETE WASH-OUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. WASH-OUTS SHALL BE LOCATED A MINIMUM OF 50 FT. FROM STORM DRAINS, OPEN DRAINAGE FACILITIES AND WATER COURSES. AVOID MIXING EXCESS AMOUNTS OF FRESH CONCRETE.
4. INSTALL BEFORE THE START OF ANY CONCRETE ACTIVITIES OR DELIVERIES.
5. INSPECT EVERY WEEK AND AFTER ½" STORM EVENT. REMOVE AND DISPOSE OF HARDENED CONCRETE AND RETURN THE FACILITY TO A FUNCTIONAL CONDITION. WASH-OUT FACILITIES MUST BE CLEANED, OR NEW FACILITIES MUST BE CONSTRUCTED AND READY FOR USE ONCE THE WASH-OUT IS 75% FULL.
6. WHEN TEMPORARY CONCRETE WASH-OUT FACILITIES ARE NO LONGER REQUIRED FOR THE WORK, THE HARDENED CONCRETE SHOULD BE REMOVED AND DISPOSED. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASH-OUT FACILITIES SHALL BE REMOVED FROM THE SITE AND DISPOSED. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCE CAUSED BY THE REMOVAL OF THE WASH-OUT SHALL BE BACKFILLED AND REPAIRED.



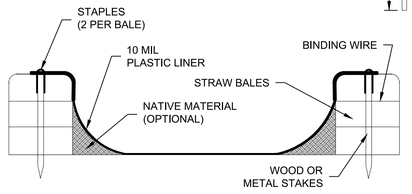
PLAN



STAPLE

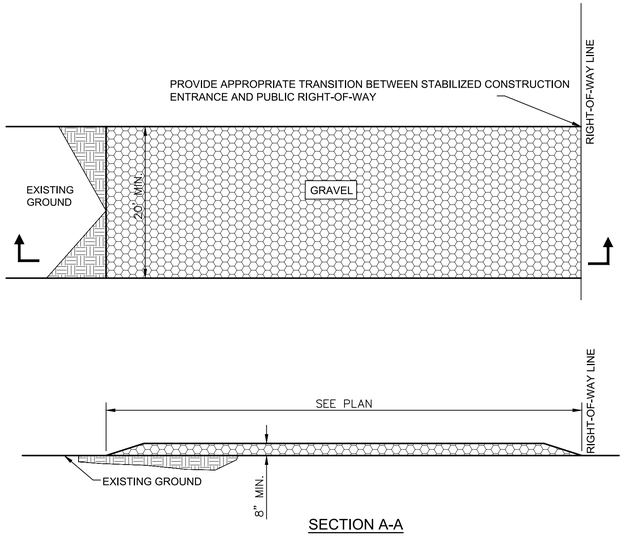


WASHOUT SIGN



SECTION

B - CONCRETE WASH-OUT DETAIL
NO SCALE

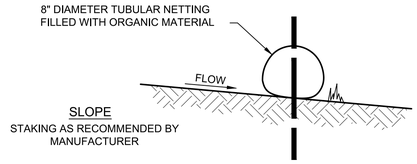


SECTION A-A

D - STABLIZIED CONSTRUCTION ENTRANCE
NO SCALE

STABILIZED CONSTRUCTION ENTRANCE NOTES:

1. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE AT ANY LOCATION WHERE ENTRANCE TO THE CONSTRUCTION SITE IS PERMITTED.
2. THE STONE SIZE SHALL CONSIST OF COARSE AGGREGATE IN ACCORDANCE WITH AASHTO M43 GRADATION 357. THE MATERIAL PLACED SHALL NOT BE LESS THAN THE WIDTH OF THE INGRESS OR EGRESS.
3. MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. REMOVE ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY.
4. WHEN NECESSARY, CLEAN WHEELS TO REMOVE SEDIMENT PRIOR TO ENTRANCE INTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. PREVENT SEDIMENT FROM ENTERING ANY STORM DRAIN, DITCH, OR WATER COURSE THROUGH USE OF SAND BAGS, GRAVEL, BOARDS OR OTHER APPROVED METHODS.
5. NO SEPARATE PAYMENT WILL BE MADE FOR STABILIZED CONSTRUCTION ENTRANCE. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS IN THE CONTRACT.



SEDIMENT BARRIER NOTES:

1. PLACE SEDIMENT BARRIER AT DOWNSLOPE LIMIT OF AREA TO BE GRADED AS NECESSARY.
2. FASTEN SEDIMENT BARRIER AS RECOMMENDED BY MANUFACTURER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. SEDIMENT BARRIER SHALL BE REMOVED WHEN IT HAS SERVED IT'S USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
6. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH RECOMMENDED BY MANUFACTURER AND DISPOSED OF IN AN APPROVED SPOIL SITE OR AS IN NO. 5 ABOVE.
7. AT EACH END OF SEDIMENT BARRIER, TURN SOCK UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18".

C - SEDIMENT BARRIER
NO SCALE

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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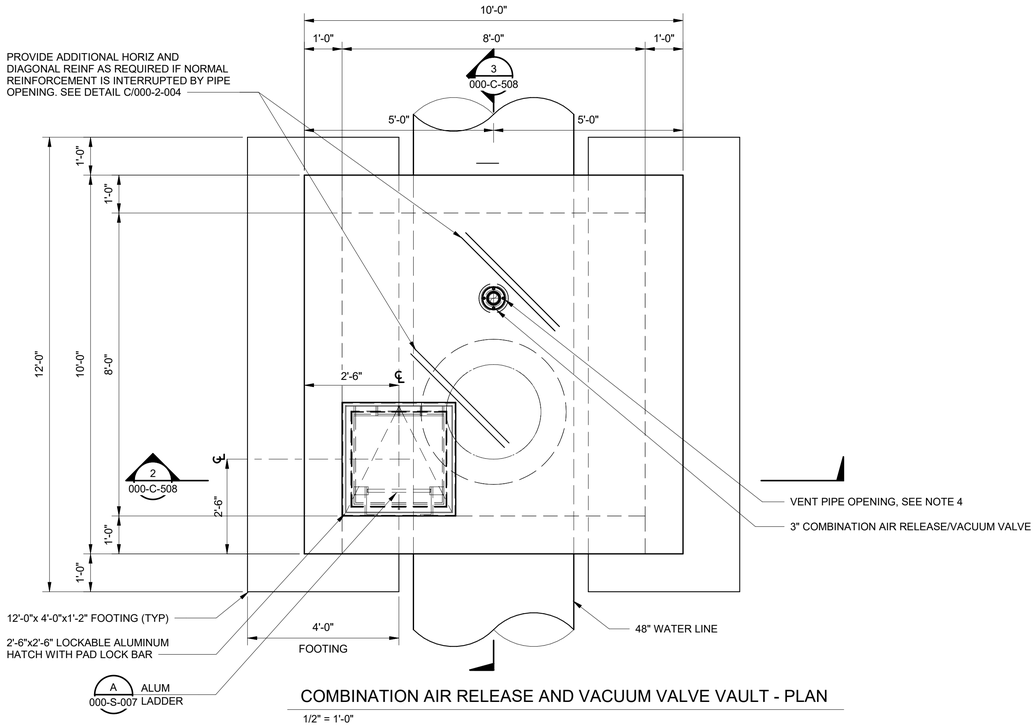
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EROSION CONTROL DETAILS

000-C-507

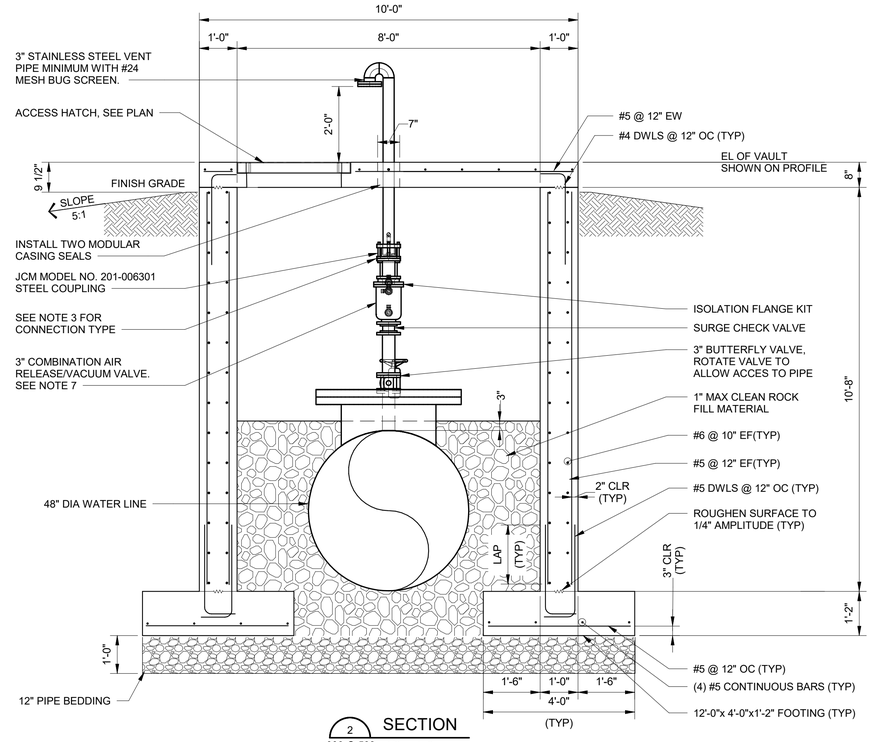
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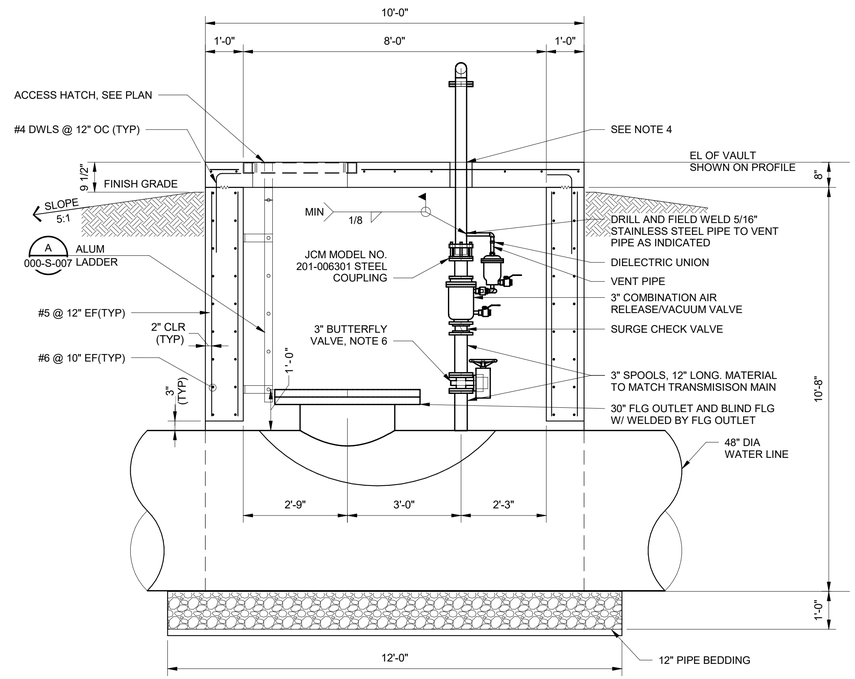
COMBINATION AIR RELEASE AND VACUUM VALVE VAULT - PLAN

1/2" = 1'-0"



2 SECTION

000-C-508 1/2" = 1'-0"



3 SECTION

000-C-508 1/2" = 1'-0"

GENERAL NOTES

1. PIPE AND VALVE MATERIAL OF CONSTRUCTION TO MATCH TRANSMISSION MAIN MATERIAL BELOW ISOLATION FLANGE.
2. GATE VALVES LOCATED IN THE AIR RELEASE/VACUUM VALVE VAULT SHALL HAVE FLANGED END CONNECTIONS.
3. CAV TO VENT PIPE CONNECTION TYPE:
   a. 3" FLANGED
4. PROVIDE MINIMUM 2" CLEARANCE BETWEEN REINFORCING AND VENT PIPE AT CONCRETE LID PENETRATIONS.
5. CAST-IN-PLACE VAULTS SHOWN IN DETAILS. PRE-CAST VAULTS MAY BE PROVIDED AT CONTRACTOR'S OPTION.
6. BUTTERFLY VALVE BODY TO MATCH PIPE SPOOL MATERIAL.
7. CAV SMALL ORIFICE SIZE IS 5/16". INLET AND OUTLET ARE 3" WITH CLASS 125 FLANGED CONNECTIONS. MATERIAL OF CONSTRUCTION TO MATCH PIPELINE.

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CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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CHECKED:	SHZ
APPROVED:	AJH
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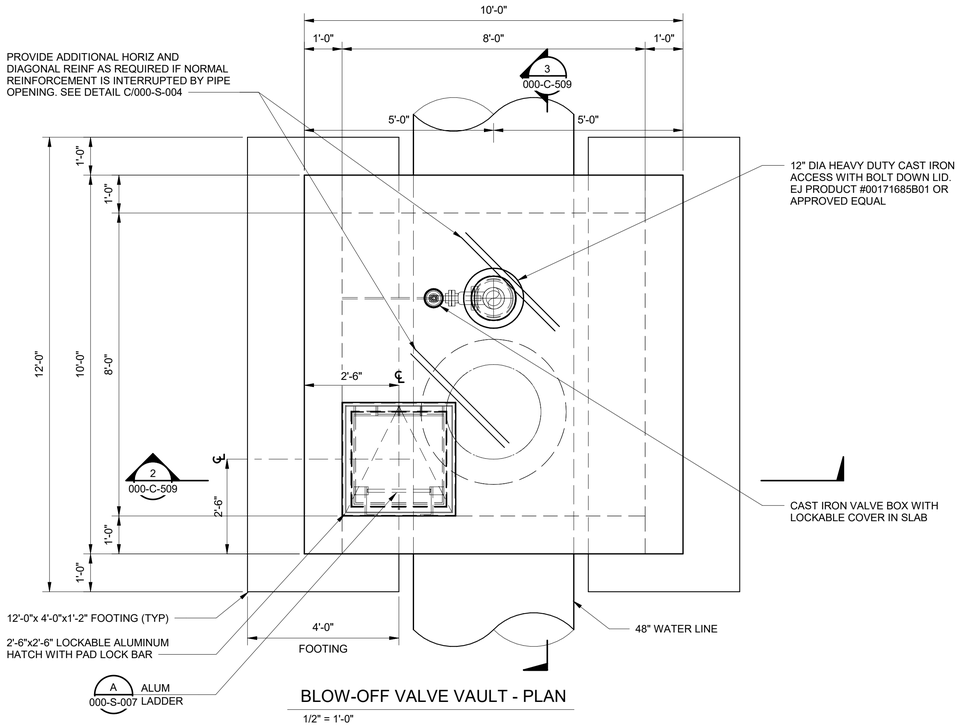
CIVIL

COMBINATION AIR RELEASE AND VACUUM VALVE (CAV) VAULT

000-C-508

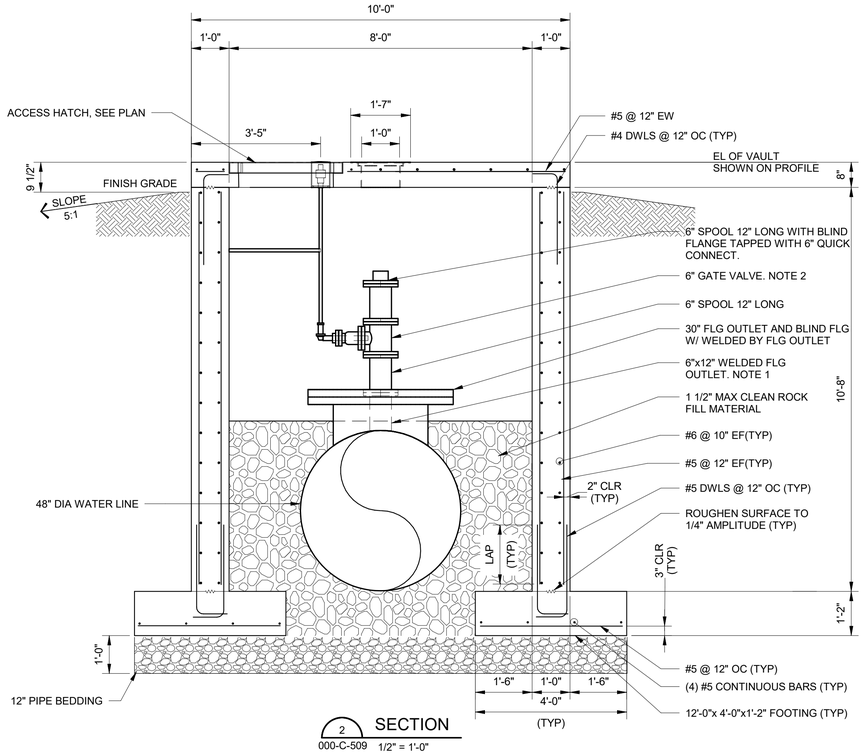
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REVIT VERSION: 2023
D11000

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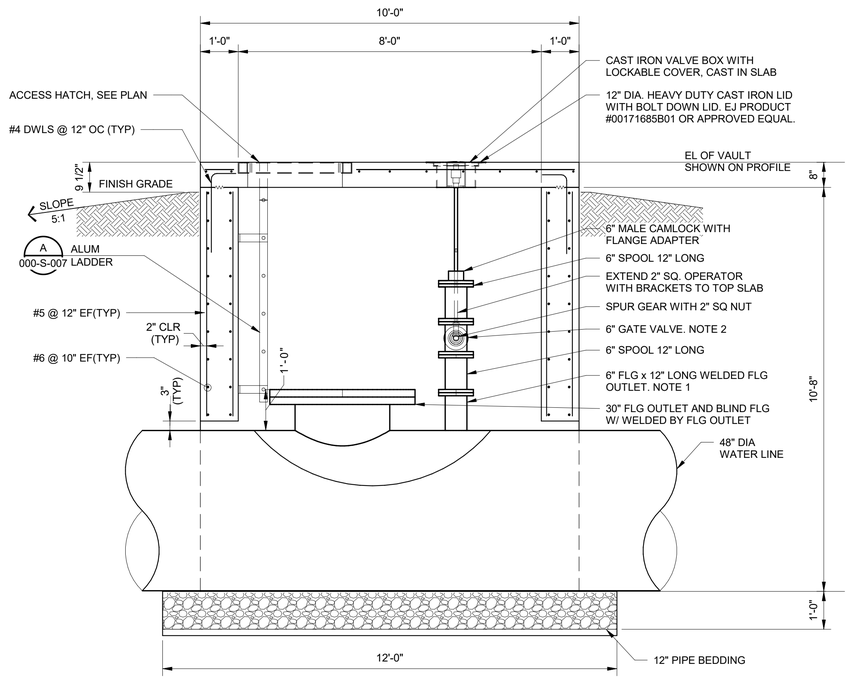
BLOW-OFF VALVE VAULT - PLAN

1/2" = 1'-0"



2 SECTION

000-C-509 1/2" = 1'-0"



3 SECTION

000-C-509 1/2" = 1'-0"

GENERAL NOTES

1. PIPE AND VALVE MATERIAL OF CONSTRUCTION TO MATCH TRANSMISSION MAIN MATERIAL BELOW ISOLATION FLANGE.
2. GATE VALVES LOCATED IN THE AIR RELEASE/VACUUM VALVE VAULT SHALL HAVE FLANGED END CONNECTIONS.
3. CAST-IN-PLACE VAULTS SHOWN IN DETAILS. PRE-CAST VAULTS MAY BE PROVIDED AT CONTRACTOR'S OPTION.

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SITE

CIVIL

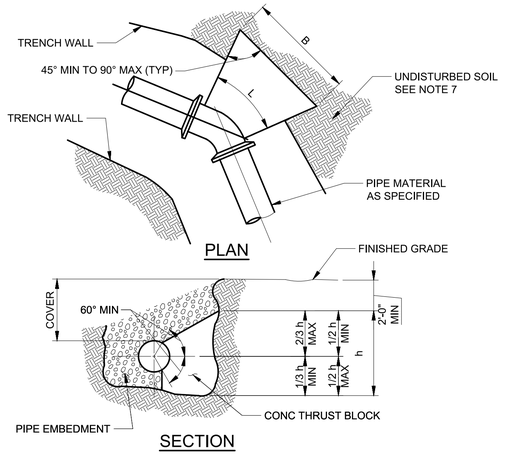
BLOW-OFF VALVE VAULT

000-C-509

50 OF 82

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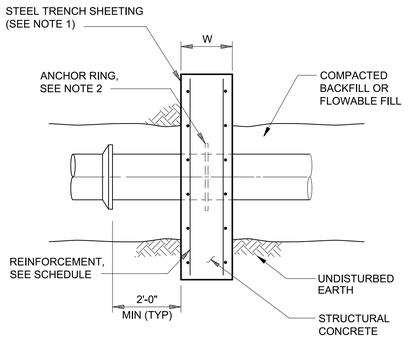
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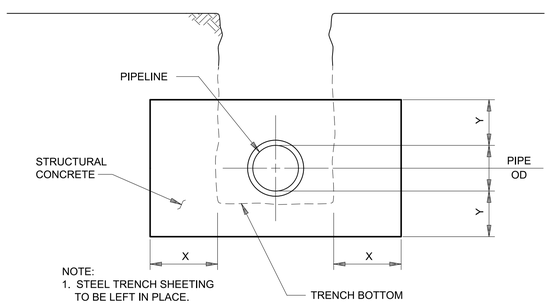


NOTES:

1. MINIMUM BLOCK DIMENSION (B AND h) SHALL BE AT LEAST OD OF PIPE OR 1 FOOT FOR PIPE OD 12" OR LESS.
2. THE BOTTOM OF THE BLOCK SHALL EXTEND AT LEAST TO THE BOTTOM OF THE TRENCH IN ALL CASES.
3. L = FITTING LENGTH MINUS CLEARANCE FOR BELLS.
4. ACTUAL TRENCH SIDESLOPE TO BE DETERMINED BY CONTRACTOR IN ACCORDANCE WITH ALL APPLICABLE SAFETY LAWS AND REGULATIONS.
5. PRIOR TO EXCAVATION AND PLACEMENT OF THRUST COLLAR, CONTRACTOR WILL REVIEW SITE CONDITIONS AND ASSESS MEANS AND METHODS REQUIRED TO MAINTAIN UNDISTURBED SOIL CONDITION BEHIND THE ALL THRUST COLLARS AS SHOWN. USE OF SHEET PILING IS ACCEPTABLE SUBJECT TO REVIEW AND ACCEPTANCE OF SUBMITTAL BY THE ENGINEER. IF UNDISTURBED SOIL CONDITION IS NOT POSSIBLE, CONTRACTOR TO PROVIDE A PLAN TO BE ACCEPTED BY THE ENGINEER THAT WILL PROVIDE ADEQUATE PROTECTION AND SUPPORT FOR THE THRUST COLLARS.
6. CONTRACTOR TO SUBMIT THE REVISED DESIGN IF THE SIZE IS MORE THAN THE DIMENSIONS SPECIFIED IN THIS TABLE.

A
-
CONCRETE THRUST BLOCK
NO SCALE





B
-
CONCRETE THRUST COLLAR
NO SCALE

CONCRETE THRUST COLLAR SCHEDULE						
PIPE DIA (IN)	LONGITUDINAL PIPE THRUST (KIPS)	REBAR	MINIMUM CONCRETE DIMENSION (FT) (SEE NOTE 6)			REMARK
			W	X	Y	
36	291	#6@6" EWEF	2.5	5.5	4.5	COLLAR A
42	393	#6@6" EWEF	2.5	9.5	4	COLLAR B

NOTES:

1. ACTUAL TRENCH SIDESLOPE TO BE DETERMINED BY CONTRACTOR IN ACCORDANCE WITH ALL APPLICABLE SAFETY LAWS AND REGULATIONS.
2. ANCHOR RING FOR STEEL PIPE SHALL BE CONTINUOUSLY WELDED AS RECOMMENDED BY PIPE MFR AND DESIGNED FOR LONGITUDINAL FORCE (SEE SCHEDULE), UNCOATED AND IN DIRECT CONTACT WITH THRUST COLLAR CONCRETE. PIPE COATING SHALL BE HELD BACK AND MINIMUM OF 18 INCHES FROM EDGE OF THRUST COLLAR CONCRETE. DUCTILE IRON PIPE SHALL USE SPLIT RING MID-PIPE RESTRAINT, EBAA 100SDB OR EQUIVALENT, IN LIEU OF WELDED ANCHOR RING.
3. PRIOR TO EXCAVATION AND PLACEMENT OF THRUST COLLAR, CONTRACTOR WILL REVIEW SITE CONDITIONS AND ASSESS MEANS AND METHODS REQUIRED TO MAINTAIN UNDISTURBED SOIL CONDITION BEHIND ALL THE THRUST COLLARS AS SHOWN. USE OF SHEET PILING IS ACCEPTABLE SUBJECT TO REVIEW AND ACCEPTANCE OF SUBMITTAL BY THE ENGINEER. IF UNDISTURBED SOIL CONDITION IS NOT POSSIBLE, CONTRACTOR TO PROVIDE A PLAN TO BE ACCEPTED BY THE ENGINEER THAT WILL PROVIDE ADEQUATE PROTECTION AND SUPPORT FOR THE THRUST COLLARS.
4. CONTRACTOR TO SUBMIT THE REVISED DESIGN IF THE SIZE IS MORE THAN THE DIMENSIONS SPECIFIED IN THIS TABLE.
5. ALL REINFORCING BARS SHALL BE GRADE 60, DEFORMED, ASTM A615, UNLESS NOTED OTHERWISE. DIMENSIONS TO REINFORCING BARS ARE TO BAR CENTERLINES, UNLESS NOTED OTHERWISE. BAR COVER IS THE CLEAR DISTANCE BETWEEN THE BAR AND THE CONCRETE SURFACE. NO WELDING OF REINFORCING BARS SHALL BE PERMITTED UNLESS APPROVAL IS OBTAINED FROM THE ENGINEER PRIOR TO CONSTRUCTION.

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PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

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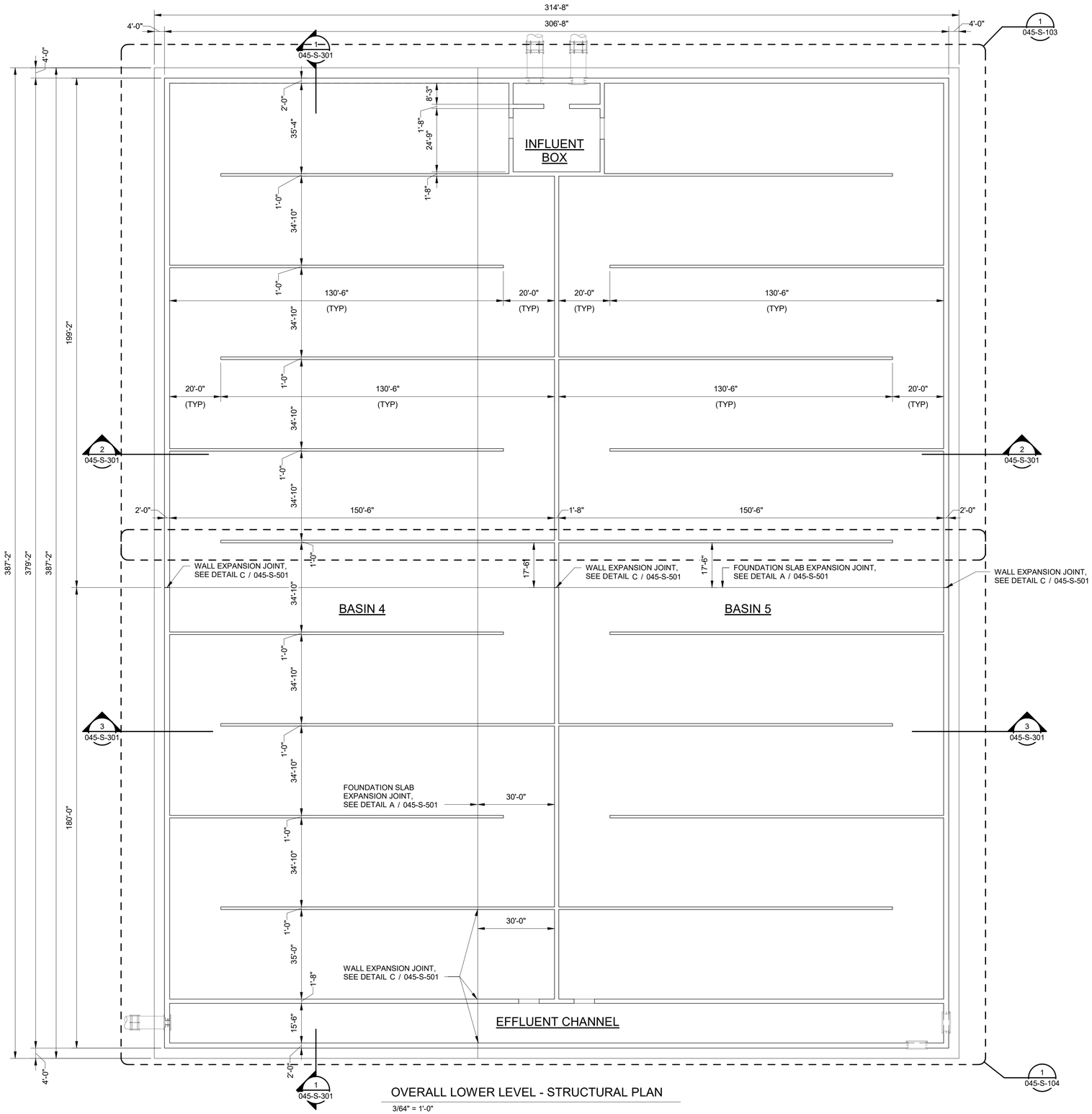
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THRUST BLOCK AND COLLAR DETAILS

000-C-510

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D31000
D31043



OVERALL LOWER LEVEL - STRUCTURAL PLAN

3/64" = 1'-0"

GENERAL SHEET NOTES

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16 MG CLEARWELL

STRUCTURAL

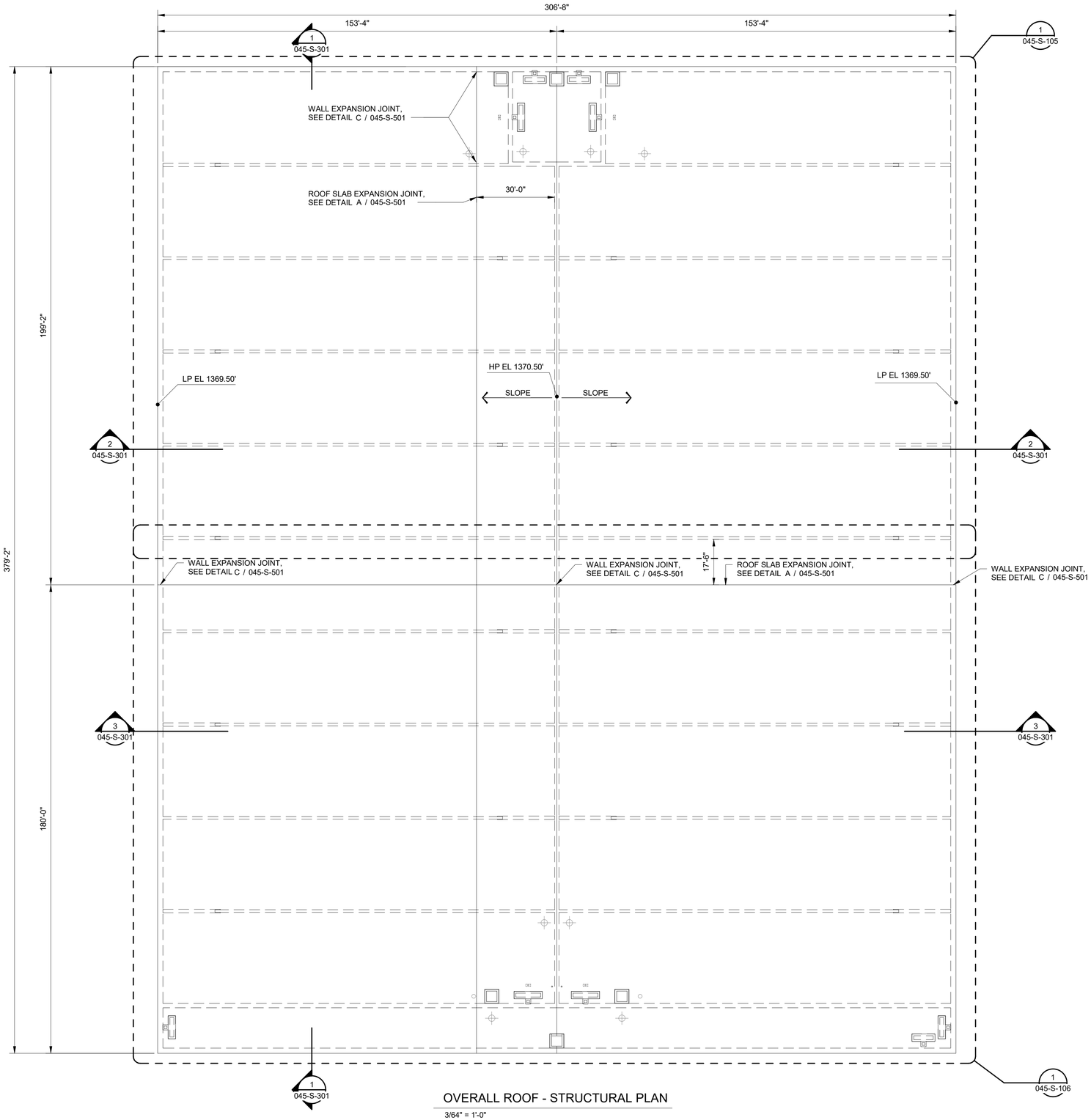
OVERALL LOWER LEVEL PLAN

045-S-101

52 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task _23-3.rvt
REV: 2021 VERSION: 2021
D11000



OVERALL ROOF - STRUCTURAL PLAN

3/64" = 1'-0"

GENERAL SHEET NOTES

1. ROOF SLAB OF CLEARWELL HAS BEEN DESIGN FOR 100 PSF LIVE LOAD.

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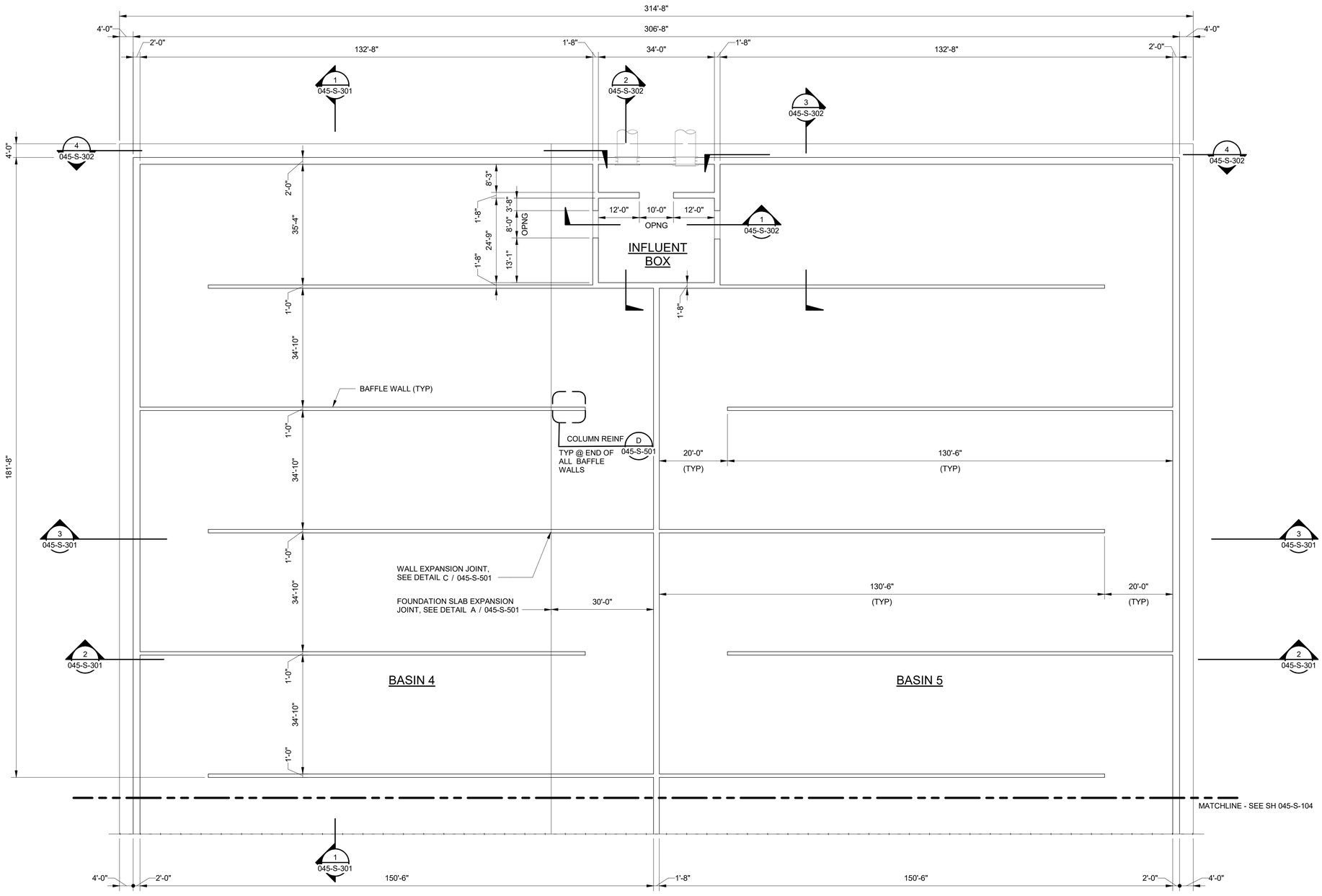
STRUCTURAL

OVERALL ROOF PLAN

045-S-102

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REVIT VERSION: 2021
D11000



PARTIAL LOWER LEVEL - STRUCTURAL PLAN A

1/16" = 1'-0"

16" 12'168" 4" 0'0" 16'0" 32"

1/16" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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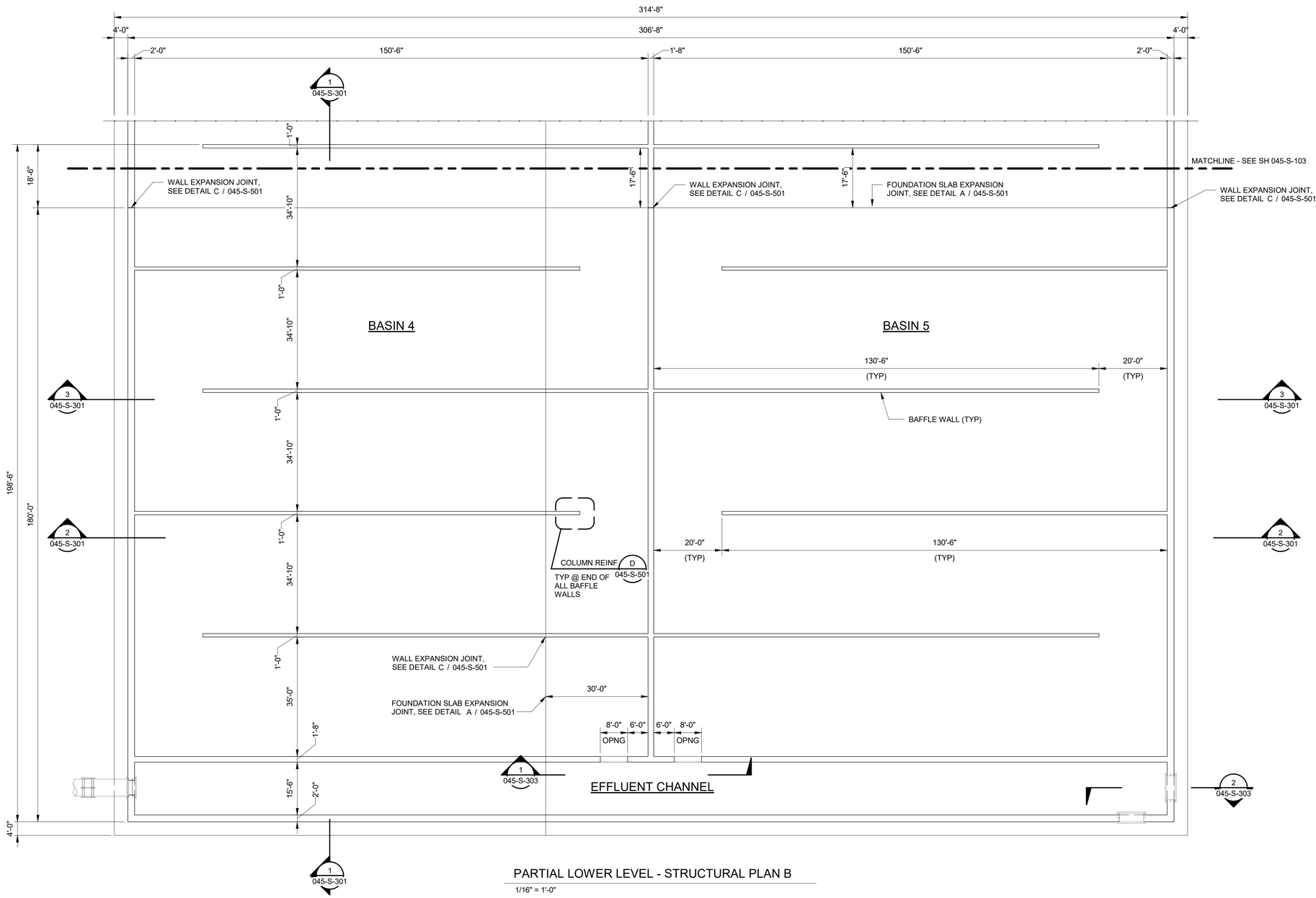
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16 MG CLEARWELL

STRUCTURAL

PARTIAL LOWER LEVEL PLAN I

045-S-103



PARTIAL LOWER LEVEL - STRUCTURAL PLAN B

1/16" = 1'-0"

16" 12'168' 4" 0'0" 16'0" 32"

1/16" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

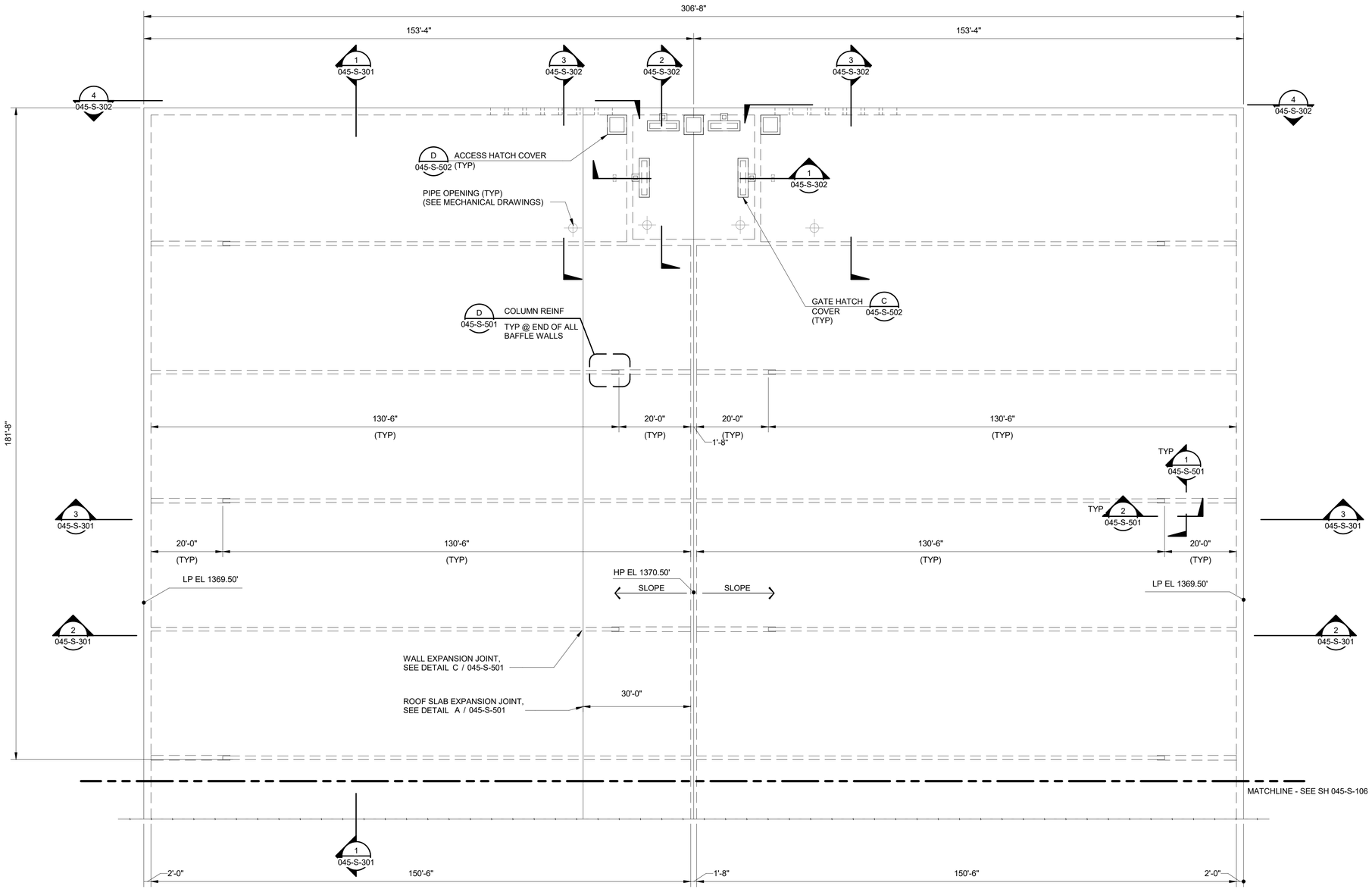
PARTIAL LOWER LEVEL PLAN II

045-S-104

55 OF 82

GENERAL SHEET NOTES

1. ROOF SLAB OF CLEARWELL HAS BEEN DESIGN FOR 100 PSF LIVE LOAD.
2. SEE MECHANICAL DRAWINGS FOR SIZES AND LOCATIONS OF ALL PIPE, GATE AND ACCESS HATCH OPENINGS.



PARTIAL ROOF - STRUCTURAL PLAN A

1/16" = 1'-0"

16" 12 8 4" 0 0' 0" 16' 32"

1/16" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:23:07 PM
FILE: Autodesk Docs:417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D11000

Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

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CONTRACT 23-3
16 MG CLEARWELL

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16 MG CLEARWELL

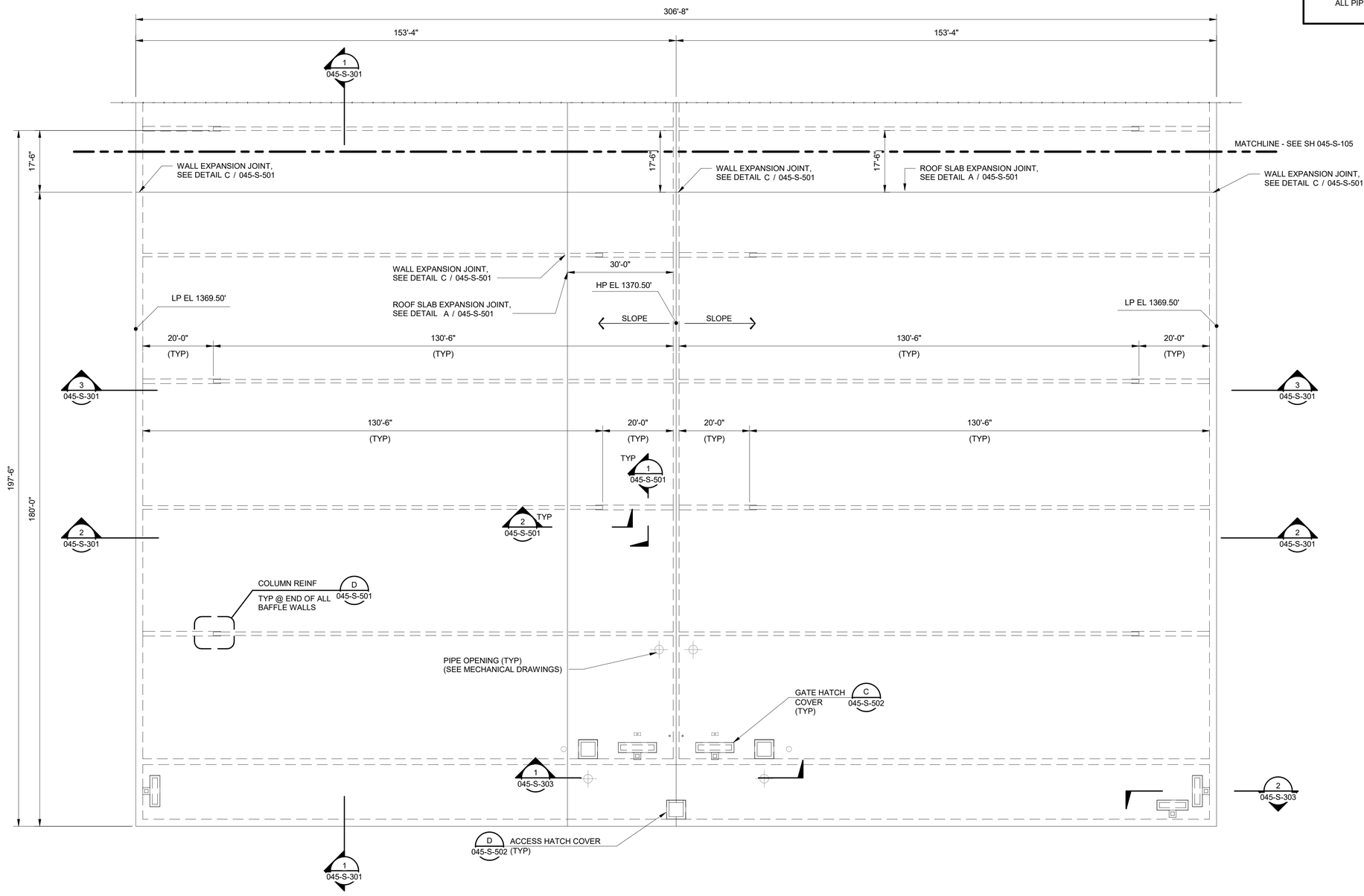
STRUCTURAL

PARTIAL ROOF PLAN I

045-S-105

GENERAL SHEET NOTES

1. ROOF SLAB OF CLEARWELL HAS BEEN DESIGN FOR 100 PSF LIVE LOAD.
2. SEE MECHANICAL DRAWINGS FOR SIZES AND LOCATIONS OF ALL PIPE, GATE AND ACCESS HATCH OPENINGS.



PARTIAL ROOF - STRUCTURAL PLAN B

1/16" = 1'-0"

16" 12 8 4" 0 0" 16" 32"

1/16" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:23:54 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D11000

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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REVISIONS AND RECORD OF ISSUE

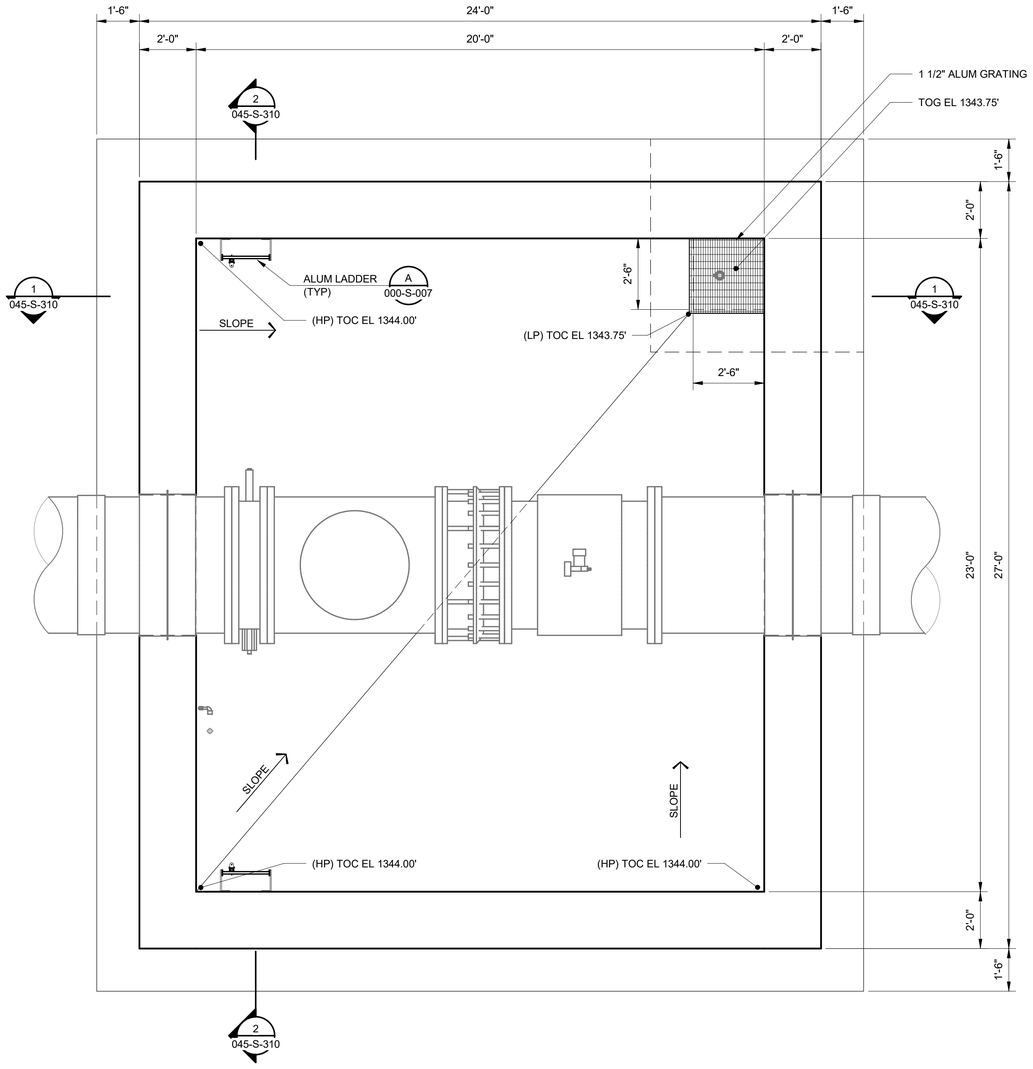
DESIGNED:	DLD
DETAILED:	KMR
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APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

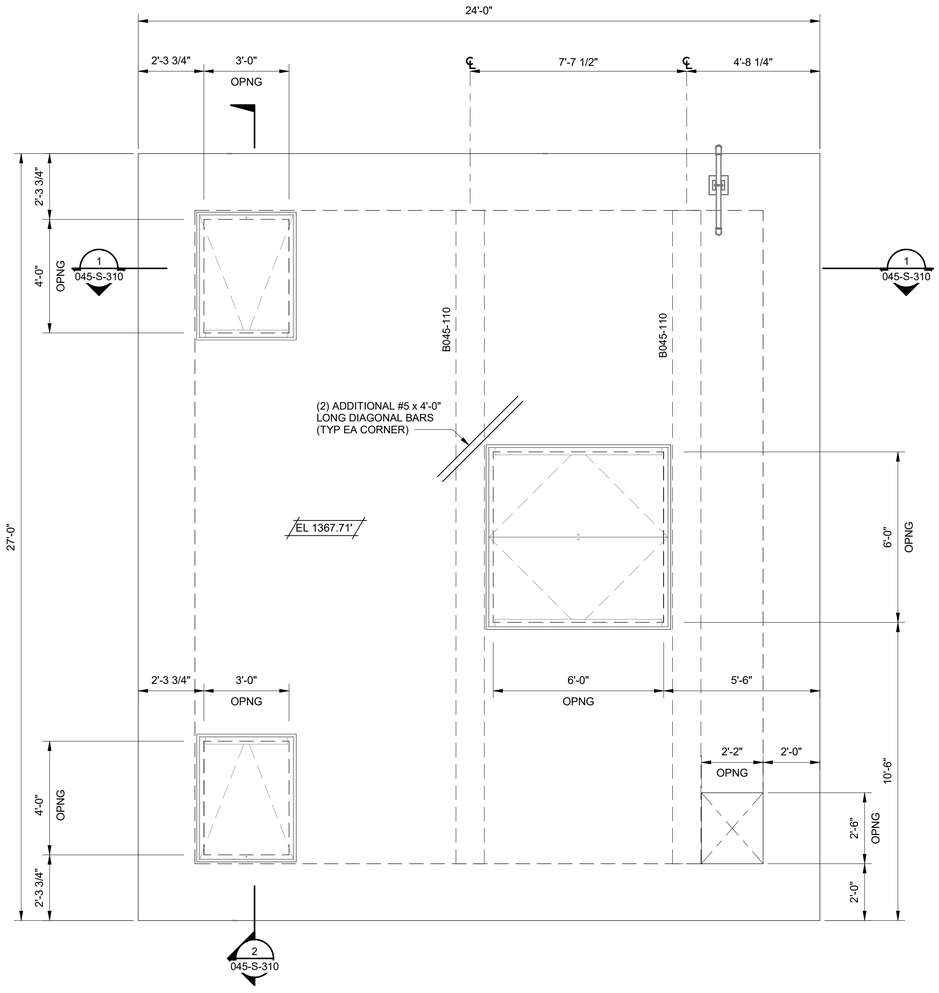
PARTIAL ROOF PLAN II

045-S-106



FOUNDATION PLAN

3/8" = 1'-0"



TOP PLAN

3/8" = 1'-0"

12" 0' 1' 2' 3' 4' 5' 6' 7'

3/8" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:36:48 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Flow Meter Vault Task_23-3.rvt
REVIT VERSION: 2023
D11000

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

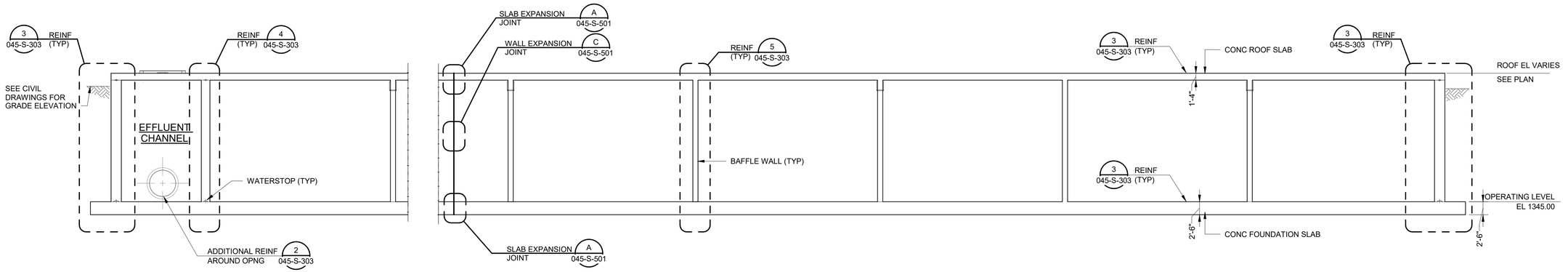
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FLOW METER VAULT

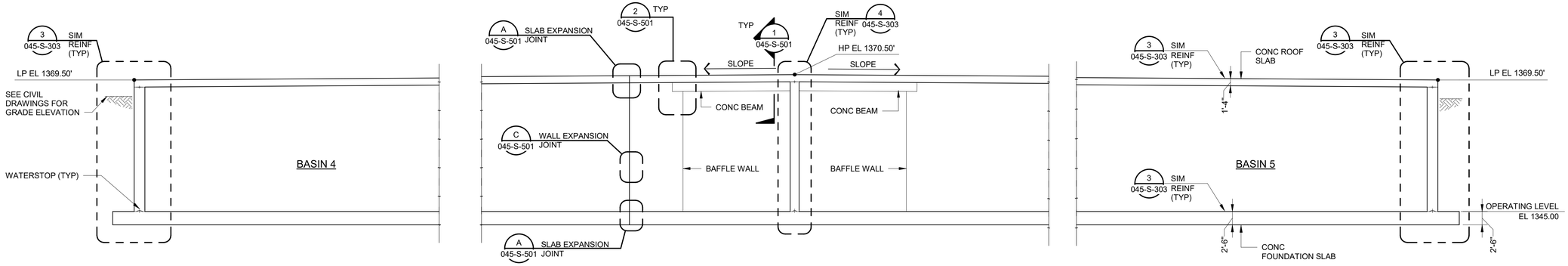
STRUCTURAL

FLOW METER VAULT PLANS

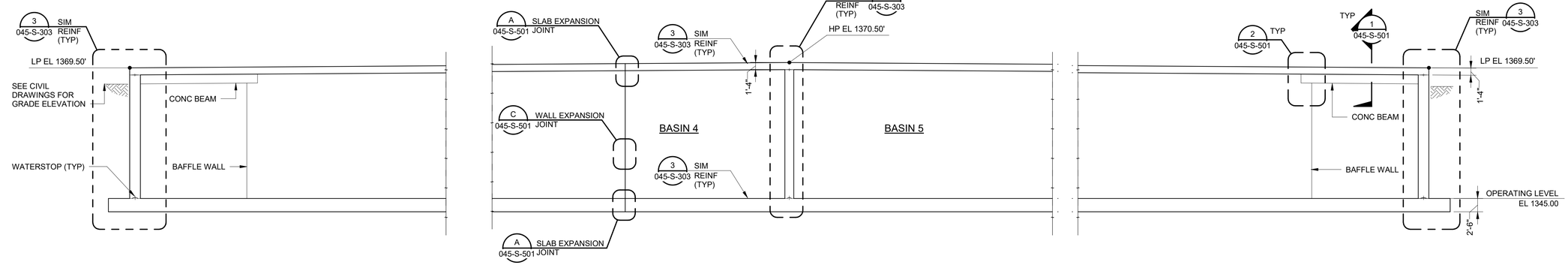
045-S-110



1 045-S-101 SECTION 3/32" = 1'-0"



2 045-S-101 SECTION 3/32" = 1'-0"



3 045-S-101 SECTION 3/32" = 1'-0"

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16 MG CLEARWELL

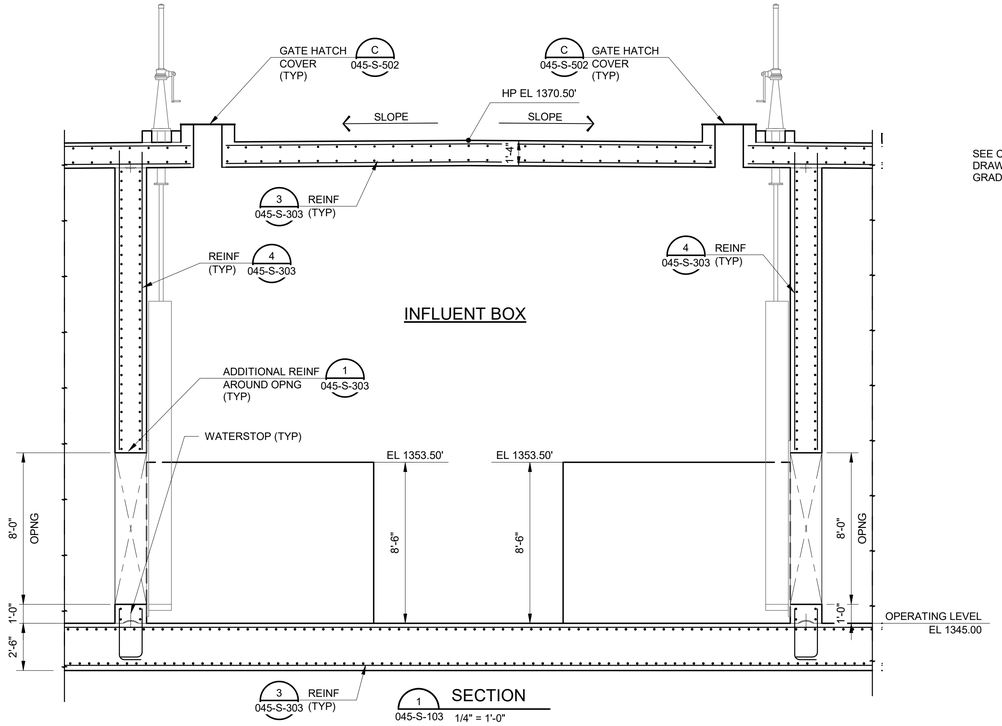
STRUCTURAL

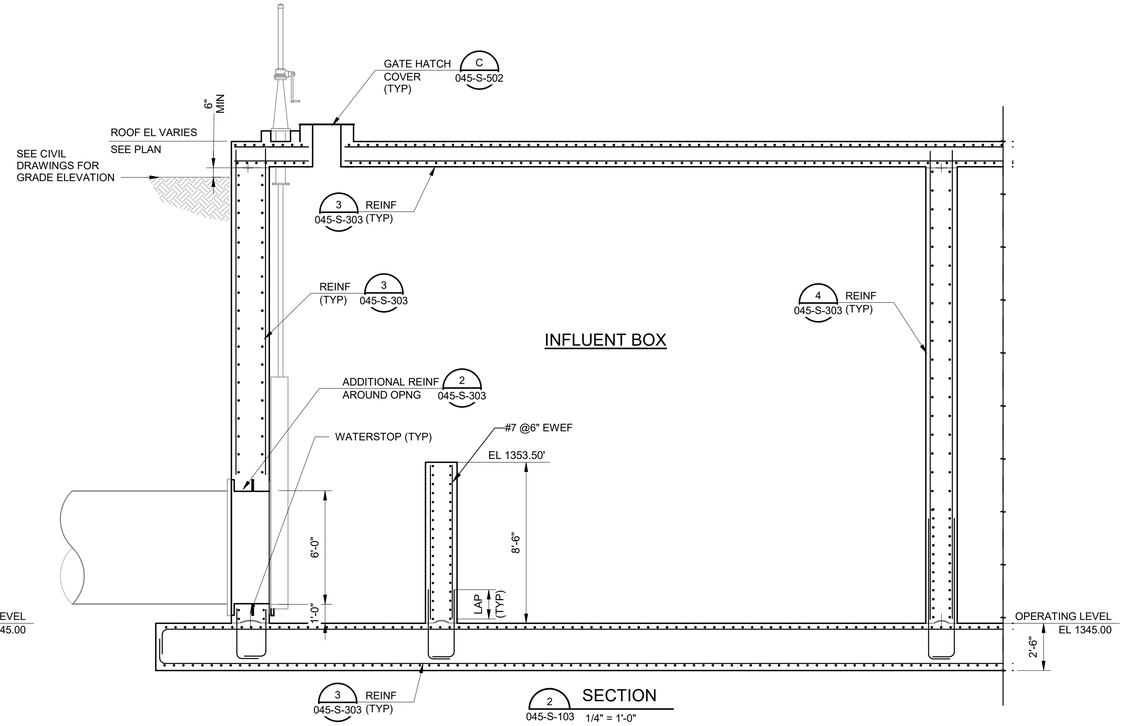
SECTIONS I

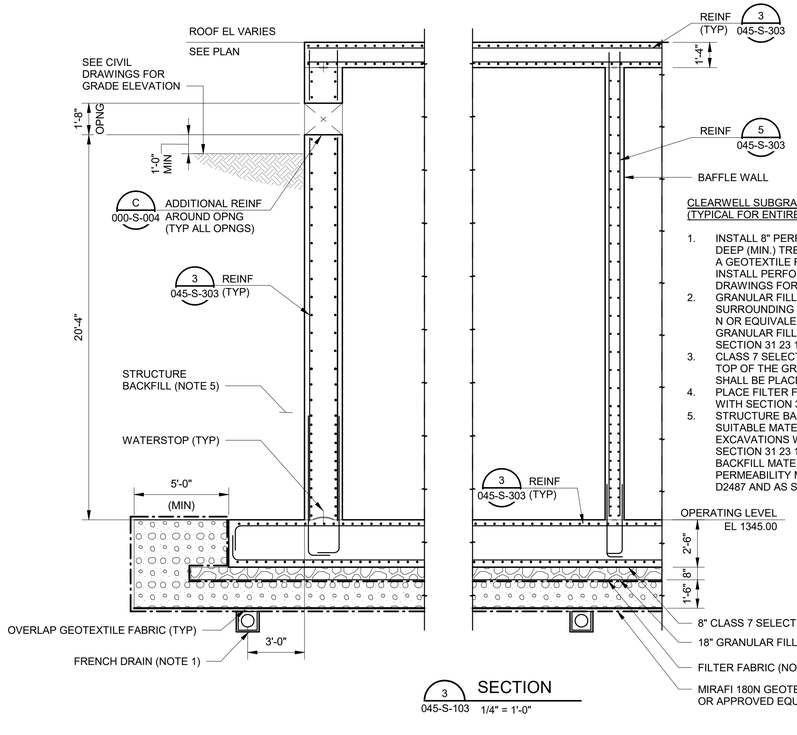
045-S-301

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:24:56 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task _23-3.rvt
REVIT VERSION: 2021
D11000

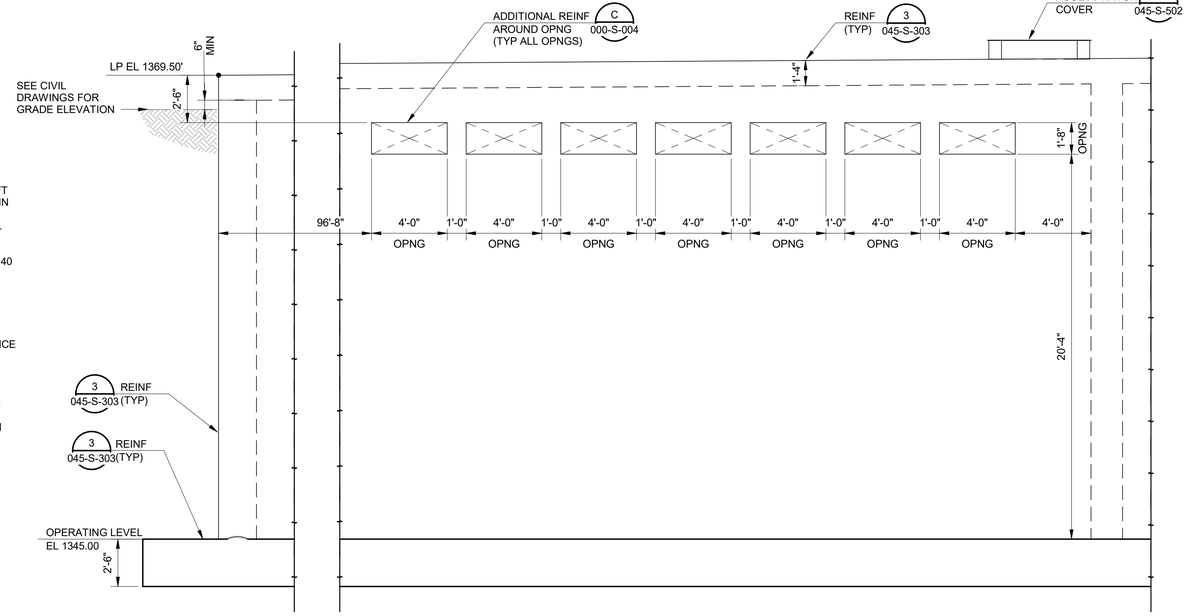






CLEARWELL SUBGRADE PREPARATION
(TYPICAL FOR ENTIRE CLEARWELL STRUCTURE):

1. INSTALL 8" PERFORATED PVC PIPE IN 1 FT WIDE BY 1 FT DEEP (MIN.) TRENCH WITH GRANULAR FILL WRAPPED IN A GEOTEXTILE FABRIC (MIRAFI 180N OR EQUIVALENT). INSTALL PERFORATIONS DOWNWARD. REFER TO CIVIL DRAWINGS FOR LAYOUT AND ELEVATIONS.
2. GRANULAR FILL SHALL BE SEPARATED FROM THE SURROUNDING SOILS WITH A FILTER FABRIC (MIRAFI 140 N OR EQUIVALENT) ON THE BOTTOM AND SIDES. GRANULAR FILL SHALL BE PLACED ACCORDING TO SECTION 31 23 11.
3. CLASS 7 SELECT FILL SHALL BE DIRECTLY PLACED ON TOP OF THE GRANULAR FILL. CLASS 7 SELECT FILL SHALL BE PLACED ACCORDING TO SECTION 31 23 11.
4. PLACE FILTER FABRIC AND GEOTEXTILE IN ACCORDANCE WITH SECTION 31 23 11.
5. STRUCTURE BACKFILL SHALL CONSIST OF EXCESS SUITABLE MATERIAL FROM TRENCH AND STRUCTURE EXCAVATIONS WHICH MEETS THE REQUIREMENTS OF SECTION 31 23 11. THE TOP 18 INCHES OF STRUCTURE BACKFILL MATERIALS SHALL CONSIST OF LOW PERMEABILITY MATERIAL CLASSIFIED AS CL PER ASTM D2487 AND AS SPECIFIED IN SECTION 31 23 11.



(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:25:49 PM
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Beaver Water District

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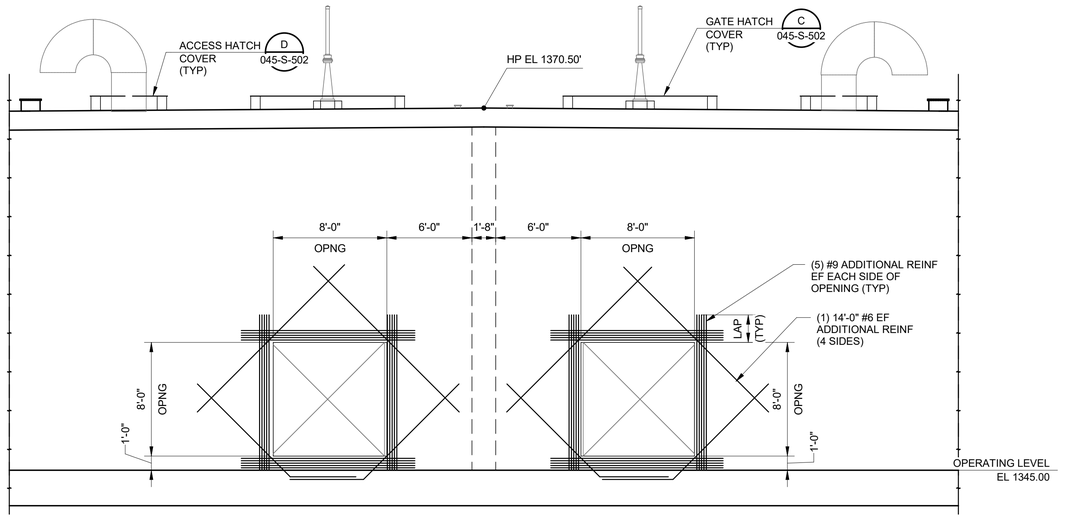
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16 MG CLEARWELL

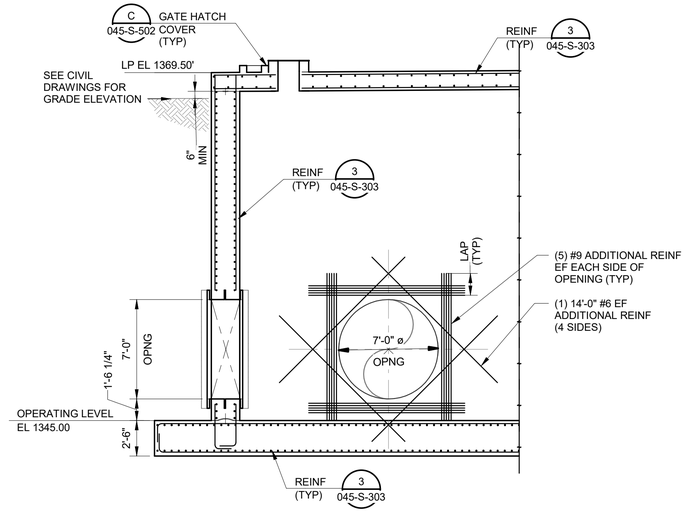
STRUCTURAL

SECTIONS II

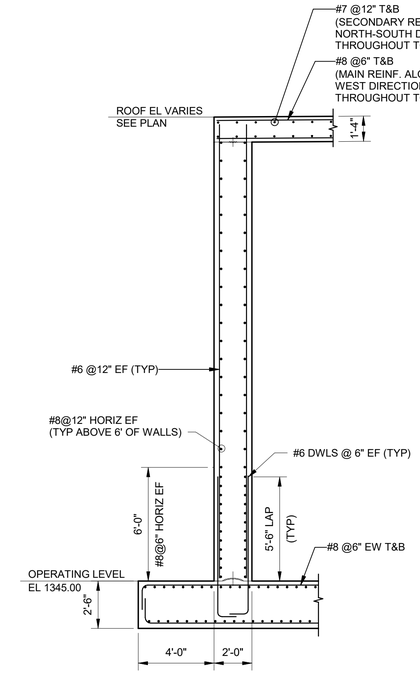
045-S-302



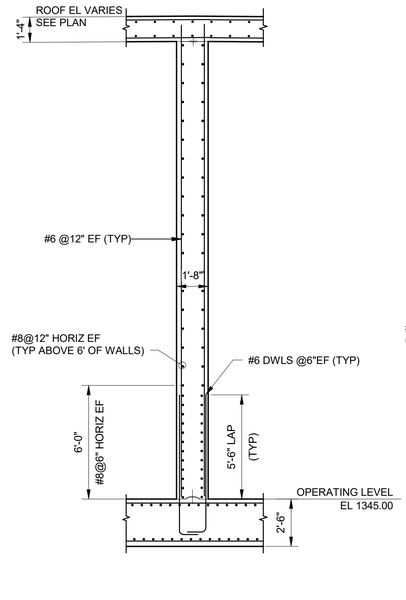
1 SECTION
045-S-104 3/16" = 1'-0"



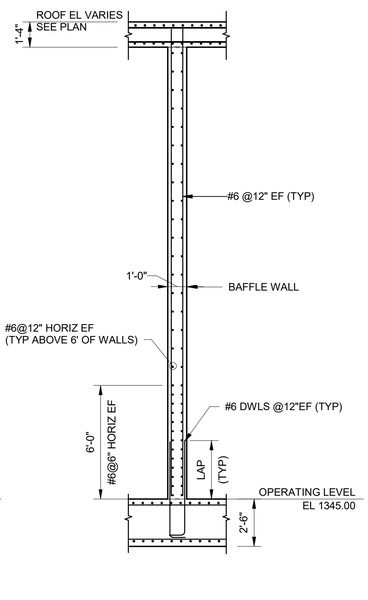
2 SECTION
045-S-104 3/16" = 1'-0"



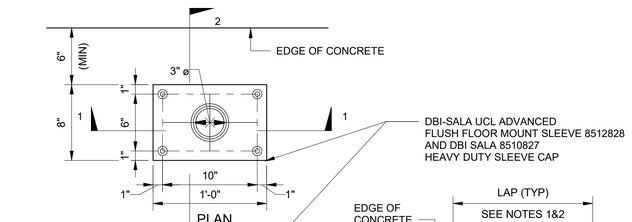
3 SECTION
045-S-301 1/4" = 1'-0"



4 SECTION
045-S-301 1/4" = 1'-0"

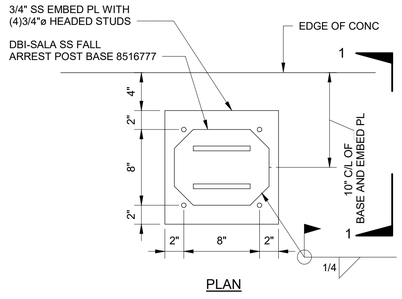


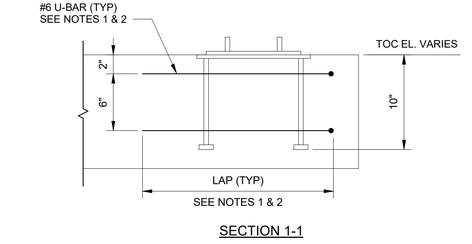
5 SECTION
045-S-301 1/4" = 1'-0"



NOTES:
1. WHERE FULL LAP LENGTH IS NOT AVAILABLE, EXTEND BARS TO WITHIN 3-INCHES OF ADJACENT EDGE AND PROVIDE STANDARD HOOKS.
2. WHERE CONCRETE EDGE OCCURS ON MORE THAN ONE SIDE, PROVIDE ADDITIONAL U-BARS EXTENDING AWAY FROM CONCRETE EDGE IN EACH DIRECTION.

A DAVIT SLEEVE CONCRETE FLUSH MOUNT
1 1/2" = 1'-0"





NOTES:
1. WHERE FULL LAP LENGTH IS NOT AVAILABLE, EXTEND BARS TO WITHIN 3-INCHES OF ADJACENT EDGE AND PROVIDE STANDARD HOOKS.
2. WHERE CONCRETE EDGE OCCURS ON MORE THAN ONE SIDE, PROVIDE ADDITIONAL U-BARS EXTENDING AWAY FROM CONCRETE EDGE IN EACH DIRECTION

B FALL ARREST POST BASE
1 1/2" = 1'-0"

PLOTTED: 11/26/2024 1:26:41 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D11000

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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CONTRACT 23-3
16 MG CLEARWELL

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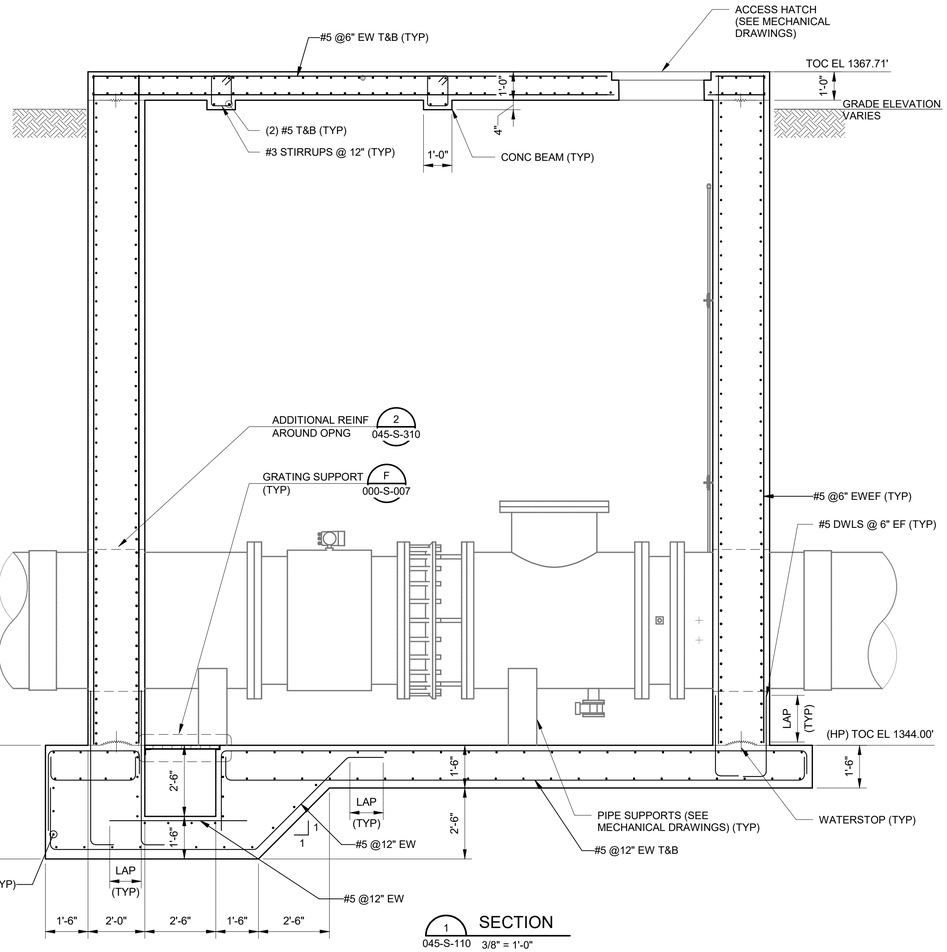
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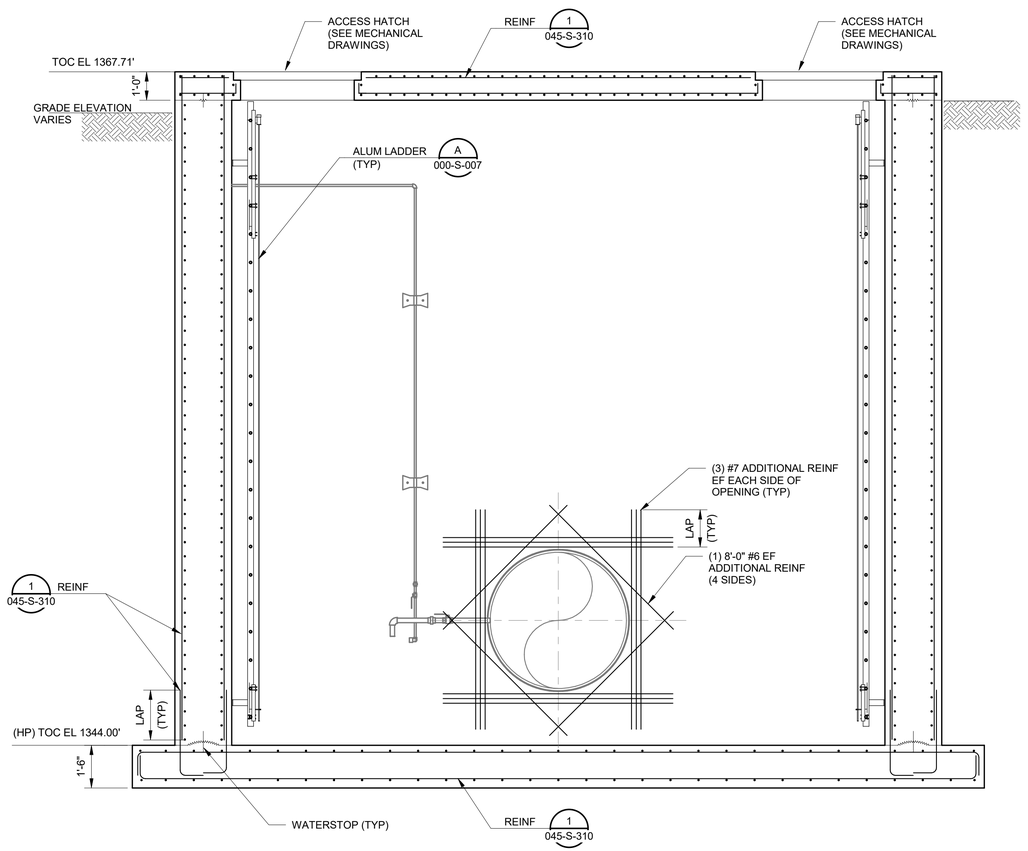
16 MG CLEARWELL

STRUCTURAL

SECTIONS III



1 SECTION
045-S-110 3/8" = 1'-0"



2 SECTION
045-S-110 3/8" = 1'-0"

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FLOW METER VAULT

STRUCTURAL

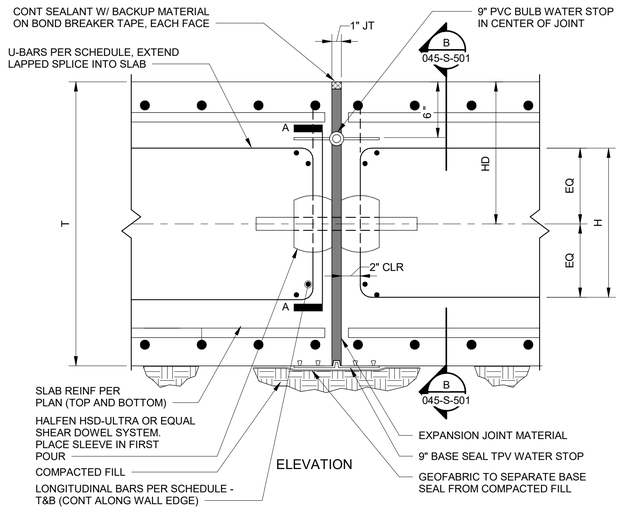
FLOW METER VAULT SECTIONS

045-S-310

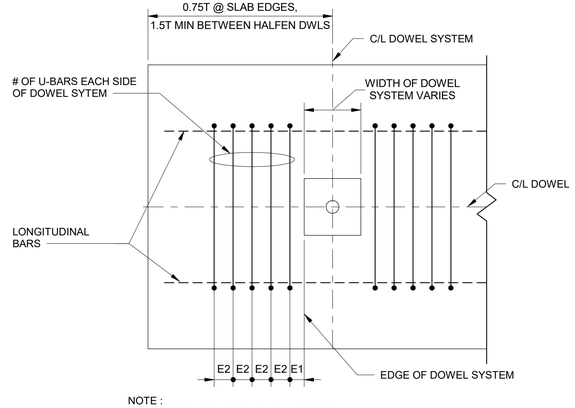
62 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:38:01 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Flow Meter Vault Task_23-3.rvt
REVIT VERSION: 2023
D1000

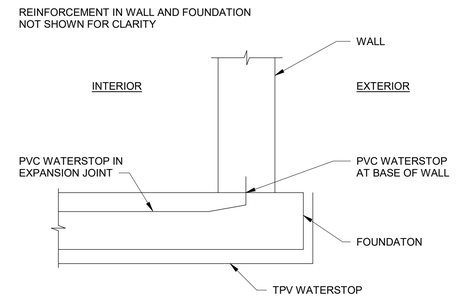


ELEVATION



NOTE :
WATERSTOP AND PRIMARY SLAB REINF NOT SHOWN FOR CLARITY.

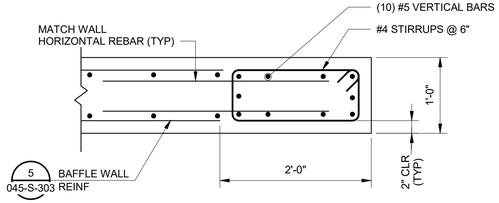
SECTION A



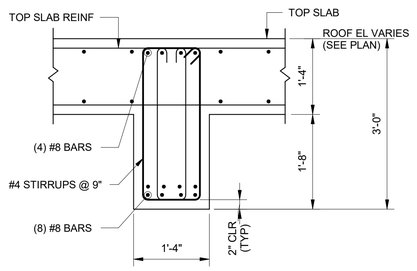
B 045-S-501 SECTION B - WATERSTOP AT WALL & FOUNDATION
NO SCALE

DOWEL SCHEDULE										
DESIGNATION	SLAB THICKNESS T	DOWEL TYPE	HEIGHT TO DOWEL "HD"	DOWEL SPACING "DS" UNO	# & TYPE OF U-BARS (EA SIDE)	HEIGHT OF U-BAR "H"	E1 SPACING	E2 SPACING	LONGITUDINAL BARS TOP & BOTTOM	REMARKS
T30S	30"	HSD-ULTRA -52 OR EQUAL	12"	3'-0"	7 - #5	9"	4 1/2"	2 1/2"	4 - #4	
T16S	16"	HSD-ULTRA -22 OR EQUAL	8"	2'-6"	3 - #4	8"	2 1/4"	2 1/4"	2 - #4	

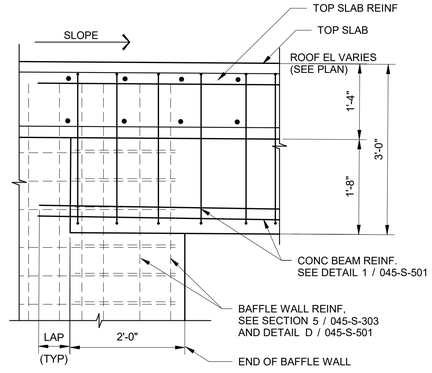
A 045-S-301 SLAB EXPANSION JOINT - TYPE B
NO SCALE



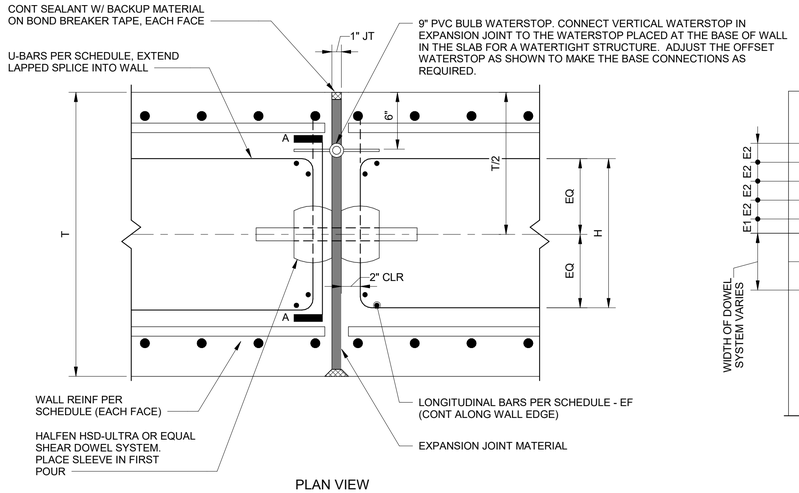
D 045-S-103 BAFFLE WALL- COLUMN REINFORCING
1" = 1'-0"



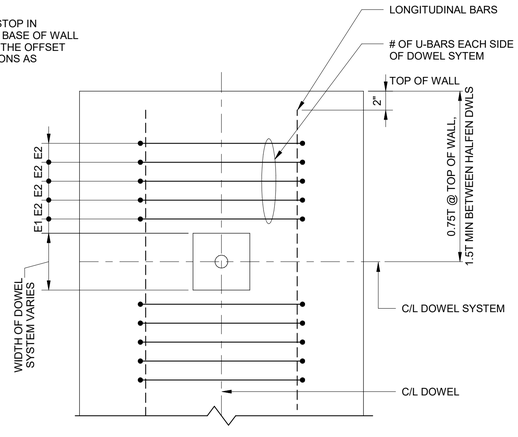
1 045-S-105 CONC BEAM REINFORCING
3/4" = 1'-0"



2 045-S-105 CONC BEAM AT WALL
3/4" = 1'-0"



PLAN VIEW



NOTE :
PRIMARY WALL REINF NOT SHOWN FOR CLARITY.

SECTION A

DOWEL SCHEDULE									
DESIGNATION	WALL THICKNESS T	DOWEL TYPE	DOWEL SPACING "DS"	# & TYPE OF U-BARS (EA SIDE)	HEIGHT OF U-BAR "H"	E1 SPACING	E2 SPACING	LONGITUDINAL BARS EACH FACE	REMARKS
T24W	24"	HSD-ULTRA -52 OR EQUAL	3'-0"	7 - #5	9"	4 1/2"	2 1/2"	4 - #5	
T20W	20"	HSD-ULTRA -22 OR EQUAL	2'-6"	3 - #4	8"	2 1/4"	2 1/4"	2 - #4	
T12W	12"	HSD-ULTRA-22 OR EQUAL	1'-8"	3 - #4	5"	2 1/4"	2 1/4"	2 - #4	

C 045-S-301 WALL EXPANSION JOINT - TYPE B
NO SCALE

Black & Veatch Corporation
Kansas City, Missouri

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STRUCTURAL

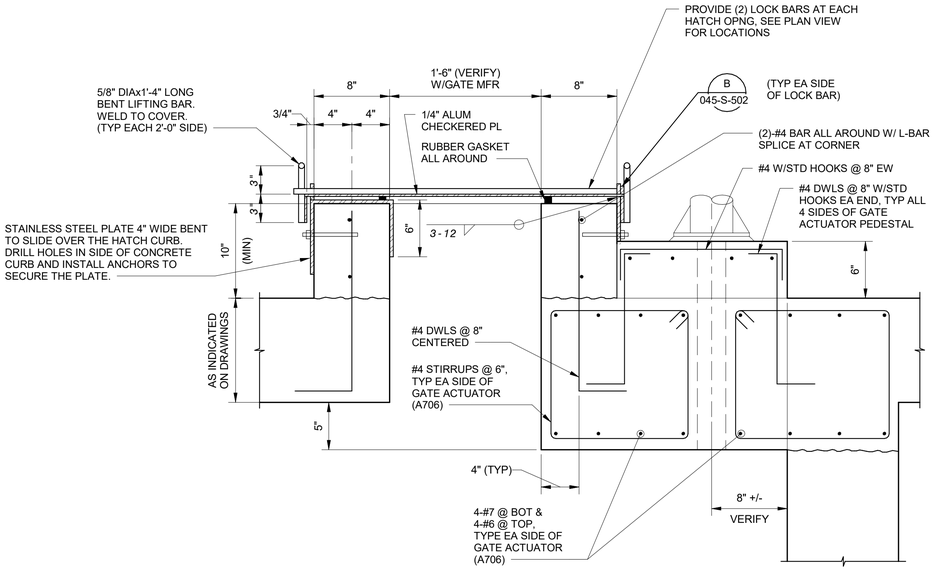
DETAILS I

045-S-501

63 OF 82

PLOTTED: 11/26/2024 1:29:07 PM
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REVIT VERSION: 2021
D1000

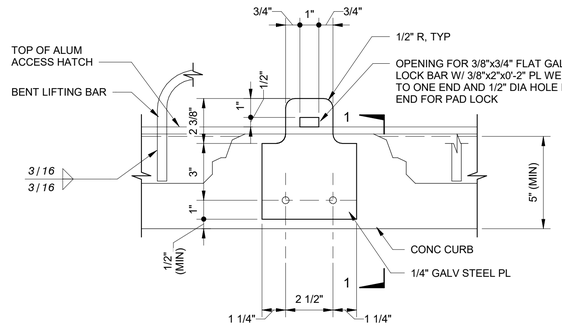
(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



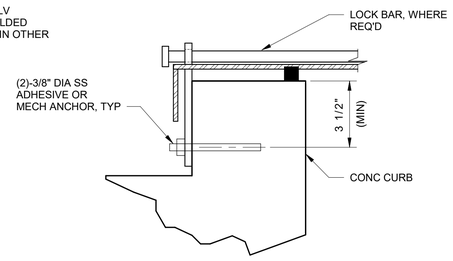
NOTES:

1. CONTRACTOR SHALL CONFIRM ALL DIMENSIONS W/FURNISHED GATE PRIOR TO REINFORCING AND CONCRETE PLACEMENT.
2. FOR GATE LOCATIONS WHERE GATE ACCESS HATCH IS NOT REQUIRED (SEE PLANS FOR LOCATIONS) PROVIDE CONCRETE PEDESTAL FOR GATE ACTUATOR AND CONCRETE SUPPORT BEAMS BELOW GATE ACTUATOR. CONCRETE SUPPORT BEAM SHALL EXTEND TO EDGE OF OPENING WHERE GATE HATCH IS REQUIRED AND 1'-9" BEYOND CENTERLINE OF GATE ACTUATOR WHERE GATE ACCESS HATCH IS NOT REQUIRED.

A GATE HATCH COVER & SUPPORT BEAM
NO SCALE

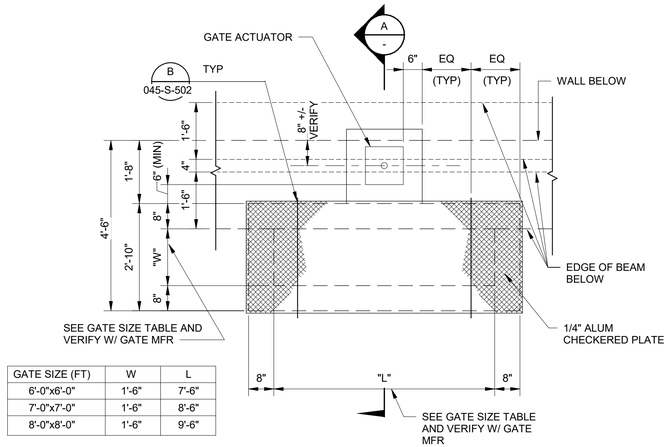


ELEVATION



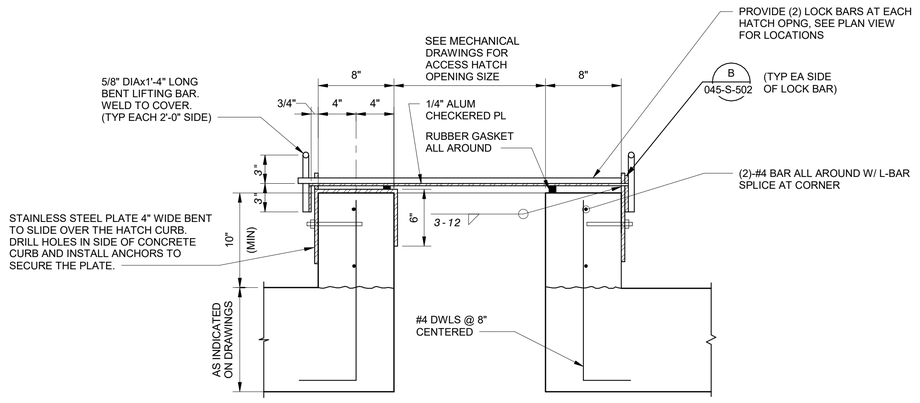
SECTION 1-1

B LOCK BAR ASSEMBLY
NO SCALE



GATE SIZE (FT)	W	L
6'-0"x6'-0"	1'-6"	7'-6"
7'-0"x7'-0"	1'-6"	8'-6"
8'-0"x8'-0"	1'-6"	9'-6"

C GATE HATCH COVER DETAIL
NO SCALE



D ACCESS HATCH COVER
NO SCALE

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	DLD
DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

STRUCTURAL

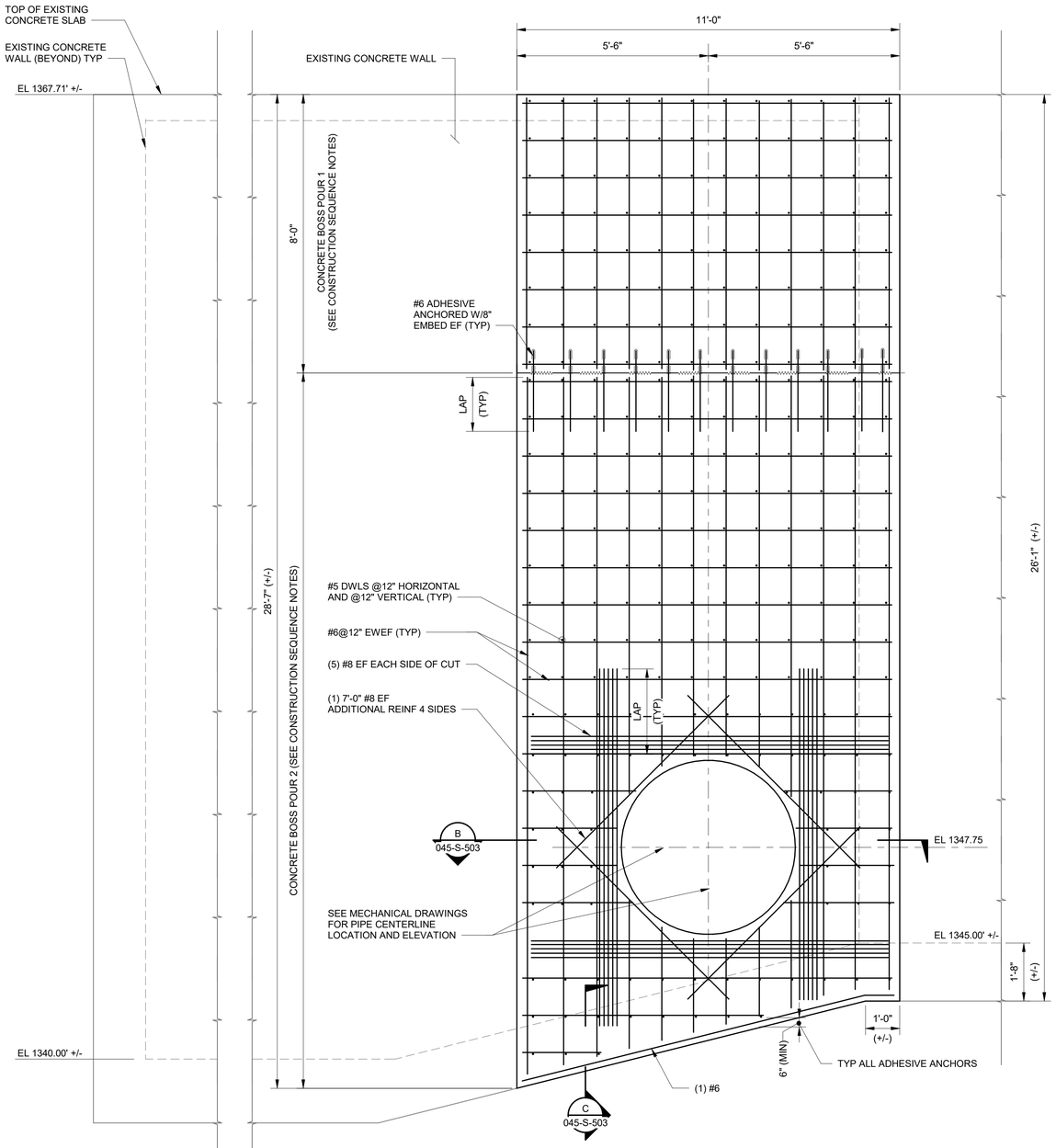
DETAILS II

045-S-502

64 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:28:19 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task _23-3.rvt
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D11000

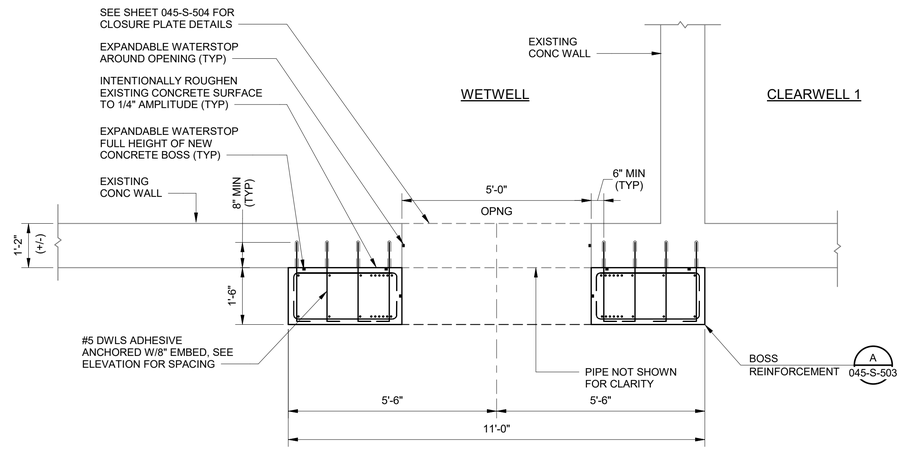


A CLEARWELL BOSS ELEVATION - DETAIL

1/2" = 1'-0"

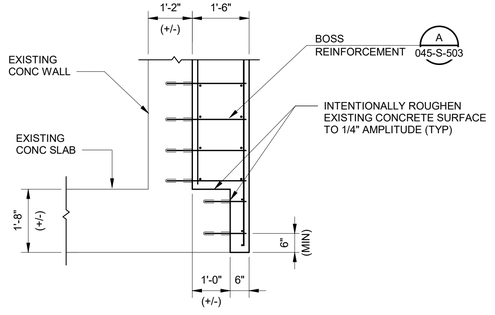
CONSTRUCTION SEQUENCE NOTES:

1. EXCAVATE SOIL DOWN TO 8'-0" FROM THE TOP OF THE EXISTING CLEARWELL ROOF SLAB.
2. CLEAN EXPOSED CONCRETE SURFACE OF THE EXISTING CLEARWELL AND INTENTIONALLY ROUGHEN TO 1/4" AMPLITUDE THE CLEARWELL WALL WITHIN THE FOOTPRINT OF CONCRETE BOSS POUR 1.
3. DRILL AND ADHESIVE ANCHOR ALL #5 DWLS INTO FACE OF EXISTING CLEARWELL FOR CONCRETE BOSS POUR 1. PRIOR TO DRILLING, CONTRACTOR SHALL SCAN AND LOCATE EXISTING REINFORCING. EXISTING REINFORCING SHALL NOT BE CUT OR DAMAGED DURING INSTALLATION OF DOWELS. LOCATION OF DOWELS SHALL BE SHIFTED UP TO 2" AS NEEDED TO AVOID EXISTING REINFORCING
4. PLACE ALL REINFORCING AS INDICATED FOR CONCRETE BOSS POUR 1.
5. PLACE CONCRETE FOR CONCRETE BOSS POUR 1.
6. CURE CONCRETE FOR CONCRETE BOSS POUR 1 AS INDICATED IN THE SPECIFICATIONS. CONCRETE SHALL MEET THE STRENGTH INDICATED IN THE SPECIFICATIONS PRIOR TO CONTINUING TO THE NEXT STEPS. CONCRETE BOSS POUR 1 SHALL BE SUPPORTED BY SOIL BELOW AND DOWELS UNTIL CURING HAS BEEN COMPLETED.
7. EXCAVATE SOIL THE REMAINING DEPTH OF THE CONCRETE BOSS. SOIL SHALL NOT BE EXCAVATED DEEPER THAN THE BOTTOM OF THE EXISTING CLEARWELL FOOTING.
8. CLEAN EXPOSED CONCRETE SURFACE OF THE EXISTING CLEARWELL AND BOTTOM OF CONCRETE BOSS POUR 1 AND INTENTIONALLY ROUGHEN TO 1/4" AMPLITUDE THE CLEARWELL WALL WITHIN THE FOOTPRINT OF CONCRETE BOSS POUR 2.
9. DRILL AND ADHESIVE ANCHOR ALL #5 DWLS INTO FACE OF EXISTING CLEARWELL FOR CONCRETE BOSS POUR 2. PRIOR TO DRILLING, CONTRACTOR SHALL SCAN AND LOCATE EXISTING REINFORCING. EXISTING REINFORCING SHALL NOT BE CUT OR DAMAGED DURING INSTALLATION OF DOWELS. LOCATION OF DOWELS SHALL BE SHIFTED UP TO 2" AS NEEDED TO AVOID EXISTING REINFORCING.
10. DRILL AND ADHESIVE ANCHOR ALL #6 INTO BOTTOM OF CONCRETE BOSS POUR 1 AS INDICATED.
11. PLACE ALL REINFORCING AS INDICATED FOR CONCRETE BOSS POUR 2.
12. PLACE CONCRETE FOR CONCRETE BOSS POUR 2.
13. CURE CONCRETE FOR CONCRETE BOSS POUR 2 AS INDICATED IN THE SPECIFICATIONS. CONCRETE SHALL MEET THE STRENGTH INDICATED IN THE SPECIFICATIONS PRIOR TO CORE DRILLING OF EXISTING CONCRETE FOR NEW PIPE OPENING.
14. INSTALL CLOSURE PLATE AS SHOWN ON SHEET 045-S-503 PRIOR TO CORE DRILLING OF CONCRETE FOR NEW PIPE OPENING.
15. REFER TO EXISTING CLEARWELL PIPE CONNECTION DETAIL FOR CORING AND PIPE INSTALLATION NOTES. SEE DETAIL A / 045-M-502.
16. AFTER COMPLETION OF CORE DRILLING AND INSTALLATION OF NEW PIPE, REMOVE CLOSURE PLATE FROM THE INTERIOR OF THE EXISTING CLEARWELL. CLOSURE PLATE SHALL ONLY BE REMOVED UPON RECEIPT OF APPROVAL BY ENGINEER.



B 045-S-503 CLEARWELL BOSS PLAN - DETAIL

1/2" = 1'-0"



C 045-S-503 CLEARWELL BOSS PLAN - SECTION

1/2" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:30:14 PM
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Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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16 MG CLEARWELL

STRUCTURAL

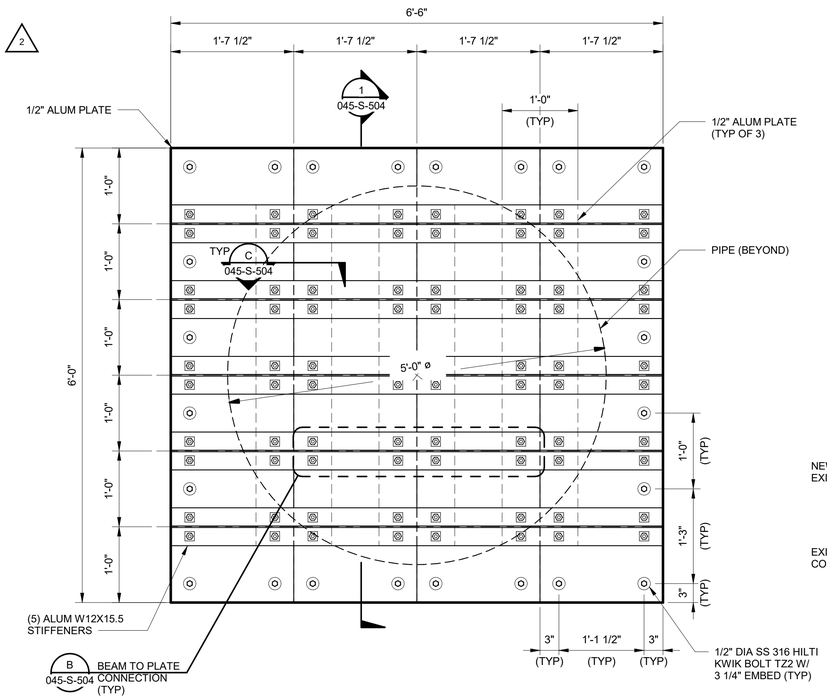
EXISTING CLEARWELL STRUCTURAL DETAILS I

045-S-503

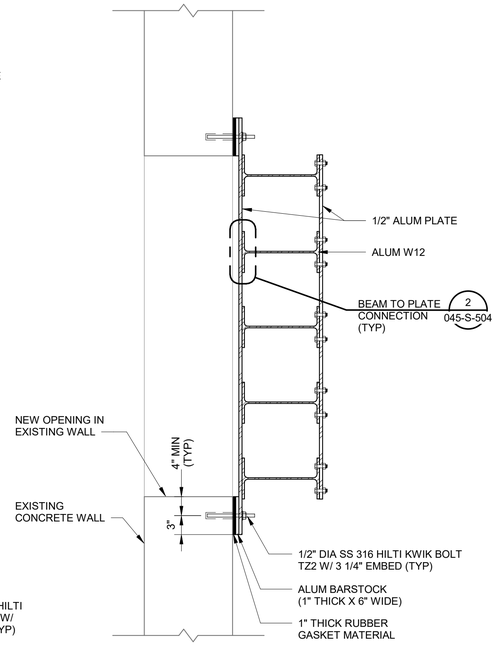
65 OF 82

GENERAL STRUCTURAL NOTES

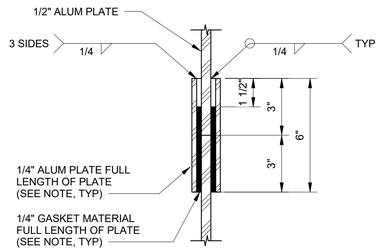
1. ALUMINUM PLATE, CONNECTIONS AND ALL ASSOCIATED DETAILS SHOWN ON THIS SHEET ARE TEMPORARY.
2. CLOSURE PLATE SHALL BE INSTALLED AND REMOVED WHEN INDICATED IN THE CONSTRUCTION SEQUENCE NOTES ON SHEET 045-S-503.
3. NO FIELD WELDING OF ALUMINUM SHALL BE COMPLETED WITHOUT APPROVAL OF ENGINEER.



A CLOSURE PLATE - ELEVATION
1" = 1'-0"

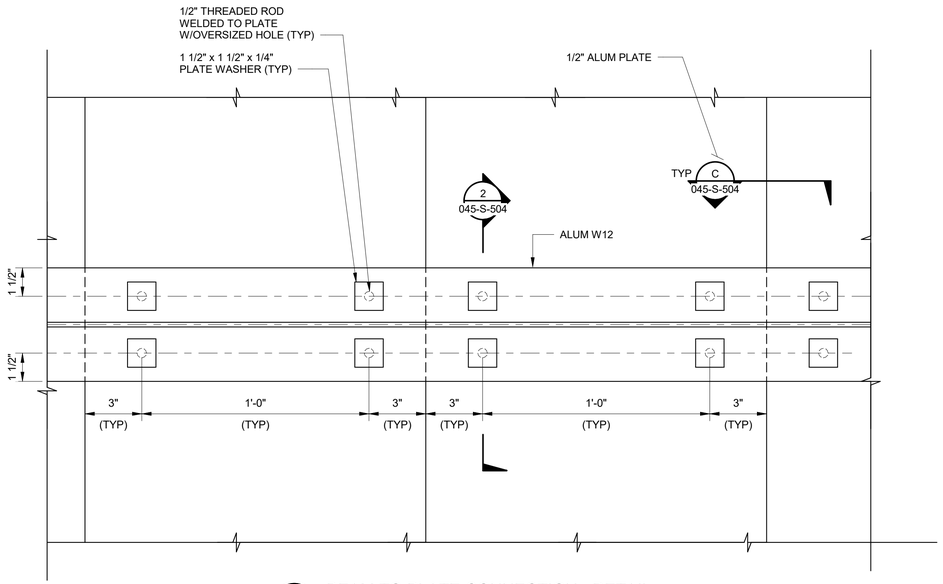


1 CLOSURE PLATE - SECTION
045-S-504 1" = 1'-0"

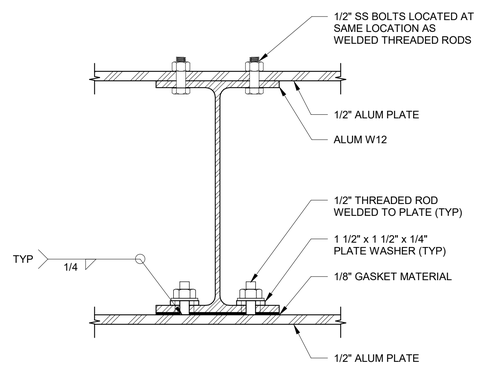


NOTE: OMIT CONNECTION AT LOCATION OF ALUM W12S.

C ALUM PLATE TO PLATE CONNECTION
045-S-504 3" = 1'-0"



B BEAM TO PLATE CONNECTION - DETAIL
045-S-504 3" = 1'-0"



2 BEAM TO PLATE CONNECTION - SECTION
045-S-504 3" = 1'-0"

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

2	01/30/25	ISSUED PER ADDENDUM NO. 2

REVISIONS AND RECORD OF ISSUE

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DETAILED:	KMR
CHECKED:	NJ
APPROVED:	DLD
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

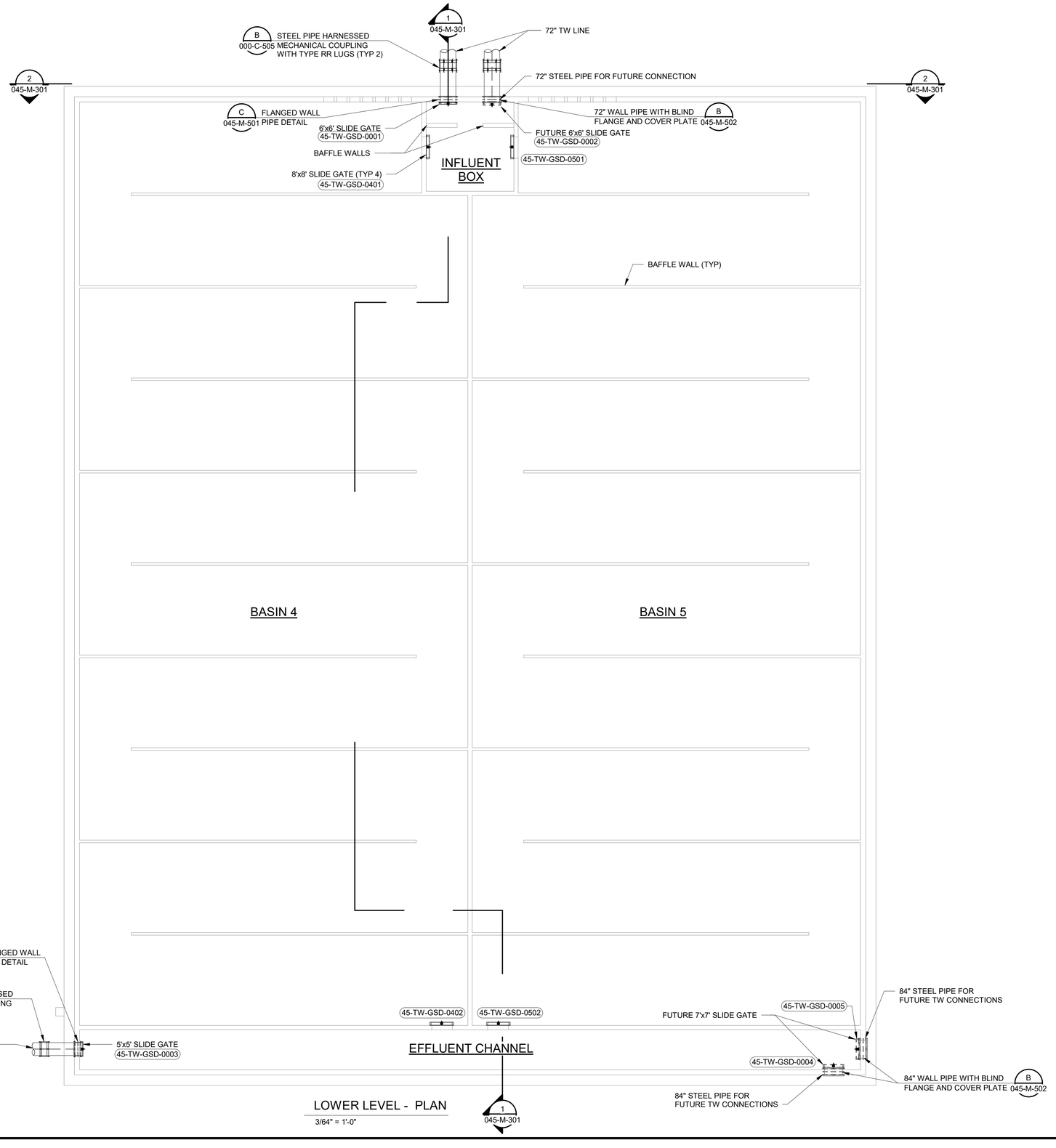
STRUCTURAL

EXISTING CLEARWELL
STRUCTURAL DETAILS
II

045-S-504

PLOTTED: 1/16/2025 11:41:21 AM
FILE: ...Autodesk Docs\417134 - BWD Plant Expansion\45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2024
D11000

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



LOWER LEVEL - PLAN

3/64" = 1'-0"

GENERAL SHEET NOTES

1. YARD PIPING OMITTED FOR CLARITY. SEE SHEET 000-C-300 FOR CONTINUATION OF YARD PIPING.

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	CS
DETAILED:	KMR
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

PROCESS MECHANICAL

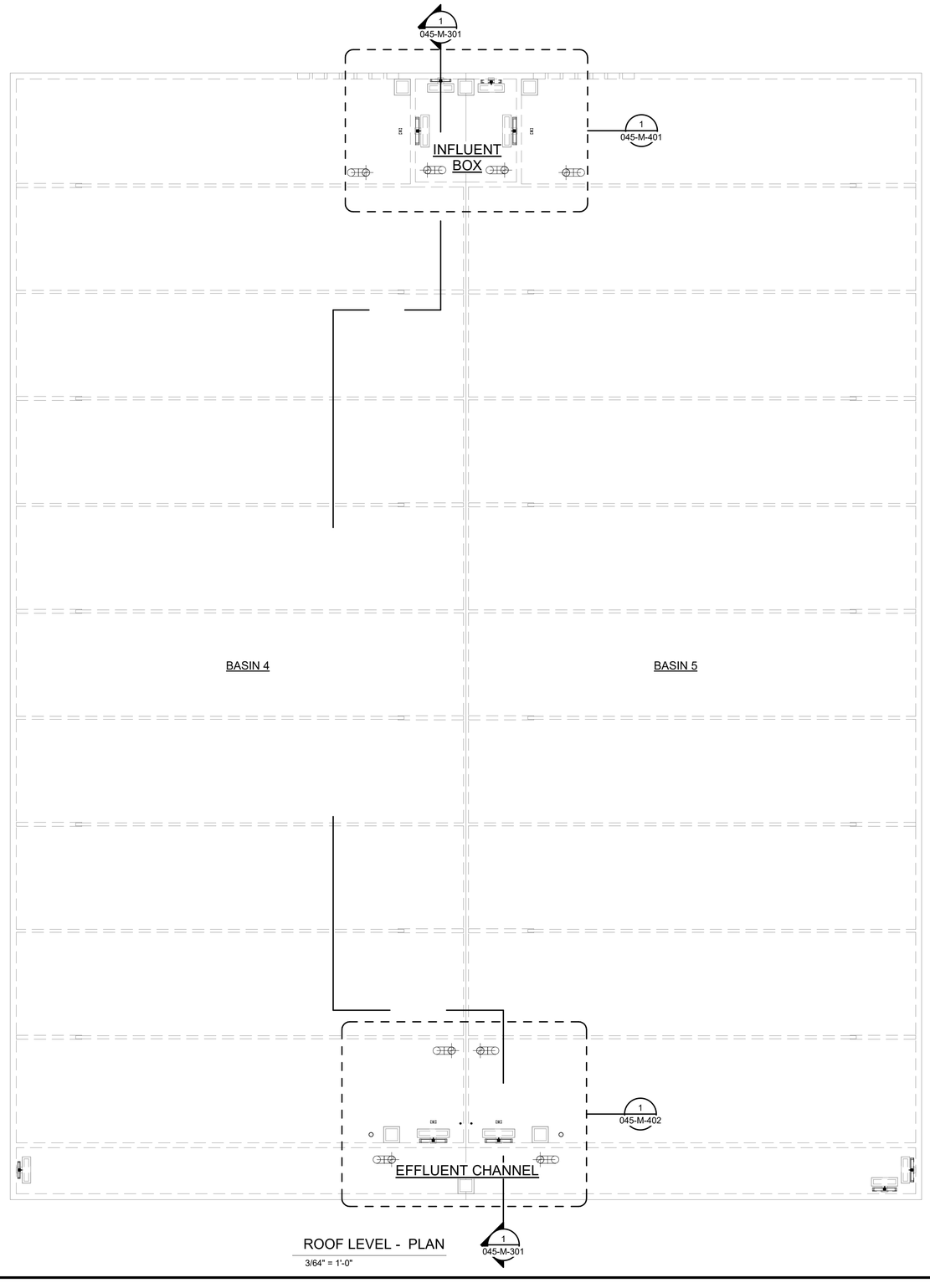
OVERALL LOWER FLOOR PLAN

045-M-101

67 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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REVIT VERSION: 2021
D11000



ROOF LEVEL - PLAN

3/64" = 1'-0"

GENERAL SHEET NOTES

1. YARD PIPING OMITTED FOR CLARITY.

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

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DESIGNED:	CS
DETAILED:	KMR
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

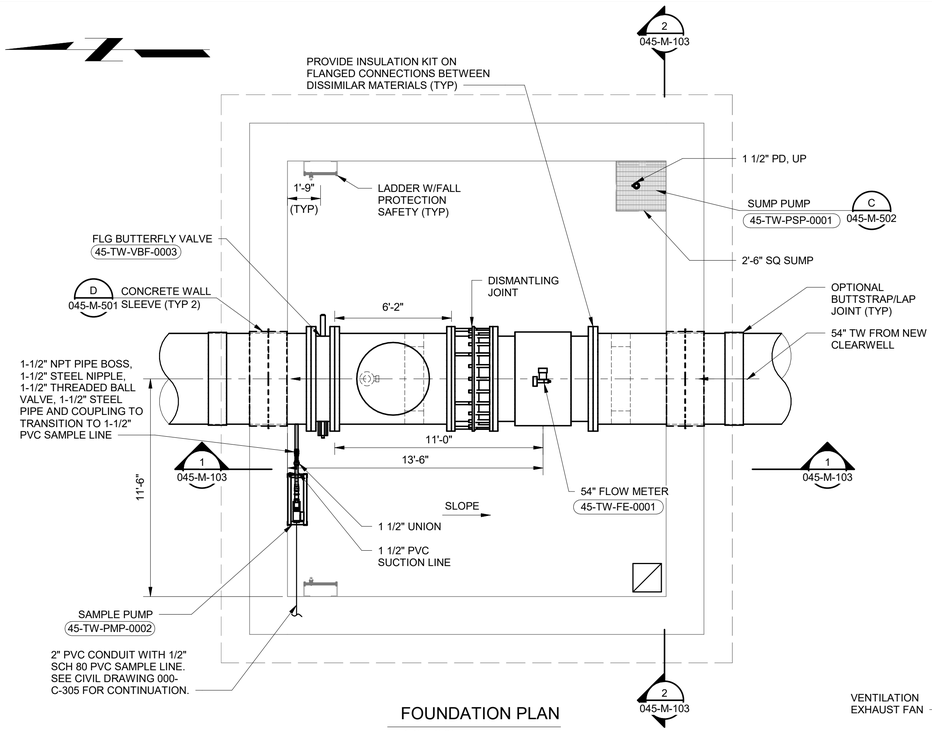
PROCESS MECHANICAL

OVERALL ROOF PLAN

045-M-102

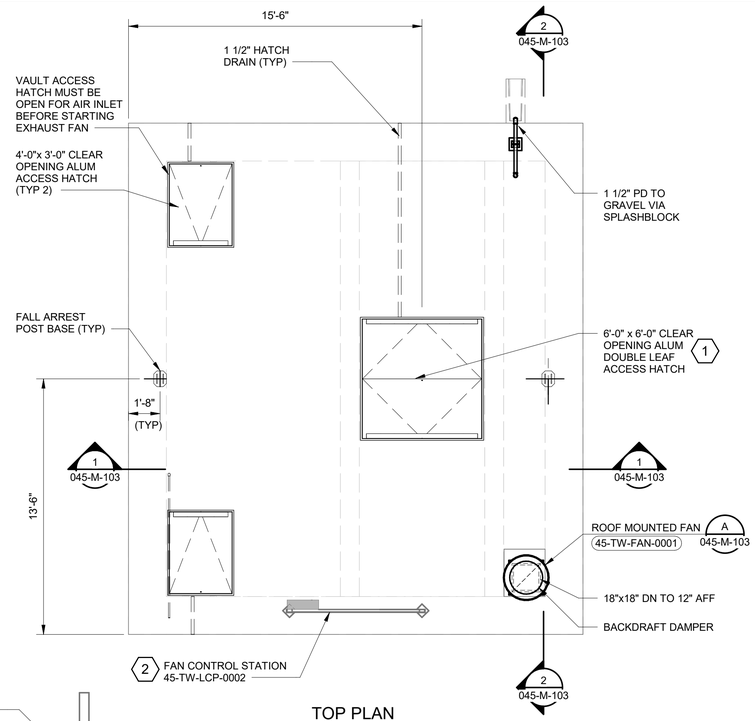
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REVIT VERSION: 2021
D11000



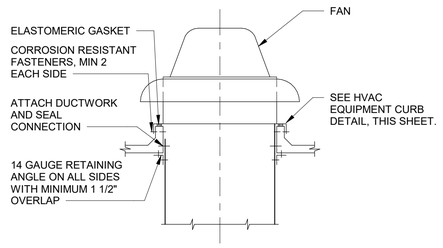
FOUNDATION PLAN

1/4" = 1'-0"



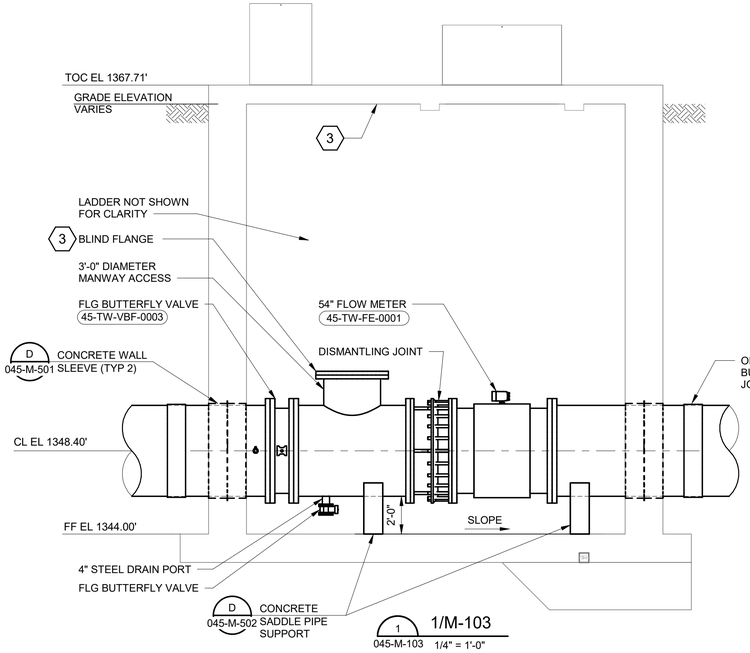
TOP PLAN

1/4" = 1'-0"



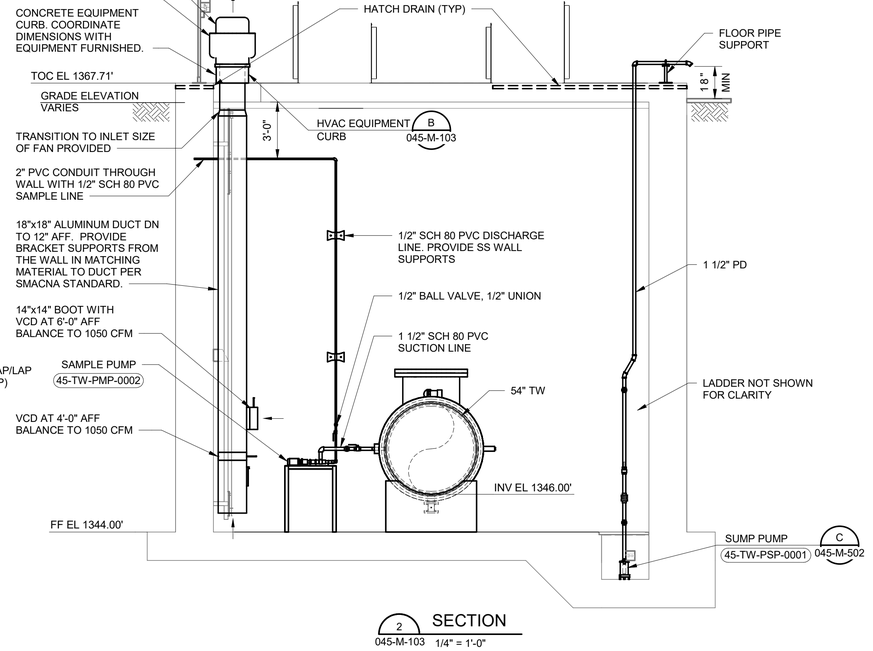
A ROOF MOUNTED FAN

NO SCALE



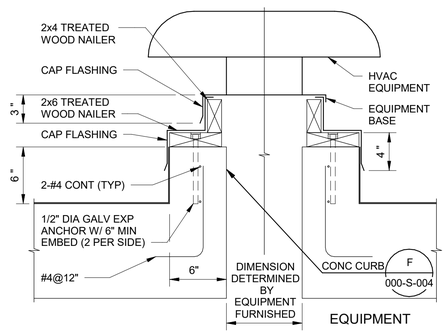
1 045-M-103 1/M-103

1/4" = 1'-0"



2 045-M-103 SECTION

1/4" = 1'-0"



B HVAC EQUIPMENT CURB

NO SCALE

SHEET KEYNOTES

1. THE 6'-0"x 6'-0" ACCESS HATCH WILL BE CENTERED ABOVE THE INSTALLED FLOW METER. CONTRACTOR SHALL CONFIRM HATCH CLEAR OPENING PERMITS REMOVAL OF FLOW METER THROUGH THE HATCH.
2. EXHAUST FAN SHALL BE CONTROLLED BY A WEATHER-PROOF ON-OFF SELECTOR SWITCH LOCATED ON LOCAL CONTROL PANEL 045-TW-LCP-0002. MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL FOR WIRING. PROVIDE A PAINTED AND ENGRAVED STAINLESS STEEL WARNING SIGN ON THE CONTROL PANEL STATING: "WARNING - OPEN NORTHEAST ACCESS HATCH BEFORE STARTING VENTILATION FAN. OPERATE FAN FOR 5 MINUTES BEFORE ENTERING THE VAULT."
3. BLIND FLANGE FOR ACCESS MANWAY SHALL BE PROVIDED WITH WELDED ON EYELET TO LIFT FLANGE. CONTRACTOR SHALL CAST IN HOT DIP GALVANIZED EYELET RATED FOR PICKING THE BLIND FLANGE DIRECTLY ABOVE THE BLIND FLANGE.

SCHEDULE NOTES

FAN SCHEDULE:
FAN TYPE ABBREVIATIONS:
PRV - POWER ROOF VENTILATOR

WHEEL TYPE ABBREVIATIONS:
C - CENTRIFUGAL

FAN SCHEDULE - M-103

UNIT NUMBER	LOCATION	MANUFACTURER	MODEL	FAN TYPE	AIRFLOW (CFM)	ESP (IN WC)	BRAKE HP	MOTOR HP	POWER SUPPLY VOLTS	POWER SUPPLY PHASE	MINIMUM WHEEL DIAMETER (IN)	WHEEL TYPE	DRIVE	FILTER DATA TYPE	FILTER DATA THICKNESS (IN)	VIBRATION ISOLATION	APPROX WEIGHT (LBS)	NOTES
45-TW-FAN-0001	FLOW METER VAULT	GREENHECK	CUE-160B	PRV	2100	0.625	0.56	3/4	240	1	16	C	DIRECT	---	---	INTERNAL	100	---

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	NM, MFR
DETAILED:	JPS, PM
CHECKED:	SHZ, SP
APPROVED:	AJH, MFR
DATE:	DECEMBER 2024
PROJECT NO.:	417134

FLOW METER VAULT

PROCESS MECHANICAL

FLOW METER VAULT PLAN AND SECTIONS

045-M-103

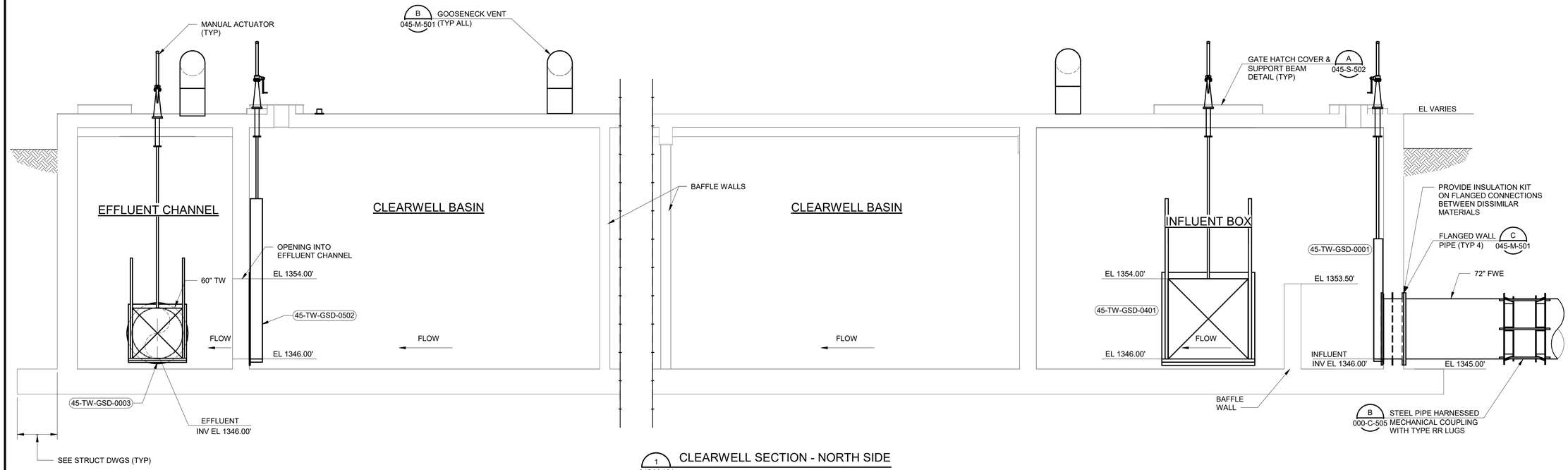
69 OF 82

PLOTTED: 11/26/2024 1:43:14 PM
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REVIT VERSION: 2023
D1000

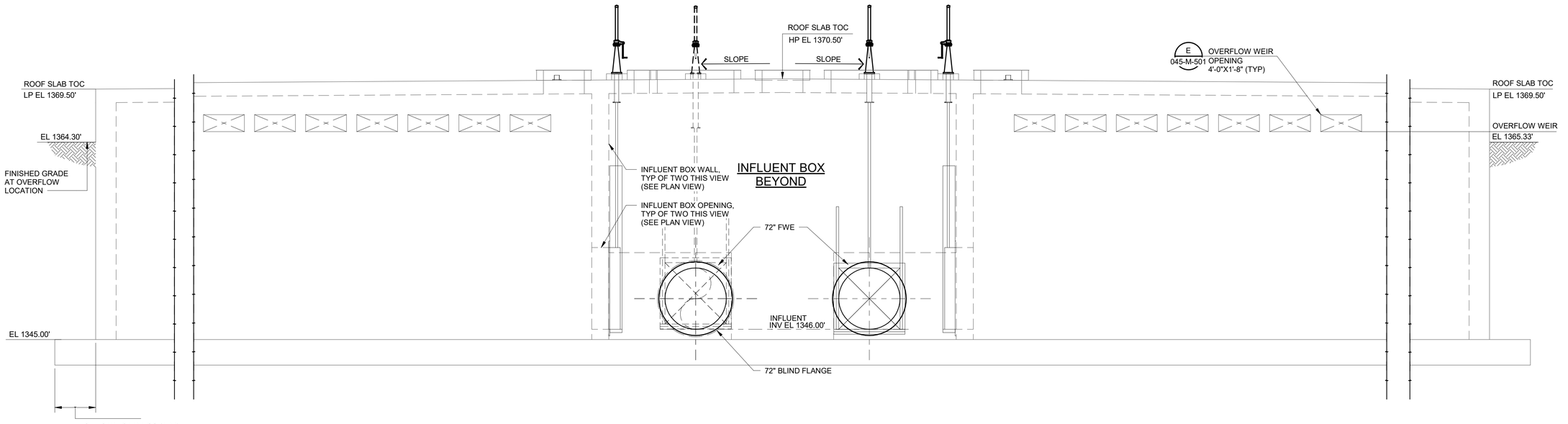
(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

GENERAL SHEET NOTES

1. YARD PIPING OMITTED FOR CLARITY.



1 045-M-101 CLEARWELL SECTION - NORTH SIDE 3/16" = 1'-0"



2 045-M-101 CLEARWELL SECTION - EAST SIDE 3/16" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:44:25 PM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
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D1000

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16 MG CLEARWELL

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16 MG CLEARWELL

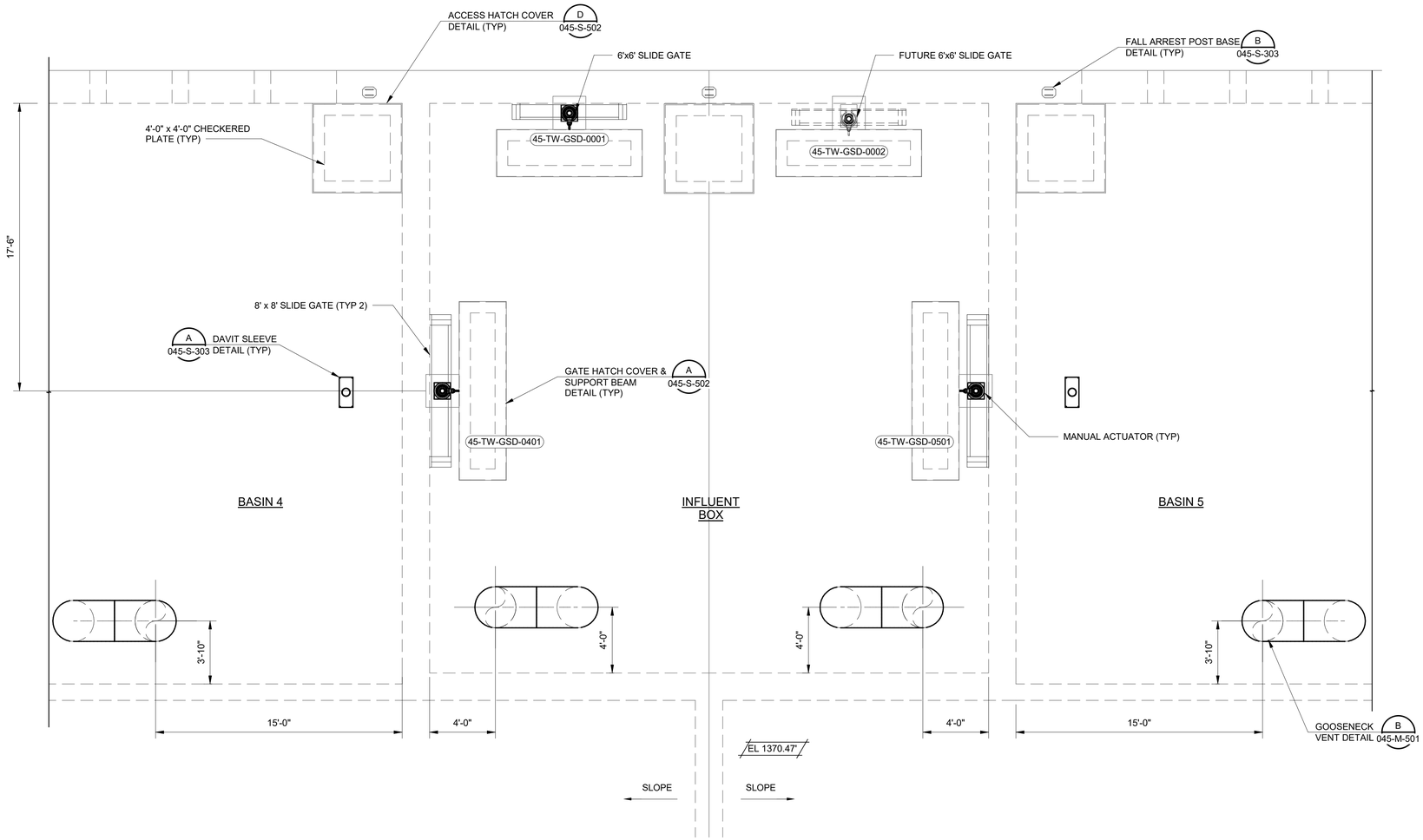
PROCESS MECHANICAL

SECTIONS

045-M-301

GENERAL SHEET NOTES

1. YARD PIPING OMITTED FOR CLARITY.



1 045-M-102 ENLARGED INFLUENT BOX PLAN
1/4" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/26/2024 1:45:55 PM
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PROJECT NO.:	417134

16 MG CLEARWELL

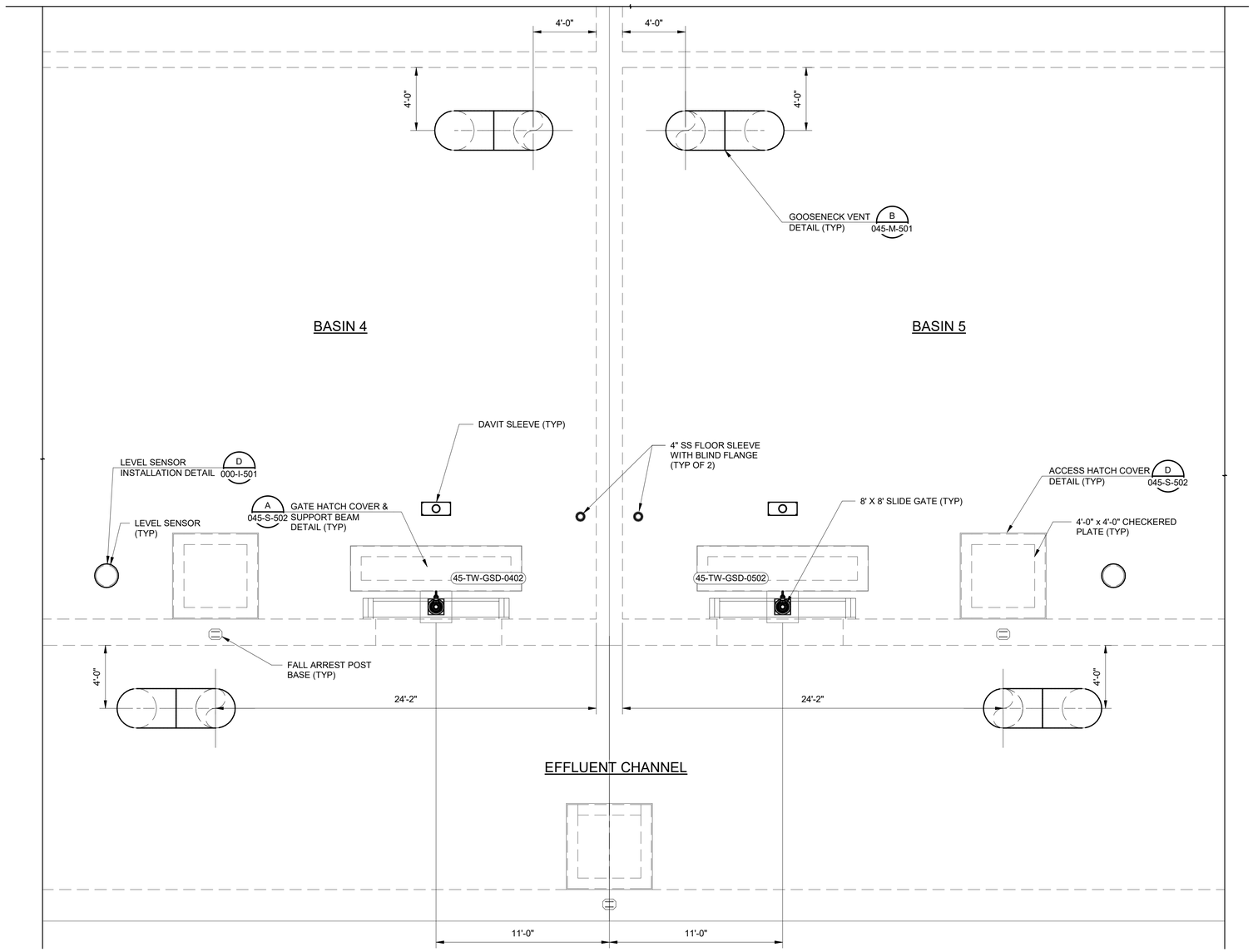
PROCESS MECHANICAL

ENLARGED ROOF PLAN - INFLUENT BOX

045-M-401

GENERAL SHEET NOTES

1. YARD PIPING OMITTED FOR CLARITY.



1 045-M-102 ENLARGED EFFLUENT CHANNEL PLAN
1/4" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	CS
DETAILED:	KMR
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

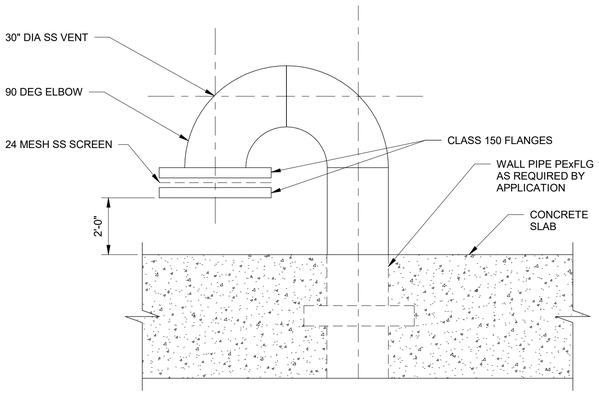
PROCESS MECHANICAL

ENLARGED ROOF PLAN - EFFLUENT CHANNEL

045-M-402

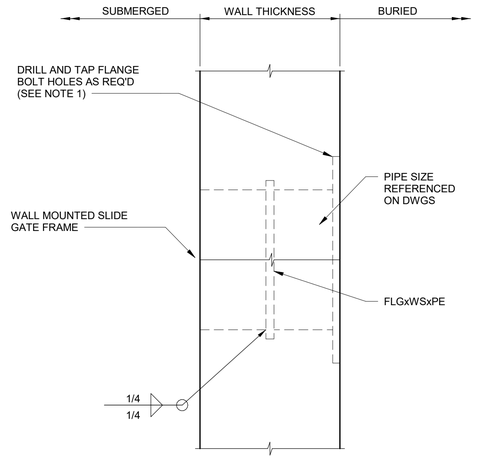
72 OF 82

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FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Clear Well Task_23-3.rvt
REVIT VERSION: 2021
D1000



B GOOSENECK VENT

3/8" = 1'-0"

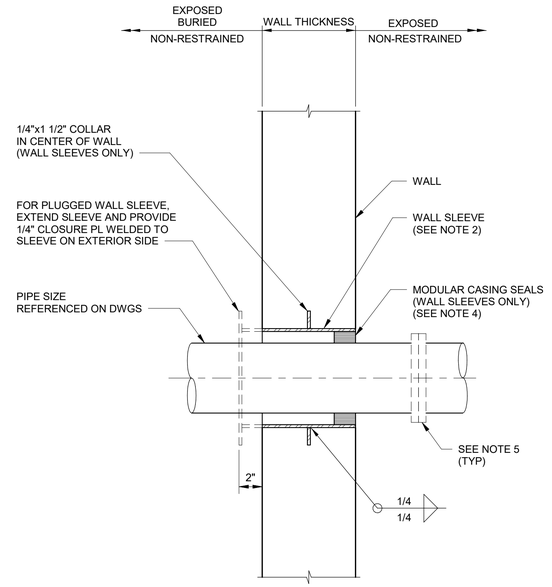


NOTES:

1. WALL PIPE MATERIAL SHALL BE STEEL. STEEL PIPE SHALL BE 3/8" FOR PIPE LARGER THAN 20", AND COATINGS SAME AS CONNECTING PIPE.
2. IF CONNECTING STEEL PIPE THICKNESS IS GREATER THAN 3/8", STEEL WALL PIPE THICKNESS SHALL BE INCREASED TO MATCH CONNECTING PIPE.
3. ANNULAR COLLAR SHALL BE SAME MATERIAL AS PIPE, 1/4" X 2" FOR PIPE 20" AND SMALLER, AND 3/8" X 3" FOR PIPE LARGER THAN 20".
4. WALL PIPE MAY BE FLUSH WITH FACE OF WALL OR EXTENDED WITH END AS REQUIRED OR INDICATED ON DRAWINGS.
5. WALL PIPE SHALL BE ORIENTED SO THAT THE BOLT HOLES STRADDLE THE TOP CENTERLINE.

C FLANGED WALL PIPE

12" = 1'-0"



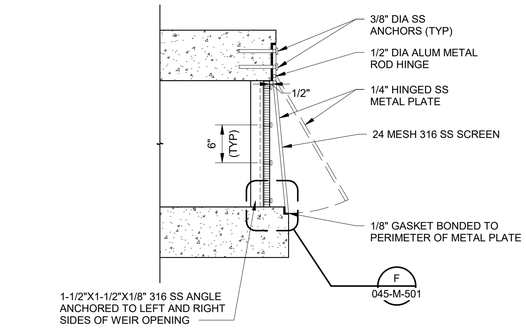
FOR PIPE 6 INCH DIAMETER AND LARGER

NOTES:

1. SCHEDULE 40 GALV STEEL PIPE SLEEVE. SIZE TO PROVIDE 3/4" ANNULAR SPACE AROUND PIPE FOR ALL BEAM SLEEVES AND FOR WALL SLEEVES FOR PIPES SMALLER THAN 1 1/2" DIAMETER. FOR PIPE SMALLER THAN 6" DIAMETER, COORDINATE WALL SLEEVE DIAMETER WITH MODULAR CASING SEAL MANUFACTURER.
2. WALL SLEEVE, SCHEDULE 40 STEEL PIPE FOR 12" AND SMALLER SLEEVES, 1/4" STEEL PIPE FOR SLEEVES LARGER THAN 12", AND HOT DIP GALVANIZED AFTER FABRICATION, 304 SS, OR OTHER MATERIAL AS SPECIFIED OR INDICATED ON DRAWINGS. COORDINATE WALL SLEEVE DIAMETER WITH MODULAR CASING SEAL MANUFACTURER.
3. FIRESAFING TO BE PROVIDED AT ALL RATED WALLS INDICATED ON THE DRAWINGS AND INSTALLED PER ACCEPTED UL RATED SYSTEM.
4. WHERE SOIL MAY BE PRESENT, USE TWO SETS OF CASING SEALS. ONE AT EACH FACE OF WALL.
5. TO MINIMIZE SLEEVE SIZE, PROVIDE A SCREW-ON FLANGE, GROOVED COUPLING, OR MECHANICAL COUPLING WITH ANCHOR STUDS ON ONE SIDE OF OPENING.
6. FOR BURIED PIPING, CONTRACTOR SHALL PROVIDE AN ADDITIONAL FIELD JOINT AS CLOSE AS PRACTICAL TO FACE OF WALL, BUT NO MORE THAN 5 FEET.
7. USE WAX TAPE TO PROTECT ALL BURIED FERROUS SURFACES INCLUDING PAINTED SURFACES. FOR PROTECTION OF ADJACENT PIPE BARREL SURFACES, SHRINK WRAP MAY BE USED IN LIEU OF WAX TAPE. SEE SPECIFICATIONS.

D CONCRETE WALL SLEEVE

12" = 1'-0"

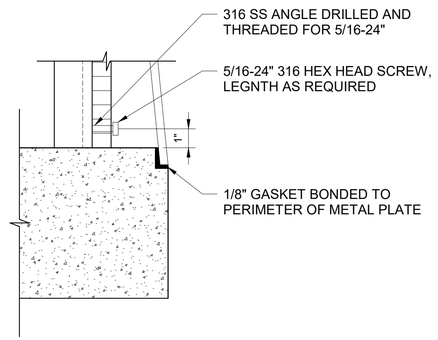


WEIR OPENING ELEVATION

WEIR OPENING SECTION

E OVERFLOW WEIR

1" = 1'-0"



F OVERFLOW WEIR ENLARGED DETAIL

3" = 1'-0"

1

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Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

1	01/08/25	ISSUED PER ADDENDUM NO. 1

REVISIONS AND RECORD OF ISSUE

DESIGNED:	CS
DETAILED:	KMR
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

PROCESS MECHANICAL

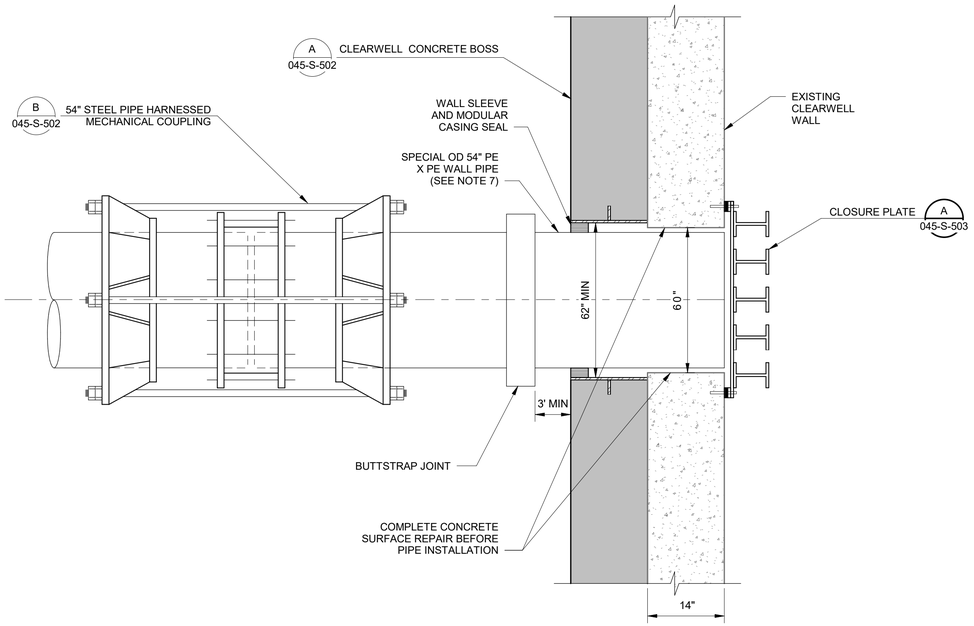
DETAILS I

045-M-501

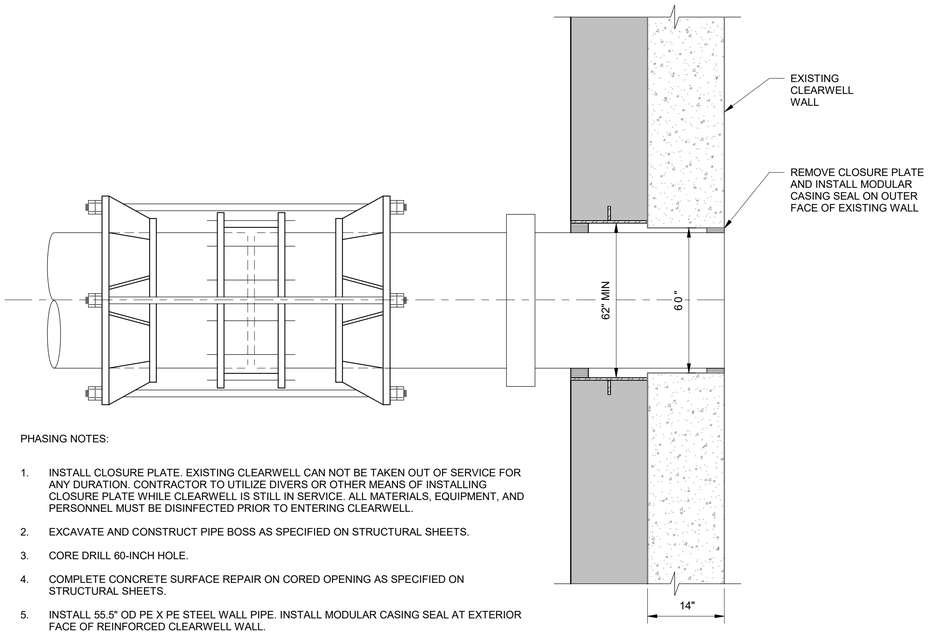
73 OF 82

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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REVIT VERSION: 2021
D1000



PHASE 1
NOT TO SCALE



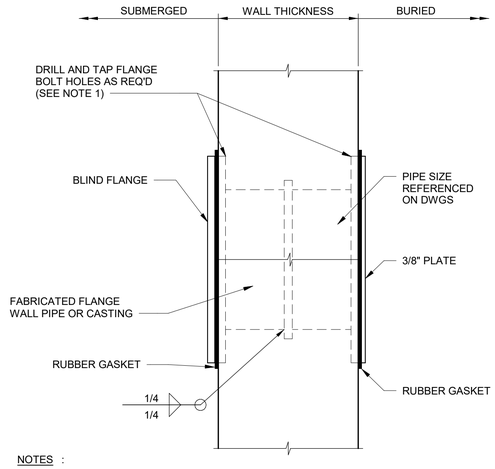
PHASE 2
NOT TO SCALE

PHASING NOTES:

1. INSTALL CLOSURE PLATE. EXISTING CLEARWELL CAN NOT BE TAKEN OUT OF SERVICE FOR ANY DURATION. CONTRACTOR TO UTILIZE DIVERS OR OTHER MEANS OF INSTALLING CLOSURE PLATE WHILE CLEARWELL IS STILL IN SERVICE. ALL MATERIALS, EQUIPMENT, AND PERSONNEL MUST BE DISINFECTED PRIOR TO ENTERING CLEARWELL.
2. EXCAVATE AND CONSTRUCT PIPE BOSS AS SPECIFIED ON STRUCTURAL SHEETS.
3. CORE DRILL 60-INCH HOLE.
4. COMPLETE CONCRETE SURFACE REPAIR ON CORED OPENING AS SPECIFIED ON STRUCTURAL SHEETS.
5. INSTALL 55.5" OD PE X PE STEEL WALL PIPE. INSTALL MODULAR CASING SEAL AT EXTERIOR FACE OF REINFORCED CLEARWELL WALL.
6. COMPLETE PIPE TIE-IN WITH TW INTERCONNECT FLOW METER VAULT, CLEAN AND DISINFECT PIPING, AND CLOSE THE NEW BUTTERFLY VALVE INSIDE THE FLOW METER VAULT.
7. REMOVE CLOSURE PLATE WITH SAME PROTOCOL USED FOR INSTALLATION. INSTALL MODULAR CASING SEAL ON OUTER FACE OF WALL.
8. INSTALL MODULAR CASING SEAL ON INNER FACE OF EXISTING CLEARWELL WALL.
9. OPEN BUTTERFLY VALVE INSIDE TW INTERCONNECT FLOW METER VAULT.

A EXISTING CLEARWELL PIPE CONNECTION DETAIL

12" = 1'-0"

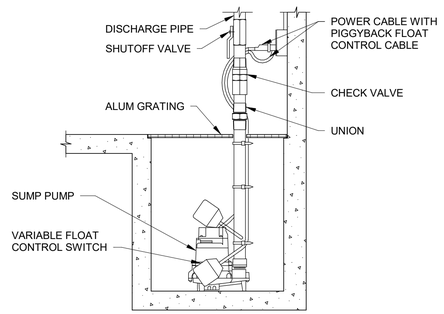


NOTES :

1. WALL PIPE MATERIAL SHALL BE STEEL OR AS INDICATED ON THE DRAWINGS. STEEL PIPE SHALL BE FOR PIPE LARGER THAN 20".
2. COATING FOR THE BLIND FLANGE, WALL PIPE, AND COVER PLATE SHALL MATCH COATING USED TYPICALLY FOR THE CONNECTING PIPE. SEE SPECIFICATION FOR MORE DETAIL.

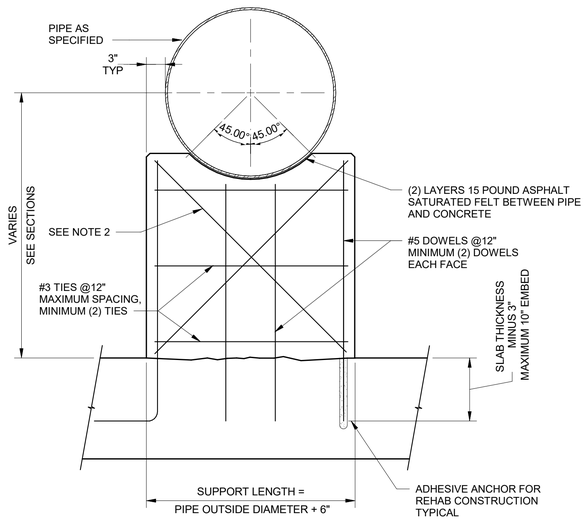
B WALL PIPE WITH BLIND FLANGE AND COVER PLATE DETAIL

12" = 1'-0"



C SIMPLEX SUBMERSIBLE SUMP PUMP

NO SCALE



NOTES:

1. SUPPORT WIDTH = 12"
2. #5 EACH FACE WITH STANDARD HOOK, ONLY REQUIRED FOR PIPE DIAMETER 48" AND LARGER.

D CONCRETE SADDLE PIPE SUPPORT

1" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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REF: XREF VERSION 2021
D11000

Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	BGM
DETAILED:	JPS
CHECKED:	SHZ
APPROVED:	AJH
DATE:	DECEMBER 2024
PROJECT NO.:	417134

16 MG CLEARWELL

PROCESS MECHANICAL

DETAILS II

045-M-502

GENERAL NOTES

1. SEE SHEETS 000-E-001 AND 000-E-002 FOR ELECTRICAL LEGENDS, ABBREVIATIONS & NOTES.

SHEET KEYNOTES

1. CONTRACTOR SHALL STUB-UP DUCTBANK CONCRETE ENCASED A MINIMUM OF 18" ABOVE GRADE. CONDUITS SHALL ROUTE EXPOSED TO TWO NEW WALL-MOUNTED NEMA 4X STAINLESS STEEL JUNCTION BOXES, ONE FOR POWER, ONE FOR CONTROL, TO BE UTILIZED TO TRANSITION THROUGH THE ELECTRICAL ROOM WALL TO THE ASSOCIATED SOURCE EQUIPMENT. ONE SPARE CONDUIT SHALL TERMINATE AT EACH JUNCTION BOX.
2. CONTRACTOR SHALL ROUTE NEW DUCTBANK BELOW EXISTING AT-GRADE ELECTRICAL DUCTBANK.

16 MG CLEARWELL
(045-E-101)

EXIST. CLEARWELL

EXIST. FIBER OPTIC

NAIL AVENUE

TW INTERCONNECT METER VAULT (045-E-102)

ITC6-X2,-X3,2" (3)EC,2"

ITC6-X2,-X3,2" (3)EC,2"

EHH (SIGNAL) (TYP)

EHH (POWER) (TYP)

EXIST. ELECTRICAL DUCTBANK

TREATED WATER PUMP STATION

PANEL 8EPP1

ITC-6

E8PP1-X1,2" ITC6-X1,-X2,-X3,2" ITC6-X4,2" (2)EC,2"

DCU-6

TREATED WATER SOUTH ELECTRICAL BUILDING

40' 20' 0 40' 80'
SCALE 1"=40'

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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ES1:1000
ES1:1000

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JCK
DETAILED:	AJS
CHECKED:	KRE
APPROVED:	KRE
DATE:	DECEMBER 2024
PROJECT NO.:	417134

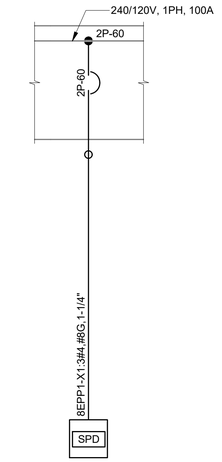
SITE

ELECTRICAL

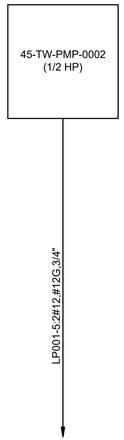
OVERALL SITE PLAN

000-E-100

75 OF 82

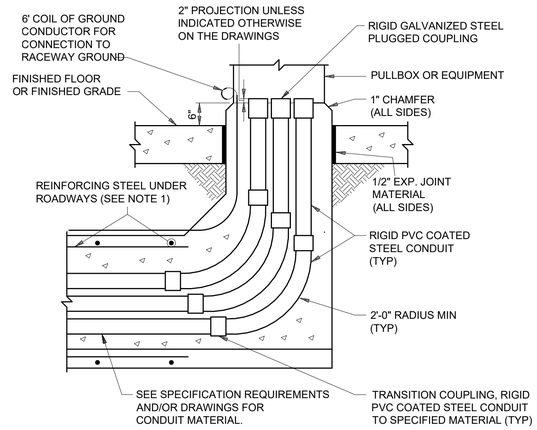


8EPP1 PARTIAL ONE-LINE DIAGRAM
(SOUTH ELECTRICAL ROOM)

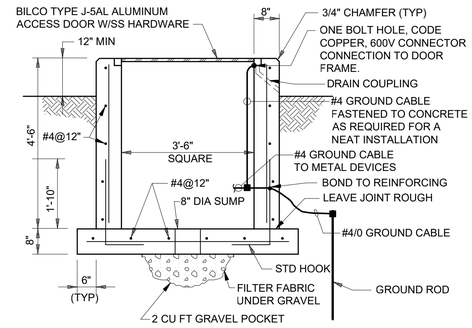


45-TW-PMP-0002 ONE-LINE DIAGRAM
(FLOW METER VAULT)

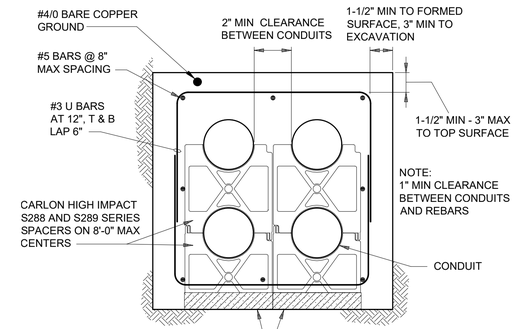
PHASE		PANELBOARD: LP-001	BUS: COPPER					MAINS: 2P-60A MAIN BREAKER	PHASE	
"L1"	"L2"	SERVICE: 120/240V, 1PH, 3W, S/N	RATING: 125A					LOCATION: FLOWMETER VAULT	"L1"	"L2"
V.A.	V.A.	MOUNTING: SURFACE							V.A.	V.A.
		LOAD	P	BKR	CKT #	BKR	P	LOAD		
100		45-TW-FIT-0001	1	20	1 2	20	1	45-TW-LIT-0400	100	
	12	FLOWMETER VAULT LIGHTING	1	20	3 4	20	1	45-TW-LIT-0500		100
1176		45-TW-PMP-0002	1	20	5 6	20	1	SUMP PUMP PANEL (45-TW-LCP-0001)	1176	
		SPARE	1	20	7 8	20	1	SPARE		
		SPARE	1	20	9 10	20	2	EXHAUST FAN (45-TW-LCP-0002)	828	
		SPARE	1	20	11 12	-	-	-		828
		SPARE	1	20	13 14	20	1	SPARE		
		SPACE	-	-	15 16	-	-	SPACE		
		SPACE	-	-	17 18	-	-	SPACE		
		SPACE	-	-	19 20	-	-	SPACE		
1276		TOTAL "L1"	3380					TOTAL "L1"	2104	
	12	TOTAL "L2"	940					TOTAL "L2"		928
		TOTAL LOAD =	4320							



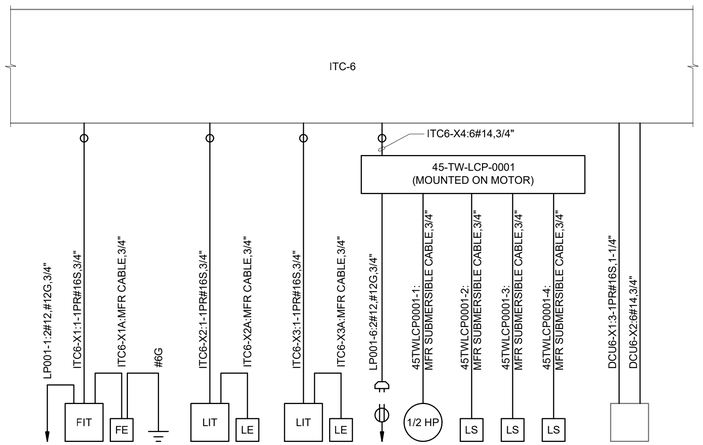
TYPICAL DUCT BANK RISER CONSTRUCTION
NO SCALE



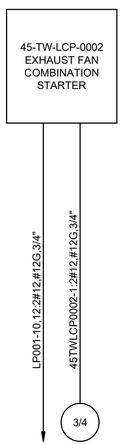
TYPICAL ELECTRICAL HANDHOLE DETAIL
NO SCALE NOT SUITABLE FOR ROADWAY LOCATIONS



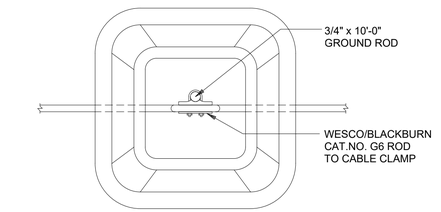
TYPICAL DUCT BANK SECTION
NO SCALE

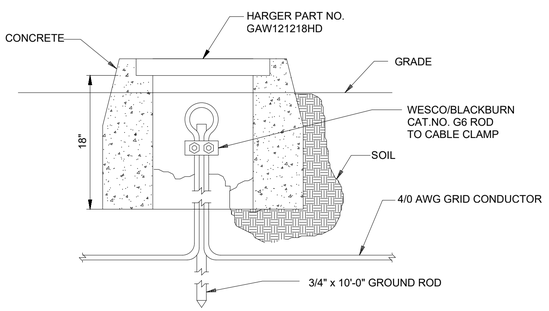


ITC-6 PARTIAL ONE-LINE DIAGRAM
(SOUTH ELECTRICAL ROOM)

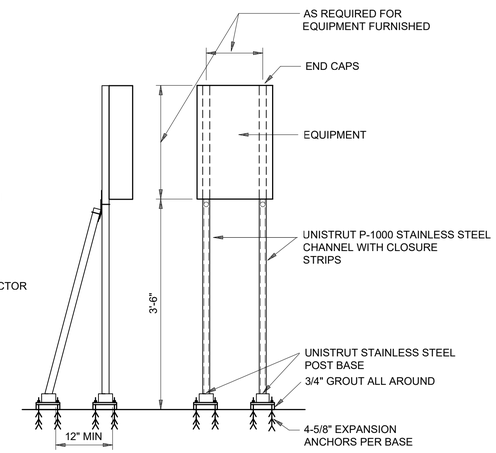


45-TW-LCP-0002 ONE-LINE DIAGRAM
(FLOW METER VAULT)





ELEVATION
TYPICAL GROUND TEST STATION



TYPICAL EQUIPMENT MOUNTING DETAIL
NO SCALE

NOTE: IN OUTDOOR LOCATIONS, USE STAINLESS STEEL BOLTS, NUTS, WASHERS, AND ANCHOR BOLTS.

GENERAL NOTES

1. SEE SHEETS 000-E-001 AND 000-E-002 FOR ELECTRICAL LEGENDS, ABBREVIATIONS & NOTES.

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JCK
DETAILED:	AJS
CHECKED:	KRE
APPROVED:	KRE
DATE:	DECEMBER 2024
PROJECT NO.:	417134

GENERAL

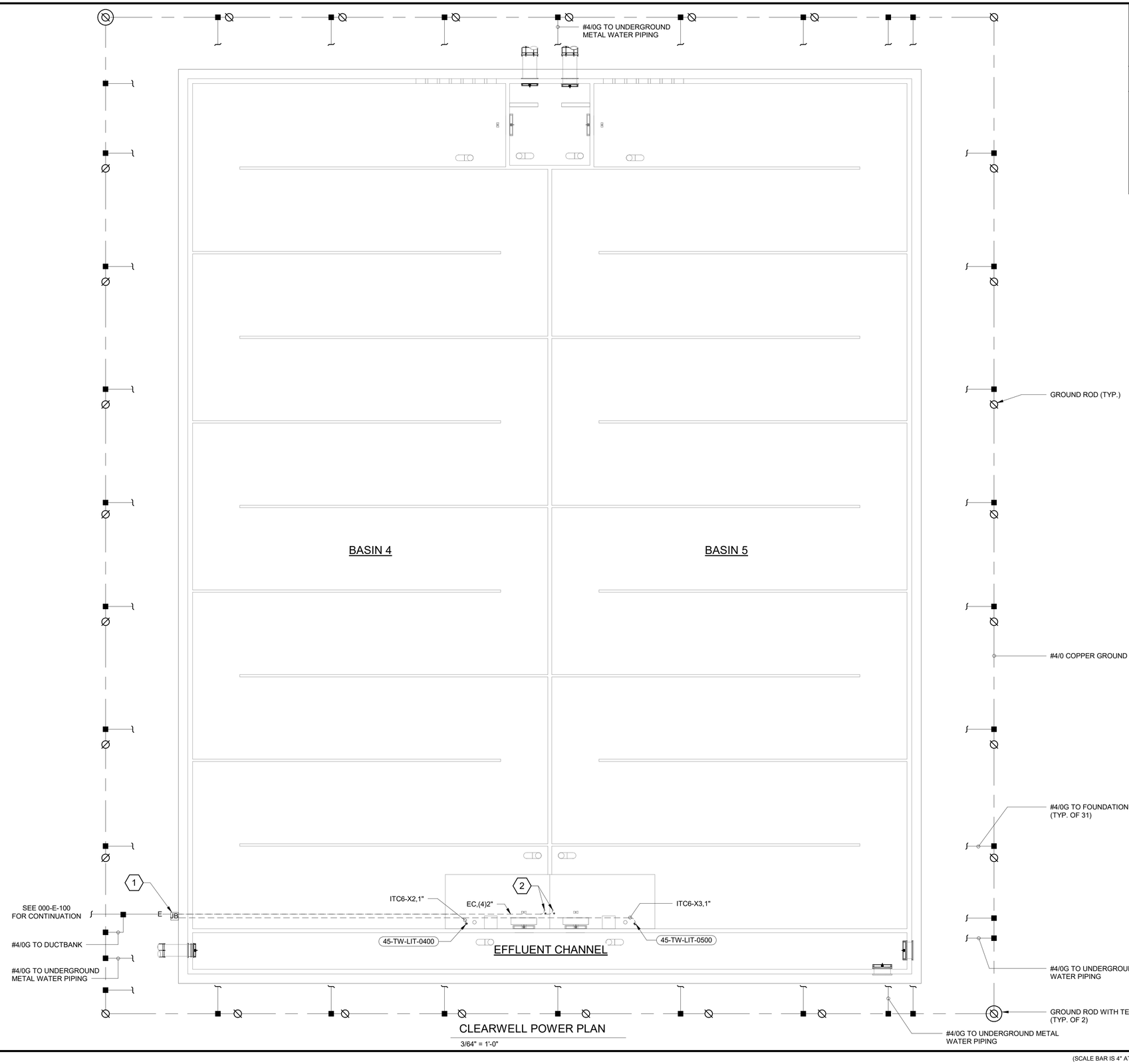
ELECTRICAL

ONE-LINE DIAGRAMS AND SCHEDULES

000-E-601

PLOTTED: 11/26/2024 3:20:10 PM
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FDT1000
D-1000

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



CLEARWELL POWER PLAN

3/64" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

GENERAL SHEET NOTES

1. SEE 000-E-001 & 000-E-002 FOR ELECTRICAL LEGENDS, ABBREVIATIONS & GENERAL NOTES.

SHEET KEYNOTES

1. CONTRACTOR SHALL TRANSITION FROM DUCTBANK TO CONDUIT-IN-SLAB AT THIS LOCATION. CONTRACTOR SHALL FURNISH AND INSTALL TWO NEMA 4X TYPE 316 SS JUNCTION BOXES, SIZED AS REQUIRED, TO FACILITATE THE TRANSITION.
2. CONTRACTOR SHALL ROUTE TWO 2" SPARE CONDUITS IN-SLAB, ONE POWER AND ONE CONTROL, FROM JUNCTION BOX TO EACH LOCATION ATOP THE CLEARWELL AS NOTED. CONTRACTOR SHALL STUB AND CAP CONDUITS FOR FUTURE USE.

BLACK & VEATCH
Black & Veatch Corporation
Kansas City, Missouri

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CONTRACT 23-3
16 MG CLEARWELL

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PROJECT NO.:	417134

16 MG CLEARWELL

ELECTRICAL

POWER PLAN

045-E-101

77 OF 82

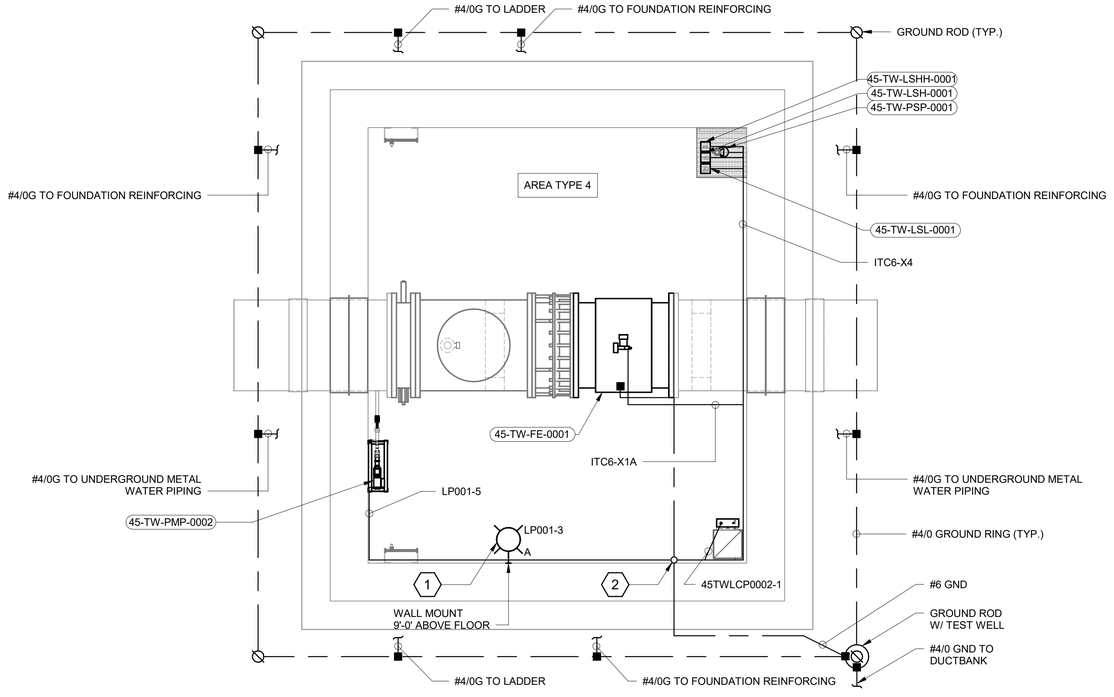
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REVIT VERSION: 2021
D11000

GENERAL NOTES

1. SEE 000-E-001 & 000-E-002 FOR ELECTRICAL LEGENDS, ABBREVIATIONS & GENERAL NOTES.
2. CONDUIT ROUTING BETWEEN UNISTRUT MOUNTED COMPONENTS ABOVE FLOWMETER VAULT OMITTED FOR CLARITY. REFER TO 000-E-601.

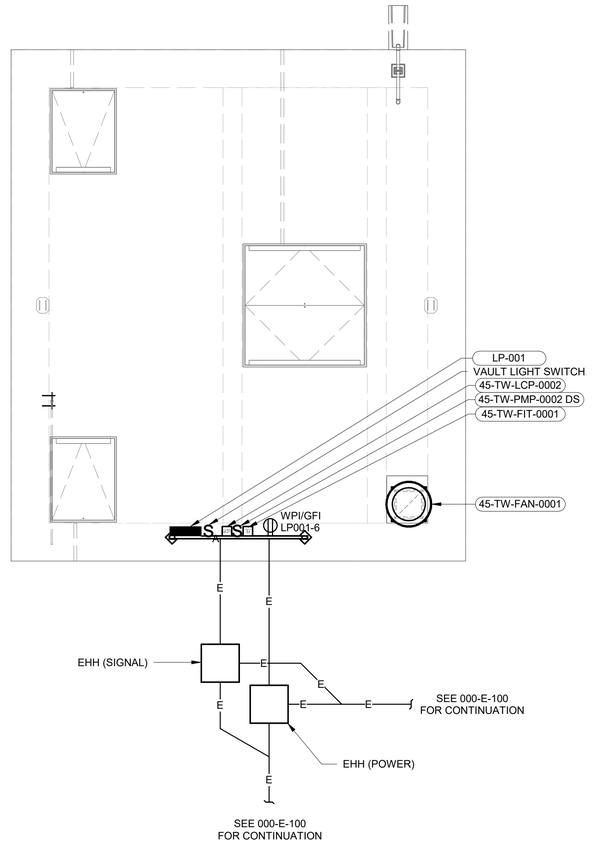
SHEET KEYNOTES

1. FIXTURE SHALL BE LITHONIA WST P2 40K VF MVOLT DBLXD OR APPROVED EQUAL.
2. CONTRACTOR SHALL ROUTE CONDUIT TO INDCATED POSITION, CORE DRILL THROUGH ROOF OF VAULT AND SEAL CONDUITS TO PREVENT INGRESS OF WATER. GROUNDING ELECTRODE CONNECTION TO 45-TW-FE-0001 SHALL BE ROUTED WITHIN PVC CONDUIT DURING SLAB PENETRATION.



FOUNDATION PLAN

1/4" = 1'-0"



TOP PLAN

1/4" = 1'-0"

4' 2' 0' 4' 8'

1/4" = 1'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

BLACK & VEATCH

Black & Veatch Corporation
Kansas City, Missouri

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED ON DECEMBER 2, 2024 BY ANDREW J. HANSEN, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF ARKANSAS, E-14664

Beaver Water District

PLANT EXPANSION PROGRAM
CONTRACT 23-3
16 MG CLEARWELL

Conformed To Bid

REVISIONS AND RECORD OF ISSUE

DESIGNED:	JCK
DETAILED:	AJS
CHECKED:	KRE
APPROVED:	KRE
DATE:	DECEMBER 2024
PROJECT NO.:	417134

FLOW METER VAULT

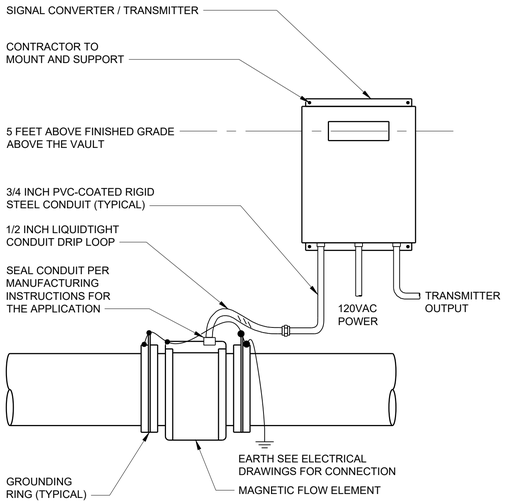
ELECTRICAL

FLOW METER VAULT POWER AND GROUNDING PLAN

045-E-102

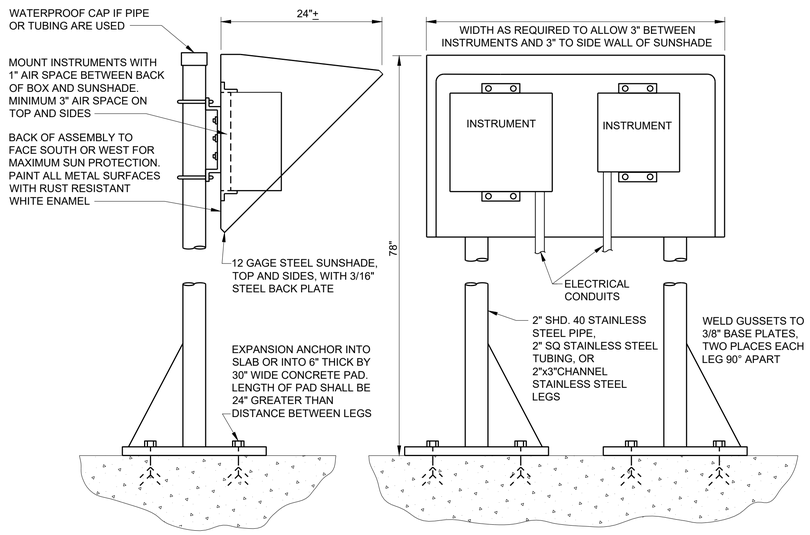
78 OF 82

PLOTTED: 11/11/2024 7:15:01 AM
FILE: Autodesk Docs://417134 - BWD Plant Expansion/45-417134-Flow Meter Vault Task_23-3.rvt
REVIT VERSION: 2023
D11000



NOTE:
1. PIPE TO BE SUPPORTED ON BOTH SIDES OF METER.

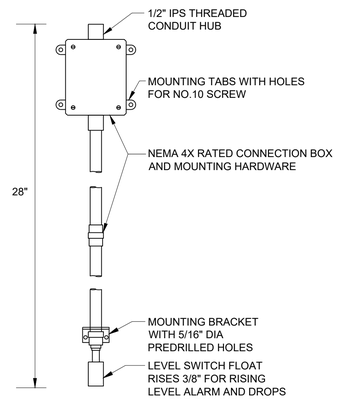
A MAGNETIC FLOWMETER
NO SCALE



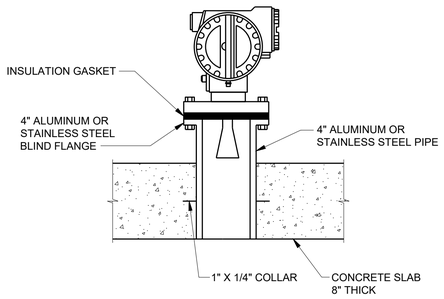
SIDE VIEW FRONT VIEW

B OUTDOOR INSTRUMENT MOUNTING DETAIL
NO SCALE

(FOR INSTRUMENTS GREATER THAN 10" WIDE OR MULTIPLE INSTRUMENTS)



C FOOD LEVEL SWITCH DETAIL
NO SCALE



D RADAR LEVEL TRANSMITTER
NO SCALE

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/28/2024 9:13:56 AM
FILE: C:\USERS\CHA080877\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\CLEARWELL\000-I-501.DWG
D11000
D11043

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Kansas City, Missouri

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Beaver Water District

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CONTRACT 23-3
16 MG CLEARWELL

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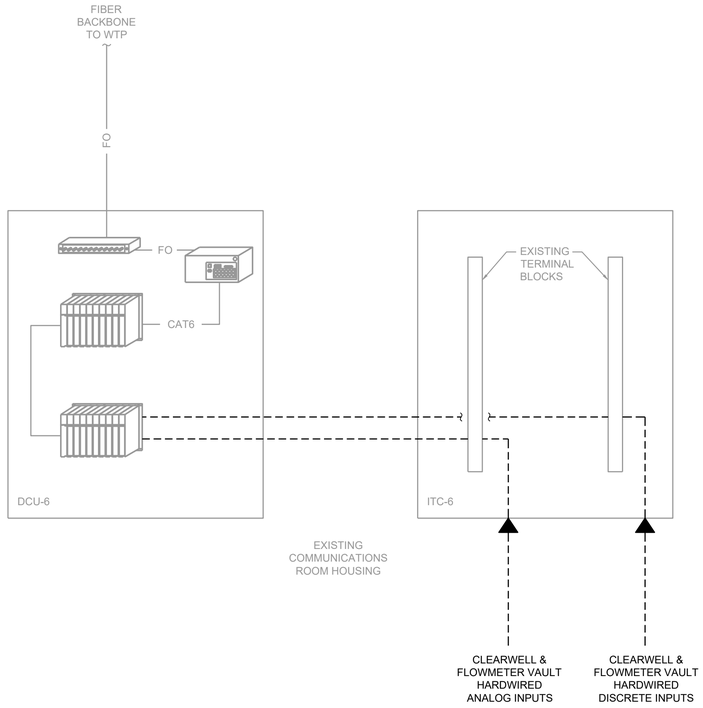
DESIGNED:	VVJ, BLB
DETAILED:	VDM
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APPROVED:	BLB
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16 MG CLEARWELL

INSTRUMENTATION

INSTRUMENT INSTALLATION DETAILS

000-I-501



LEGEND:

- DISTRIBUTED CONTROL UNIT OR REMOTE INPUT/OUTPUT UNIT (DCU/RIO)
- FIBER PATCH PANEL (FPP)
- ETHERNET SWITCH (ESW)
- HARDWIRED SIGNALS
- FO — FIBER OPTIC CABLE
- CAT6 — CATEGORY 6 METALLIC CABLE

NOTE:

1. DISTRIBUTED CONTROL UNITS I/O MODULES WILL BE PROCURED, INSTALLED AND TESTED BY THE OWNER IF SUFFICIENT SPARES ARE NOT AVAILABLE. CONTRACTOR SHALL TERMINATE ALL POWER AND CONTROL WIRING FROM PROCESS EQUIPMENT TO ITC-6 THEN THE DCU-6 I/O MODULES. OWNER WILL PROVIDE DCU PROGRAMMING.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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16 MG CLEARWELL

INSTRUMENTATION

DCS NETWORK CONTROL BLOCK DIAGRAM

000-I-601

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FILE: C:\USERS\CHA08687\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\CLEARWELL\000-I-601.DWG
FDT1000
FD1003

FIELD		EXISTING ITC-6	EXISTING DCU-6 PANEL	
DESCRIPTION				
FLOWMETER VAULT SUMP PUMP IN AUTO	FLOWMETER VAULT SUMP PUMP LCP 45-TW-LCP-0001			DI
FLOWMETER VAULT SUMP PUMP RUNNING				DI
FLOWMETER VAULT SUMP LEVEL HIGH HIGH ALARM				DI
14 MG CLEARWELL TREATED WATER WET WELL INLET FLOW	FIT 0001			AI
16 MG CLEARWELL BASIN NO.4 LEVEL	LIT 0400			AI
16 MG CLEARWELL BASIN NO.5 LEVEL	LIT 0500			AI

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/28/2024 9:15:21 AM
FILE: C:\USERS\CHA080677\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\000-I-602.DWG
STYLE: ISO A1 (600.00 x 841.00 MM)

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16 MG CLEARWELL

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16 MG CLEARWELL

INSTRUMENTATION

INSTRUMENT INTERCONNECTION DIAGRAM

000-I-602

DCS HMI

DCU-6

HIGH LEVEL LAH | LEVEL LI | IN REMOTE YI | RUNNING YIR | E-STOP YA | COMMON FAIL UA | FAIL TO START YA | RUN CMD UCR

FLOW FI 0001 | LEVEL LI 0400 | LEVEL LI 0500 | IN AUTO YI 0001 | RUNNING YIR 0001 | HIGH-HIGH LEVEL LAHH 0001

BAFFLED CLEARWELL BASIN NO.5

BAFFLED CLEARWELL BASIN NO.4

16 MG CLEARWELL STRUCTURE

14 MG CLEARWELL STRUCTURE (1)

INFLUENT BOX

EFFLUENT CHANNEL

INFLUENT CHANNEL

CLEARWELL BASINS 1,2,& 3

TREATED WATER WETWELL & HIGH SERVICE PUMP STATION

TREATED WATER HIGH SERVICE PUMPS

FLOWMETER VAULT

OVERFLOW

45-TW-GSD-0501

BLIND FLANGE (TYP)

PLATE (TYP)

45-TW-GSD-0002

45-TW-GSD-0001

45-TW-GSD-0401

45-TW-GSD-0402

45-TW-GSD-0502

45-TW-GSD-0003

45-TW-GSD-0004

45-TW-GSD-0005

FROM STARR WTP — 72"-TW-SP

FROM PLANNED 80 MGD WTP EXPANSION

45-TW-VBF-0001

72"-TW-SP

72"-TW-SP

45-TW-VBF-0002

FLOW DIRECTION

LIT 0500 RAD

LE 0500 RAD

LIT 0400 RAD

LE 0400 RAD

LIT 0400 — 120V — US

84"-TW-SP

TO FUTURE TREATED WATER PUMP STATION

84"-TW-SP — TO FUTURE TW PUMP STATION

60"-TW-SP

TO CUSTOMER CITIES

TO OWNER-SUPPLIED WATER QUALITY PANEL IN HIGH SERVICE PUMP STATION

240V — HS 0002 — OO — YLR 0002 — RUN — 45-TW-LCP-0002

45-TW-FAN-0001

120V — FIT 0001

120V — 45-TW-CV-0002

45-TW-VBA-0002

45-TW-VBA-0003

45-TW-VBF-0004

FE 0001 — M

45-TW-PMP-0002

45-TW-VBF-0003

54"-TW-SP

OOA — HS 0001 — YLR 0001 — RUN — LAHH 0001 — 45-TW-LCP-0001

120V

LSH 0001

LSHH 0001

LSL 0001

45-TW-VBA-0001

45-TW-PSP-0001

45-TW-CV-0001

SUMP PUMP DISCHARGE TO GROUND

OVERFLOW

54"-TW-PCCP

72"-TW-PCCP

FROM STEELE WTP

1 — 48"-TW-PCCP

LSH — INFLUENT CHANNEL

LE — US

FROM CROXTON WTP

FROM CROXTON EXPANSION WTP

60"-TW-SP — TO WESTERN CORRIDOR PUMP STATION

NOTES:

1. SEE LEGEND AND ABBREVIATIONS ON DRAWINGS 000-I-001, 000-I-002 & 000-I-003.
2. THE SYSTEM CODE IS "TW" UNLESS OTHERSIE NOTED. THE SYSTEM CODE FOR GROUNDWATER DEWATERING IS "GWD".
3. 16 MG CLEARWELL, FLOW METER VAULT AND GROUNDWATER DRAINAGE MANHOLE ARE AREA CODE 45.
4. LOCAL CONTROL DEVICES, SUCH AS INDICATING LIGHTS AND SWITCHES, LOCATED ON MCCs OR AT EQUIPMENT, MAY NOT BE SHOWN.

GENERAL KEY NOTES:

(1) INSTRUMENTATION TAGS AND CONTROLS FOR EXISTING INFRASTRUCTURE AND EQUIPMENT OMITTED FOR CLARITY. SOME EXISTING EQUIPMENT IS ALSO OMITTED FOR CLARITY.

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

PLOTTED: 11/28/2024 9:17:09 AM
FILE: C:\USERS\CHA086877\APPDATA\LOCAL\AUTODESK\AUTOCAD PLANT 3D\COLLABORATION\CACHE\417134\PID DWG\CLEARWELL\045-I-601.DWG
FDT1000
DT1002

BLACK & VEATCH
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16 MG CLEARWELL

INSTRUMENTATION

P&ID - 16 MG CLEARWELL AND FLOW METER VAULT

045-I-601

82 OF 82