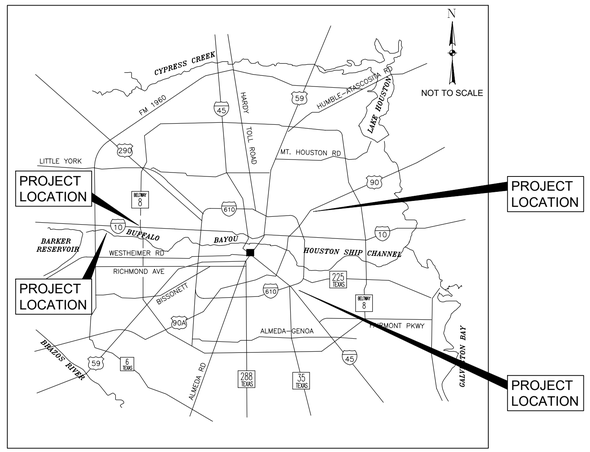
CITY OF HOUSTON

HOUSTON PUBLIC WORKS
CAPITAL PROJECTS

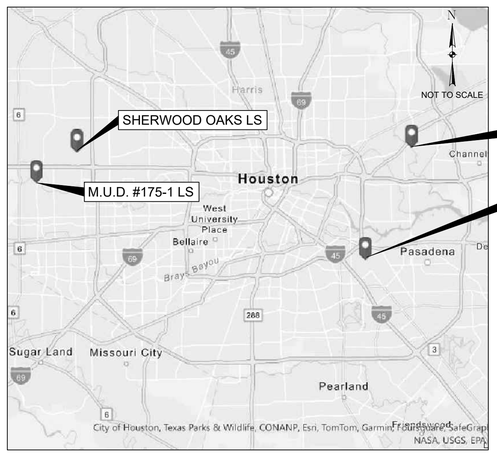
LIFT STATION RENEWAL AND REHABILITATION
GREEN DOLPHIN, SHERWOOD OAKS, WEST COURT AND M.U.D. #175-1 LIFT STATIONS

WBS NO. R-000267-0172-4

APPLICABLE CODES
2021 INTERNATIONAL BUILDING CODE WITH CITY OF HOUSTON AMENDMENTS
2023 NATIONAL ELECTRICAL CODE
2021 UNIFORM MECHANICAL CODE



LOCATION MAP



VICINITY MAP

LIFT STATION	ADDRESS	KEY MAP NO.	DISTRICT
GREEN DOLPHIN	12870 GREEN DOLPHIN	456 U	I
M.U.D. #175-1	1090 ENCLAVE PKWY	488 F	G
SHERWOOD OAKS	11333 CHATTERTON DR	449 T	A
WEST COURT	2 WEST COURT DR	535 L	I

TDLR EABPR _____

MAYOR
JOHN WHITMIRE

CONTROLLER
CHRIS HOLLINS

DISTRICT COUNCIL MEMBERS

AMY PECK DISTRICT A
TARSHA JACKSON DISTRICT B
ABBIE KAMIN DISTRICT C
CAROLYN EVANS-SHABAZZ DISTRICT D
FRED FLICKINGER DISTRICT E
TIFFANY D. THOMAS DISTRICT F
MARY NAN HUFFMAN DISTRICT G
MARIO CASTILLO DISTRICT H
JOAQUIN MARTINEZ DISTRICT I
EDWARD POLLARD DISTRICT J
MARTHA CASTEX-TATUM DISTRICT K

COUNCIL MEMBERS AT-LARGE

JULIAN RAMIREZ POSITION 1
WILLIE DAVIS POSITION 2
TWILA CARTER POSITION 3
LETITIA PLUMMER POSITION 4
SALLIE ALCORN POSITION 5

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY SUITE 600,
HOUSTON, TX 77024
(713)-961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

PARKS-FORESTRY DEPT.

METRO

HOUSTON WATER

TRANSPORTATION & DRAINAGE OPERATIONS

CAPITAL PROJECTS SURVEY

CITY ENGINEER DATE

DIRECTOR OF HOUSTON PUBLIC WORKS DATE

FOR CITY OF HOUSTON USE ONLY

SHT	DWG #	DRAWING TITLE
GENERAL		
1	G-000-001	COVER SHEET
2	G-000-002	INDEX OF DRAWINGS
3	G-000-003	LEGENDS AND GENERAL NOTES
4	G-000-004	ABBREVIATIONS
5	G-000-005	GENERAL NOTES SHEET 1 OF 2
6	G-000-006	GENERAL NOTES SHEET 2 OF 2
7	G-000-007	CONSTRUCTION SIGN BUILD HOUSTON FORWARD
8	M-000-001	PROCESS MECHANICAL - LEGENDS AND GENERAL NOTES
9	E-000-001	ELECTRICAL LEGEND AND SYMBOLS SHEET 1 OF 2
10	E-000-002	ELECTRICAL LEGEND AND SYMBOLS SHEET 2 OF 2
11	E-000-003	ELECTRICAL LIGHTING FIXTURE SCHEDULE
12	E-000-004	ELECTRICAL GENERAL NOTES
13	I-000-001	INSTRUMENTATION LEGENDS & SYMBOLS SHEET 1 OF 2
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17	C-000-503	CIVIL DETAILS SHEET 3 OF 9
18	C-000-504	CIVIL DETAILS SHEET 4 OF 9
19	C-000-505	CIVIL DETAILS SHEET 5 OF 9
20	C-000-506	CIVIL DETAILS SHEET 6 OF 9
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27	S-000-504	STANDARD CONCRETE JOINT DETAILS
28	S-000-505	STANDARD CONCRETE REINFORCEMENT DETAILS
29	S-000-506	MISCELLANEOUS CONCRETE DETAILS
30	S-000-507	STANDARD STEEL FRAMING CONNECTIONS DETAILS
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158	E-207-702	ELECTRICAL COMMUNICATION DIAGRAM
159	E-207-703	ELECTRICAL THREE-LINE DIAGRAM
160	E-207-601	ELECTRICAL CONDUIT SCHEDULE
161	E-207-501	ELECTRICAL TYPICAL JUNCTION BOX DETAILS
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205	E-281-601	ELECTRICAL CONDUIT SCHEDULE
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224	I-281-614	INSTRUMENTATION PUMP NO.4 CONTROL WIRING DIAGRAM
225	I-281-615	INSTRUMENTATION ODOR CONTROL P&ID DIAGRAM
226	I-281-616	INSTRUMENTATION ODOR CONTROL PANEL WIRING DIAGRAM

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

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STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL

INDEX OF DRAWINGS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 2 OF 226	

G-000-002

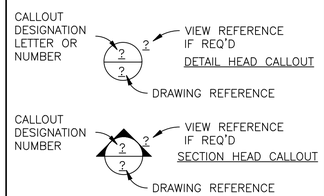
FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-000-GENERAL_BV.rvt

GENERAL LEGENDS

MATERIALS LEGEND

- STONE
- EARTH
- GRANULAR FILL
- CONCRETE
- STEEL
- ALUMINUM
- BEDROCK
- CHECKERED PLATE
- SAND
- RIPRAP
- BRICK
- CMU
- FACE BLOCK
- SOLID FILL
- ENGINEERED FILL
- ENGINEERED FILL (GRAVEL)
- GRATING

SECTION/DETAIL/ELEVATIONS LEGEND



NORTH ARROWS LEGEND

ANNOTATIONS LEGEND

GENERAL TEXT
.10" ROMANS BT
DRAWING TEXT, NOTES, SCHEDULES, DIMENSIONS & MINOR CALLOUTS

GENERAL TEXT (UNDERLINED)
.10" ROMANS BT, UNDERLINED
SPECIFIC DRAWING TEXT & NOTES

SUB–TITLE TEXT
.13" ROMANS BT, UNDERLINED
MINOR TITLES & MAJOR CALLOUTS

TITLE TEXT
.16" ROMANS BT, UNDERLINED
MAJOR TITLES

1 SHEET KEYNOTE
NUMERIC SEQUENCE
COORDINATE W/ SHEET KEYNOTES IN BORDER NOTE BLOCK

REVISIONS

? REVISION TAG

REVISION CLOUD

DEMOLITION & RE–USE LEGEND

- DEMOLITION
- MODIFICATION

VIEW TITLES LEGEND

PLAN VIEW TITLES

TITLE LINE 1
TITLE LINE 2 BELOW)
SCALE/NO SCALE

SECTION & DETAIL VIEW TITLES

A SECTION
X–XX–XXX SCALE/NO SCALE
X–XX–XXX
X–XX–XXX
SECTIONS WITH CROSS–REFERENCE

A DETAIL
X–XX–XXX SCALE/NO SCALE
X–XX–XXX
X–XX–XXX
DETAILS WITH CROSS–REFERENCE

A DETAIL
SCALE/NO SCALE
DETAILS WITH NO CROSS–REFERENCE

ELEVATIONS LEGEND

NEW WORK ELEVATIONS

EL 0.00	GENERAL ELEVATION
FLR EL 0.00	FLOOR ELEVATION
CL EL 0.00	CENTERLINE OF PIPE OR EQUIPMENT ELEVATION
INV EL 0.00	INVERT OF PIPE OR EQUIPMENT ELEVATION
TOG EL 0.00	TOP OF GRATING ELEVATION
TOC EL 0.00	TOP OF CONCRETE ELEVATION
EL 0.00	FLOOR ELEVATION IN PLAN VIEW

EXISTING WORK ELEVATIONS

EL 0.00+/–	GENERAL ELEVATION
FLR EL 0.00+/–	FLOOR ELEVATION
CL EL 0.00+/–	CENTERLINE OF PIPE OR EQUIPMENT ELEVATION
INV EL 0.00+/–	INVERT OF PIPE OR EQUIPMENT ELEVATION
TOG EL 0.00+/–	TOP OF GRATING ELEVATION
TOC EL 0.00+/–	TOP OF CONCRETE ELEVATION
EL 0.00+/–	FLOOR ELEVATION IN PLAN VIEW

EL 0.00 — SPOT ELEVATION

N 0'–0" E 0'–0" EL 0.00 — SPOT COORDINATE

0.00' — SPOT SLOPE

LINE STYLES LEGEND

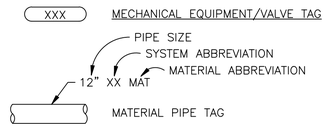
- FINE LINES
- THIN LINES
- MEDIUM LINES
- WIDE LINES
- BOLD LINES
- HEAVY LINES
- EXISTING LINES
- CENTERLINE 1/4"
- CENTERLINE 1/2"
- GRID LINE
- HIDDEN LINES
- HIDDEN LINES 1/8"
- HIDDEN LINES 1/16"
- MEDIUM HIDDEN LINES
- MEDIUM HIDDEN LINES 1/8"
- MEDIUM HIDDEN LINES 1/16"
- MECHANICAL HIDDEN
- MATCH LINE
- 1 HOUR FIRE RATED
- 2 HOUR FIRE RATED
- 3 HOUR FIRE RATED
- SMOKE RATED

PIPE AND FITTINGS LEGEND

- EXISTING PIPE
- NEW PIPE
- EXISTING PIPING TO BE REMOVED
- WELDED JOINT
- GROOVED END JOINT
- FLANGED JOINT
- THERMAL DISPERSION FLOW ELEMENT
- ELECTRO MAGNETIC FLOW ELEMENT (FM)
- MECHANICAL JOINT
- GROOVED END ADAPTER FLANGE
- FLANGED COUPLING ADAPTER
- FLEXIBLE COUPLING
- DISMANTLING JOINT
- METAL BELLOWS EXPANSION JOINT
- ELASTOMERIC BELLOWS EXPANSION JOINT
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- LATERAL UP
- LATERAL DOWN
- CONCENTRIC REDUC
- ECCENTRIC REDUCE
- REDUCING BUSHING
- UNION
- BLIND FLANGE
- ELBOW, 90°
- ELBOW, 45°
- CROSS
- TEE
- LATERAL

NOTE: ONLY FLANGED END CONNECTIONS ARE SHOWN. FITTINGS WITH OTHER END CONNECTION TYPES ARE SHOWN SIMILARLY ON THESE CONTRACT DRAWINGS. REFER TO PIPING SPECIFICATIONS.

EQUIPMENT & PIPE TAGGING LEGEND



VALVE LEGEND (NON–SCHEMATIC)

- CHECK VALVE
- PINCH VALVE
- FLANGED ECCENTRIC PLUG VALVE
- MJ ECCENTRIC PLUG VALVE
- BALL VALVE
- BUTTERFLY VALVE

ARCHITECTURAL LEGEND

TAGS ARE MEDIUM LINES & CALLOUTS ARE SUB–TITLE TEXT UNLESS NOTED OTHERWISE.

XX XX	ACCESSORY ITEM LETTER SEQUENCE
C1	CEILING "C" + NUMERIC SEQUENCE
? ?	CURTAIN PANEL LETTER SEQUENCE
WS	CURTAIN WALL or FRAME TYPE LETTER SEQUENCE
F1	FLOOR "F" + NUMERIC SEQUENCE
101A	DOOR ROOM NUMBER + LETTER SEQUENCE
101A	LOUVER ROOM NUMBER + LETTER SEQUENCE
00	LABORATORY CABINET NUMERIC SEQUENCE
RL1	RAILING "RL" + NUMERIC SEQUENCE
R1	ROOF "R" + NUMERIC SEQUENCE
ROOM NAME / 101 / 150 SF	ROOM NAME & NUMBER FIRST DIGIT LEVEL DESIGNATION + NUMERIC SEQUENCE (01–99)
	OPTIONAL AREA REPORT
Stair No.?	STAIR STAIR No. + NUMERIC SEQUENCE (01–99)
A1	WALL LETTER SEQUENCE + NUMERIC SEQUENCE COORDINATE WITH WALL TYPES
W	WINDOW LETTER SEQUENCE

INTERIOR PIPING ABBREVIATIONS

AFC	ANTI–FOAM CHEMICAL
ALP	AIR LOW PRESSURE
CMS	COMPRESSED AIR–SERVICE
DS	DIGESTED SLUDGE
DR	PLANT DRAIN
ELU	ELUTRIATE
FILT	FILTRATE
FSC	FERMENTER SCUM
MGCL	MAGNESIUM CHLORIDE
NG	NATURAL GAS
OA	ODOROUS AIR
OF	OVERFLOW
PD	SUMP PUMP DISCHARGE
PSD	PRIMARY SLUDGE
PSC	PRIMARY SCUM
PTDS	PHOSPHOROUS TREATED DIGESTED SLUDGE
TFS	THICKENED FERMENTED SLUDGE
RCS	RECIRCULATED SLUDGE
W1	POTABLE WATER
W2	NON–POTABLE WATER
W3	PLANT EFFLUENT WATER

GENERAL SHEET NOTES

1. THIS IS A GENERAL LEGEND PROVIDED TO FACILITATE USE OF DRAWINGS. REFER TO THE DRAWINGS AND SPECIFICATIONS FOR ITEMS REQUIRED.
2. "SCREENED" (LIGHT) DELINEATION INDICATED ON CIVIL/SITE, DRAWINGS DENOTES EXISTING WORK AND/OR STRUCTURES. THE "SCREENED" INFORMATION WAS TAKEN FROM EXISTING RECORD DRAWINGS, AS BUILT DRAWINGS, AND FIELD SURVEYS. THIS INFORMATION IS FOR REFERENCE ONLY AND SHALL BE FIELD–VERIFIED BY THE CONTRACTOR PRIOR TO THE ORDERING OF MATERIALS OR THE BEGINNING OF CONSTRUCTION, UNLESS OTHERWISE NOTED.
3. "BOLD" OR SOLID (DARK) LINE DELINEATION INDICATED ON ALL DRAWINGS DENOTES NEW WORK THAT IS TO BE CONSTRUCTED OR MODIFIED AS PART OF THIS CONTRACT.
4. ARCHITECTURAL, STRUCTURAL, MECHANICAL, HVAC, PLUMBING, AND ELECTRICAL DISCIPLINE DRAWINGS REFERENCING OTHER DISCIPLINE'S AREA OF WORK INTO THEIR DRAWINGS WILL BE "SCREENED" WITH (LIGHT) DELINEATION. THIS DOES NOT NECESSARILY DENOTE WORK AS EXISTING OR NEW. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY EXISTING FACILITIES AND EQUIPMENT AND MODIFICATIONS TO THEM AND NEW FACILITIES AND NEW WORK.
5. EXISTING DIMENSIONS AND ELEVATIONS ON DRAWINGS ARE APPROXIMATE ONLY AND ARE INDICATED ON THE DRAWINGS WITH +/– SUFFIX. CONTRACTOR SHALL FIELD–VERIFY DIMENSIONS AND ELEVATIONS PRIOR TO ORDERING MATERIALS AND BEGINNING OF CONSTRUCTION.
6. EXISTING STRUCTURES, FACILITIES, EQUIPMENT ETC. SHALL BE NOTED IN ANNOTATIONS WITH "EXIST" OR "EXISTING" IN PREFIX OF THE CALLOUT OR LABEL.
7. REFER TO SPECIFICATION SECTION 01110 FOR CONSTRUCTION SEQUENCING AND SCHEDULE REQUIREMENTS.
8. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, AND PIPE SIZES WITH EQUIPMENT MANUFACTURER. PROVIDE NECESSARY FITTINGS, REDUCERS, AND ACCESSORIES FOR INSTALLATION AND TO FACILITATE EQUIPMENT REMOVAL.
9. GENERAL "G" DRAWINGS CONTAIN INFORMATION SUCH AS GENERAL NOTES, LEGENDS, SYMBOLOGY, ANNOTATIONS, AND ABBREVIATIONS WHICH IS INFORMATION THAT IS APPLICABLE TO ALL DRAWINGS OF THIS PROJECT.
10. ALL DRAWINGS WITH PIPING THAT ARE CONTINUOUS SHALL REFER TO THE CIVIL DRAWINGS FOR THEIR CONTINUATION.
11. GRAPHICS WHICH ARE TO BE SHOWN AS SCREENED SHALL BE DELINEATED AS LIGHT.
12. GRAPHICS WHICH ARE TO BE SHOWN AS NEW WORK SHALL BE DELINEATED AS SOLID.
13. NOT ALL HANGERS, BRACKETS, BRACES OR OTHER SUPPORTS FOR PIPING, DUCTWORK, AND EQUIPMENT ARE INDICATED ON THE DRAWINGS. REFER TO THE SPECIFICATIONS FOR SUPPORT REQUIREMENTS.
14. "SCREENED" (LIGHT) TEXT HAS PREVIOUS PROJECT RECORD DOCUMENTS AND IS NOT APPLICABLE TO NEW WORK BEING PERFORMED WITHIN THIS CONTRACT.

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FB NO. P–6182

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL
LEGENDS AND GENERAL NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 3 OF 226	

G–000–003

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 – COH Lift Station Renew–Replace\Project Files\5.0 Design Files – B&V\5.0.5 Civil 3D\G–000–003.dwg

ABBREVIATIONS

A	ACID, AMBER INDICATING LIGHT,AMP
AB	ANCHOR BOLT
ABS	ACID BATH SINK
AC	ALTERNATING CURRENT, ASPHALTIC CONCRETE
A/C	AIR CONDITIONER, (ING)
ACP	ASBESTOS CEMENT PIPE
ACST	ACOUSTIC, (AL
AD	ACCESS DOOR, AREA DRAIN, AIR DAMPER, ANODE
ADD	ADDITIONAL
ADH	ADHESIVE
ADJ	ADJUSTABLE, ADJACENT
ADMIN	ADMINISTRATION
ADP	ALBIN D. POGORSKI
AF	AIR FLOW
AFD	AJUSTABLE FREQUENCT DRIVE
AFF	ABOVE FINISH FLOOR
AH	AHEAD
AHU	AIR HANDLING UNIT
AL	ACTIVE LEAF
ALP	AIR LOW PRESSURE
ALT	ALTERNATE, (IVE)
ALUM	ALUMINUM
AM	AMMETER
AMP	AMPERE
ANOD	ANODIZED
AP	ACCESS PANEL
APPR	APPROACH
APPROX	APPROXIMATE, (LY)
AR	ALARM RELAY
ARCH	ARCHITECTURAL
AS	AMMETER SWITCH
ASSY	ASSEMBLY
AUTO	AUTOMATIC
AUX	AUXILIARY
AVS	AUTOMATIC VALVE STATION
AWG	AMERICAN WIRE GAGE
B	BEAM
B TO B	BACK TO BACK
BA	BEARING AREA
BAL	BALANCE
BAT	BATTERY
BC	BEGIN CURVE
BD	BOARD
BEJ	BRICK EXPANSION JOINT
BF	BLIND FLANGE
BHP	BRAKE HORSEPOWER
BITUM	BITUMINOUS
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BM	BENCHMARK
BOF	BOTTOM OF FOOTING
BOT	BOTTOM
BP	BACK PRESSURE
BPMK NO	BASEPLATE MARK NUMBER
BRG	BEARING
BRK	BRICK
BS	BOTH SIDES
B&S	BELL AND SPIGOT
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT–HOUR
BU	BELL–UP
BUR	BUILT UP ROOFING
BVC	BEGIN VERTICAL CURVE
C	COUNTER
C TO C	CENTER TO CENTER
CB	CATCH BASIN
CD	CEILING DIFFUSER
C/EJ	CONTRACTION/EXPANSION JOINT
CFM	CUBIC FEET PER MINUTE
C&G	CURB AND GUTTER
CHKD	CHECKERED
CI	CAST IRON
CIMH	CAST IRON MANHOLE
CIMHS	CAST IRON MANHOLE STEPS
CIP	CAST IRON PIPE
CISP	CAST IRON SOIL PIPE
CJT	CONTROL JOINT
CKT	CIRCUIT
CL	CENTERLINE, CLASS
CLG	CEILING
CLO	CLOSET
CLR	CLEAR, (ANCE)
CMP	CORRUGATED METAL PIPE
CMS	COMPRESSED AIR – SERVICE
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT, COMPANY
COD	CHEMICAL OXYGEN DEMAND
COL	COLUMN
COMB	COMBINATION
COMB SWR	COMBINED SEWER
COMP	COMPRESSOR, (ED)
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS, CONTINUATION, CONTROL
CONTR	CONTRACTOR
COR	CORNER
CORR	CORRIDOR, CORRUGATED
CP	CONTROL PANEL
CPLG	COUPLING
CPT	CONTROL POWER TRANSFORMER
CRS	COURSES, (ING)
CS	CONTROL STATION, CUP SINK, CHLORINE SOLUTION, CONTROL SWITCH
CSK	COUNTERSUNK, (INK)
CT	CERAMIC TILE, CYCLE TIMER
CT	CURRENT TRANSFORMER
CTR(S)	CENTER(S)
CU	CUBIC
CU YD	CUBIC YARD
CW	COLD WATER

D	DOOR, DRAIN
DBL	DOUBLE
DC	DIRECT CURRENT
DEG	DEGREE
DEPT	DEPARTMENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DH	DOOR HEIGHT
DI	DROP INLET, DUCTILE IRON
DIA	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DISP	DISPENSER
DIST	DISTRIBUTION
DIV	DIVISION
DL	DEAD LOAD
DM	DAMPER MOTOR
DMJ	DISMANTLING JOINT
DN	DOWN
DO	DOOR OPENING, DISSOLVED OXYGEN
DPDT	DOUBLE POLE DOUBLE THROW
DR	DRAIN
DS	DOWNSPOUT
DT	DISTRIBUTION TRANSFORMER
DV	DRAIN VALVE
DWG(S)	DRAWING(S)
DWL(S)	DOWEL(S)
E	EAST, ELECTRICAL
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EC	END CURVE
ECC	ECCENTRIC
ECC RED	ECCENTRIC REDUCER
EEW	EMERGENCY EYEWASH
EF	EACH FACE, EXCESS FLOW
EFF	EFFLUENT
EJ	EXPANSION JOINT
EL	ELEVATION
ELB	ELBOW
ELECT	ELECTRIC, (AL)
ELEV	ELEVATOR
ELU	ELUTRATE
EMER	EMERGENCY
ENC	ENCASEMENT
ENCL	ENCLOSURE
ENT	ENTRANCE
EOL	END OF LINE
EQ	EQUAL
EQUIP	EQUIPMENT
EW	EACH WAY
EW	EMERGENCY EYEWASH
EWEF	EACH WAY EACH FACE
EXCH	EXCHANGER
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION, EXPOSED
EXP JT	EXPANSION JOINT
EXT	EXTENSION, EXTERIOR, EXTERNAL
F	FAN
F TO F	FACE TO FACE
FB	FACE BRICK
FC	FLEXIBLE CONNECTION, FLOW CONTROL
FCA	FLANGED COUPLING ADAPTER
FD	FLOOR DRAIN
FDN	FOUNDATION
FDPR	FIRE DAMPER
FE	FINAL EFFLUENT, FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FER	FERMENTER
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FLAT HEAD, FIRE HYDRANT
FHMS	FLAT HEAD MACHINE SCREW
FIG	FIGURE
FIN	FINISH
FL	FLOOR, FLOW LINE
FLEX	FLEXIBLE
FLG	FLANGE, FLASHING
FM	FORCE MAIN
FO	FUEL OIL
FOB	FLAT ON BOTTOM
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FOT	FLAT ON TOP
FPS	FERMENTATE PRIMARY SLUDGE
FRM	FERMENTATE
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FAR SIDE, FLOOR SLEEVE, FLOAT SWITCH
FT	FOOT
FTG	FOOTING
FURN	FURNISH, FURNISHED
FV	FLAP VALVE
FWD	FORWARD
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC/MS	GAS CHROMATOGRAPH/MASS SPECTROMETER
GEN	GENERAL, GENERATOR
GM	GAS METER
GPM	GALLONS PER MINUTE
GR	GRADE
GWB	GYPSUM WALLBOARD
GTS	GRAVITY THICKENED SLUDGE
GYP	GYPSUM
H	HIGH, HOUR, HYDROGEN
HB	HOSE BIBB
HC	HOLLOW CORE
HDR	HEADER
HE	HEAT EXCHANGER
HEX	HEXAGONAL
HF	HOSE FAUCET
HGT	HEIGHT
HH	HANDHOLE
HLS	HIGH LEVEL SWITCH
HMC	HARNESSED MECHANICAL COUPLING
HMD	HOLLOW METAL DOOR
HMJ	HARNESSED MECHANICAL JOINT
HORIZ	HORIZONTAL
HP	HIGH POINT, HORSEPOWER
HR	HOUR, HANDRAIL
HS	HIGH STRENGTH
HV	HOSE VALVE
HVAC	HEATING,VENTILATING AND AIR CONDITIONING
HW	HOT WATER
HWY	HIGHWAY
HYDRO	HYDROPNEUMATIC

I	INDICATOR
ID	INSIDE DIAMETER
IF	INSIDE FACE
I/I	CURRENT TO CURRENT BOOSTER
IN	INCHES
INC	INCORPORATED
INCL	INCLUDING
INCR	INCREASE
INST	INSTRUMENT, (ATION)
INSUL	INSULATE, (ED), (ING)
INT	INTERIOR, INTERNAL
INV	INVERT
IPS	IRON PIPE SIZE
JAN	JANITOR
JB	JUNCTION BOX
JF	JOINT FILLER
JT	JOINT
K	KIPS
KIT	KITCHEN
KO	KNOCK OUT
KS	KITCHEN SINK
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWH	KILOWATT HOUR
L	LOUVER
LAB	LABORATORY
LAM	LAMINATE(D)
LAT	LEAVING AIR TEMPERATURE
LAT	LATERAL
LAV	LAVATORY
LB(S)	POUNDS
LG	LENGTH, LONG
LH	LEFT HAND
LIN	LINEAL, LINEAR
LL	LIVE LOAD
LO	LOUVER OPENING
LS	LEVEL SWITCH
LT	LEFT, LAB TABLE
MA	MILLIAMPERE
MACH	MACHINE
MAINT	MAINTENANCE
MAN	MANHOLE
MAS	MASONRY
MAX	MAXIMUM
MB	MACHINE BOLT
MC	MECHANICAL COUPLING
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MED	MEDIUM
MET	METAL
MEZ	MEZZANINE
MFM	MAGNETIC FLOWMETER
MFR(S)	MANUFACTURER(S)
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM, MINUTE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MJRG	MECHANICAL JOINT RETAINER GLAND
MJTR	MECHANICAL JOINT WITH TIE ROD
ML	MIXED LIQUOR
MO	MASONRY OPENING, MOTOR OPERATED
MP	METERING PUMP
MRD	METAL ROOF DECK
MS	MACHINE SCREW
MSL	MEAN SEA LEVEL
MTD	MOUNTED
MTL	MATERIAL
MTR	MOTOR
MXP	SUBMERSIBLE, PROP, BLENDER MIXER
N	NORTH
N/A	NOT APPLICABLE
NBC	NAIL IN BOTTLE CAP
NC	NORMALLY CLOSED
NEUT	NEUTRAL
NF	NEAR FACE
NG	NATURAL GAS
N.O.	NORMALLY OPEN
NO.(S)	NUMBER(S)
NOCL	SODIUM HYPOCHLORITE
NOM	NOMINAL
NORM	NORMAL
NPT	NATIONAL PIPE THREAD
NPW	NONPOTABLE WATER
NS	NEAR SIDE
NTS	NOT TO SCALE
OA	ODOROUS AIR
OC	ON CENTER, ODOR CONTROL
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE, OVERFLOW
OH	OVERHEAD
OL	OVERLOAD
OPER	OPERATING
OPNG	OPENING
OPP	OPPOSITE
OSL	OUTSTANDING LEG
OZ	OUNCE

PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVATURE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PCL	CENTRIFUGAL PUMP
PCP	PIER CUTOFF POINT
PD	PLAN DIMENSION, SUMP PUMP DISCHARGE
PDD	DOUBLE DISK PUMP
PE	PRIMARY EFFLUENT, PLAIN END
PG	PRESSURE GAUGE
PH	PIPE HANGER, PENTHOUSE
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE
PL	PLATE
PLYWD	PLYWOOD
PNL(S)	PANEL(S)
POLY	POLYMER
POT	POINT ON TANGENT
PP	POWER POLE
PR	PAIR
PROJ	PROJECTION
PRS	PRESSURE REDUCING STATION
PRV	POWER ROOF VENTILATOR
PSD	PIPE SUPPORT, PUMP STATION, PRIMARY SLUDGE
PSC	PRIMARY SCUM
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE, POINT ON VERTICAL CURVE
PVCP	POLYVINYL CHLORIDE PIPE
PVMT	PAVEMENT
PW	POTABLE WATER
R	RADIUS, RISER, RIM
RAS	RETURN ACTIVATED SLUDGE
RCP	REINFORCED CONCRETE PIPE
RCCP	REINFORCED CONCRETE CYLINDER PIPE
RCHEP	REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE
RCY	RECYCLE
RD	ROOF DRAIN, ROAD
RDL	ROOF DRAIN LEADER
RECEP	RECEPTION
RECIRC	RECIRCULATING
RECP	RECEPTACLE
RED	REDUCER, REDUCING
REG	REGULATOR, REGULATING
REF	REFERENCE
REFR	REFRIGERATION, REFRIGERATOR
REINF	REINFORCING
REM	REMOVABLE
REQD	REQUIRED
RET	RETURN
REV	REVISION, REVISED, REVERSED
RFG	ROOFING
RG	RETAINER GLAND
RH	ROOF HOOD, RIGHT HAND, ROUND HEAD, RED HEAD
RHMS	ROUND HEAD MACHINE SCREW
RHWS	ROUND HEAD WOOD SCREW
RM	ROOM
RO	ROUGH OPENING
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RS	RAW SLUDGE, RAW SEWAGE, ROLLED STEEL
RT	RIGHT
RW	RAW WATER
R/W	RIGHT OF WAY
S	SOUTH, SPEAKER
SAN	SANITARY
SAN SWR	SANITARY SEWER
SCHED	SCHEDULE
SD	STORM DRAIN, SOAP DISH
SE	SECONDARY EFFLUENT
SEC	SECOND
SECT	SECTION
SER SK	SERVICE SINK
SEW	SEWAGE
SG	SLIDE GATE, SUPPLY GRILLE
SHT	SHEET
SHR	SHOWER
SHD	SHOWER DOOR
SIM	SIMILAR
SKL	SKYLIGHT
SM	SHEET METAL
SP	SUMP PUMP
SPA	SPACING, SPACES
SPEC(S)	SPECIFICATION(S)
SPLY	SUPPLY
SQ	SQUARE
SR	SUPPLY REGISTER
SS	STAINLESS STEEL, SANITARY SEWER
SSFM	SANITARY SEWER FORCE MAIN
SSK	SERVICE SINK
ST	SELF TAPPING
STS	STORM SEWER
STA	STATION
STD	STANDARD
STL	STEEL
STM	STORM
STOR	STORAGE
STRUCT	STRUCTURAL
SUP	SUPPLY
SUSP	SUSPENDED
SV	SHUTOFF VALVE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SWS	SEAL WATER SOLENOID
SYM	SYMMETRICAL
SYS	SYSTEM

T	THERMOSTAT, TREAD, TOTALIZER
T	TRANSFORMER, TELEPHONE, TOP
TAN	TANGENT
TB	TERMINAL BOX
T&B	TOP AND BOTTOM
TBE	THREAD BOTH ENDS
TBM	TEMPORARY BENCHMARK
TC	TOWEL CABINET, TOP OF CURB
TC	TERMINAL CABINET
TEL	TELESCOPING
TEMP	TEMPERATURE, TEMPORARY
TERM	TERMINAL
TFD	TRICKLING FILTER DRAIN
TFI	TRICKLING FILTER INFLUENT
TFS	THICKENED FERMENTED SLUDGE
T&G	TONGUE & GROOVE
TH	TEST HOLE
THK	THICK, THICKNESS
THR	THRESHOLD
TI	TOTALIZING INDICATOR, TEMPERATURE INDICATOR
TIR	TOTALIZING INDICATING RECORDER
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOG	TOP OF GRADE
TOM	TOP OF MASONRY
TOS	TOP OF STEEL
TOW	TOP OF WALL
TP	TWISTED PAIR COUPLE, TOWEL PIN
T/P	TOP OF PIPE
T/W	TOP OF WATER
TRANS	TRANSFORMER, TRANSMITTER, TRANSFER
TS	TEMPERATURE SWITCH
TV	TELEVISION
TYP	TYPICAL
UDM	ULTRASONIC DENSITY METER
UGND	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
USGS	UNITED STATES GEOLOGICAL SURVEY
V	VALVE, VOLT, VENT
VAC	VACUUM
VAR	VARIES
VAT	VINYL ASBESTOS TILE
VBF	VALVE, AWWA BUTTERFLY
VBI	VALVE, INDUSTRIAL BUTTERFLY
VBL	VALVE, BALL
VBM	VALVE, BALL MISCELLANEOUS
VC	VERTICAL CURVE, VICTAULIC COUPLING
VCD	VERTICAL CONTROL DAMPER
VCK	VALVE, CHECK
VCN	VALVE, CONE
VCP	VITRIFIED CLAY PIPE
VG	VALVE, GATE
VGD	VALVE, DOUBLE DISC GATE
VGL	VALVE, GLOBE
VERT	VERTICAL
VF	VACUUM FILTER
VIB	VIBRATION
VKG	VALVE, KNIFE GATE
VM	VOLT METER
VNR	VENEER
VPC	VALVE, PRESSURE REGULATING
VPG	VALVE, PLUG
VPL	VALVE, ECCENTRIC PLUG
VPR	VALVE, PRESSURE REDUCING
VSP	VALVE, PRESSURE RELIEF
VSPV	VALVE, PRESSURE/VACUUM RELIEF
VSV	VALVE, VACUUM RELIEF
VV	VENT VALVE
VVB	VACUUM BREAKER
W	WEST, WIDE, WINDOW, WATT,
WATER W/	WITH
W1	POTABLE WATER
W2	NON–POTABLE
W3	PLANT EFFLUENT WATER
WAS	WASTE ACTIVATED SLUDGE
WB	WALLBOARD
WC	WATER CLOSET
WD	WOOD, WIDTH
WF	WALL FITTING
WH	WALL HYDRANT
WL	WATER LEVEL
WM	WATER METER, WATTMETER
WO	WINDOW OPENING
W/O	WITHOUT
WOM	WOMEN
WP	WATERPROOF, WORKING POINT
WR	WASTE RECEPTACLE
WRF	WASTE RECLAMATION FACILITY
WS	WATERSTOP
WT	WEIGHT
WW	WETWELL
WWF	WELDED WIRE FABRIC
W3	RECYCLED PLANT EFFLUENT
x	BY,TIMES
YH	YARD HYDRANT
&	AND
@	AT
<	DEFLECTION ANGLE
#	NUMBER
%	PER CENT

GENERAL NOTES:

1. ABBREVIATIONS ARE FOR REFERENCE ONLY AND NOT ALL ABBREVIATIONS ARE USED ON THE DRAWINGS.

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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL
ABBREVIATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 4 OF 226	

G–000–004

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GENERAL NOTES

CITY OF HOUSTON PUBLIC WORKS GENERAL NOTES – INSIDE CITY LIMITS:

1. UNLESS OTHERWISE NOTED AND APPROVED ON DRAWINGS, CONSTRUCT CIVIL INFRASTRUCTURE IN ACCORDANCE WITH THE EFFECTIVE EDITION OF THE HOUSTON PUBLIC WORKS STANDARD CONSTRUCTION SPECIFICATIONS, STANDARD CONSTRUCTION DETAILS, AND SUPPLEMENTS, ADDENDA AND AMENDMENTS THERETO. THE LATEST EDITION OF THE ABOVE PUBLICATIONS CAN BE FOUND AT: HTTP://WWW.HOUSTONPERMITTINGCENTER.ORG/OFFICE-CITY-ENGINEER/DESIGN-AND-CONSTRUCTION-STANDARDS.
2. THE DESIGN MUST BE CONSISTENT WITH THE EFFECTIVE EDITION OF HOUSTON PUBLIC WORKS INFRASTRUCTURE DESIGN MANUAL AND TCEQ (TEXAS COMMISSION ON ENVIRONMENTAL QUALITY) REQUIREMENTS.
3. THE GEOTECHNICAL INVESTIGATION FOR THIS PROJECT WAS CONDUCTED IN ACCORDANCE WITH CHAPTER 11 OF THE LATEST EDITION OF THE PUBLICATION INFRASTRUCTURE DESIGN MANUAL, PUBLISHED BY HOUSTON PUBLIC WORKS. SOILS REPORT WAS PREPARED BY [GEOTECHNICAL ENGINEERING FIRM] REPORT NO. [NO. OF REPORT], DATED [DATE OF REPORT].
4. UTILITIES PRESENTED ON THESE DRAWINGS ARE SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS IN THE FIELD PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL NOTIFY TEXAS ONE CALL AT 713-223-4567/811 OR 800-344-8377 AND LONE STAR NOTIFICATION CENTER AT 800-669-8344 AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION. UTILITIES MARKED WITHIN THE PUBLIC RIGHT OF WAY OR IN EASEMENTS SHALL COMPLY WITH TAC TITLE 16, PART 1, CHAPTER 18, RULE §18.6 AND THE AMERICAN PUBLIC WORKS ADMINISTRATION (APWA) UNIFORM COLOR CODE.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH THE EFFECTIVE EDITION OF HOUSTON PUBLIC WORKS STANDARD CONSTRUCTION SPECIFICATIONS FOR WASTEWATER COLLECTION SYSTEM, WATER LINES, STORM DRAINAGE, STREET PAVING, AND TRAFFIC AND STANDARD CONSTRUCTION DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE, STREET PAVING, AND TRAFFIC, REFERENCED ABOVE AND SUPPLEMENTS
6. CONTRACTOR SHALL NOTIFY THE OFFICE OF THE CITY ENGINEER, HOUSTON PUBLIC WORKS @ 832-394-9098 OR VIA FAX AT 832-395-4424 FOR INSPECTION AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
7. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF THE OWNING AUTHORITY.
8. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS AND TREES ALONG THE AREA OF EXCAVATION.
9. CONTRACTOR SHALL COMPLY WITH LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
10. CONTRACTOR SHALL MAINTAIN A SET OF REDLINE DRAWINGS AND RECORD AS-BUILT CONDITIONS DURING CONSTRUCTION. THESE AS-BUILT DRAWINGS WILL BE SUBMITTED TO THE DESIGN CONSULTANT WHO WILL MAKE THE CHANGES ON THE ORIGINAL TRACINGS, LABEL EACH SHEET IN THE SET AS "RECORD DRAWINGS", AND RETURN IT TO THE OFFICE OF THE CITY ENGINEER.

STANDARD NOTES FOR CONSTRUCTION DRAWINGS (HCFCD):

1. FENCES AND/OR OTHER ENCROACHMENTS IN THE HCFCD RIGHT-OF-WAY ARE NOT TO BE REMOVED UNLESS OTHERWISE STATED ON THE PLANS. IN CASES WHERE FENCE REMOVAL IS INDICATED ON THE PLANS, THE FENCE SHALL BE REMOVED AND PLACED NEATLY ON THE ADJACENT PROPERTY AT THE START OF CONSTRUCTION. WHERE THERE IS NOT A SEPARATE ITEM LISTED ON THE UNIT PRICE SCHEDULE, THE ENCROACHMENT REMOVAL IS INCIDENTAL TO SITE PREPARATION AND RESTORATION.
2. DO NOT ENTER PRIVATE PROPERTY WITHOUT PROPER WRITTEN AUTHORIZATION FROM THE OWNER. PROVIDE COPY OF WRITTEN PERMISSION TO HCFCD.
3. STRIP VEGETATION AND TOPSOIL AND STOCKPILE FOR REUSE ONSITE. MATERIAL FOUND UNACCEPTABLE BY THE ENGINEER WILL BE REMOVED AND PAID AS EXCAVATION AND OFFSITE DISPOSAL. NO SEPARATE MEASUREMENT AND PAYMENT WILL BE MADE FOR STRIPPING, STOCKPILING AND PLACING ON-SITE TOPSOIL. THE COST FOR THIS WORK WILL BE INCIDENTAL TO RELATED PAY ITEMS UNDER SPECIFICATION SECTION NUMBER 02315 LISTED ON THE UNIT PRICE SCHEDULE.
4. RIPRAP AND GRANULAR FILL MATERIAL REMOVED DURING EXCAVATION, MEETING SPECIFICATION SECTION NUMBER 02378, SHALL BE REUSED AS DIRECTED BY THE ENGINEER. REUSED MATERIAL WILL BE MEASURED AND PAID FOR AS EXCAVATION AND ON-SITE FILL UNDER SPECIFICATION NUMBER 02315. NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR PROCESSING, HANDLING, STOCKPILING, AND PLACING MATERIAL FOUND TO BE ACCEPTABLE FOR REUSE. UPON APPROVAL OF THE ENGINEER, DISPOSAL OF NONCONFORMING RIPRAP AND GRANULAR FILL MATERIAL WILL BE MEASURED AND PAID FOR AS REMOVE AND DISPOSE OF CONCRETE RUBBLE UNDER SPECIFICATION SECTION NUMBER 02120, MATERIAL DISPOSAL.
5. THE LOCATION AND GRADE OF THE BACKSLOPE INTERCEPTOR STRUCTURES AND SWALES MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER AT THE TIME OF CONSTRUCTION. UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, THE BACKSLOPE INTERCEPTOR STRUCTURE SHALL BE SET AT A MAXIMUM DEPTH OF 2.5 FEET AND THE MINIMUM GRADE FOR BACKSLOPE SWALES SHALL BE 0.2%.
6. ADJUST AND/OR EXTEND YARD DRAINS TO OUTFALL AT TOE OF CHANNEL PER STANDARD OUTFALL DETAILS. PAYMENT WILL BE INCIDENTAL TO SITE PREPARATION AND RESTORATION.
7. COMPLETED SECTIONS OF THE CHANNEL WILL BE TURNED OVER FOR VEGETATION ESTABLISHMENT IN MAXIMUM 1500 LINEAR FOOT SEGMENTS. CONTRACTOR MAY NOT DISTURB GREATER THAN 1500 LF OF CHANNEL AT A TIME.
8. CLEAR AND REMOVE ALL SILT FROM CULVERTS, PIPES AND UNDER BRIDGES TO THE PROPOSED DESIGN GRADES TO PROVIDE POSITIVE FLOW.
9. LENGTHS AND DIAMETERS REPRESENTED ON PLANS ARE APPROXIMATE. CONTRACTOR WILL BE RESPONSIBLE FOR FIELD VERIFICATION PRIOR TO ORDERING MATERIALS.
10. ACTIVITIES THAT DISTURB BIRD HABITAT, INCLUDING BUT NOT LIMITED TO CLEARING, GRUBBING, AND IMPACTS TO STRUCTURES WHERE MIGRATORY BIRDS AND BALD EAGLES MIGHT NEST, REQUIRE A NEST HABITAT SURVEY. DO NOT PROCEED UNTIL HARRIS COUNTY FLOOD CONTROL DISTRICT HAS CONDUCTED A NEST HABITAT SURVEY TO VERIFY ACTIVE MIGRATORY BIRD NESTS AND BALD EAGLE NESTS ARE NOT PRESENT. THE HARRIS COUNTY FLOOD CONTROL DISTRICT MUST PROVIDE WRITTEN AUTHORIZATION TO PROCEED.
11. WHEN BANK EROSION REPAIRS CALL FOR THE PLACEMENT OF 3"x5" GRANULAR FILL IN THE CHANNEL BOTTOM TO ESTABLISH A BASE FOR REBUILDING THE SLOPE. THE 3"x5" GRANULAR FILL SHALL BE LIMITED TO AN ELEVATION 6-INCHES ABOVE THE NORMAL WATER SURFACE ELEVATION LEVEL.
12. THE CONTRACT CONTAINS UNIT ITEMS FOR THE ESTABLISHMENT OF BEST MANAGEMENT PRACTICES FOR STORM WATER QUALITY PURPOSES. WHEN NOT CALLED FOR IN THE PROJECT PLANS, COORDINATE THE NEED AND LOCATION OF THESE UNIT ITEMS WITH THE DISTRICT REPRESENTATIVE ON SITE PRIOR TO PLACEMENT. THESE UNIT ITEMS INCLUDE, BUT ARE NOT LIMITED TO, REINFORCED SILT FENCE FOR MATERIAL STOCKPILES, ANCHORED SODDING FOR DISTURBED EARTHEN AREAS OR AROUND CONCRETE AND CONCRETE INTERCEPTOR, AND STABILIZED CONSTRUCTION ACCESS FOR PROJECT SITE INGRESS/EGRESS.
13. WHEN INCLUDED IN THE SCOPE OF WORK, THE PURPOSE OF DEEP PLOWING THE SLOPE OR BERM OF A CHANNEL IS TO BREAK UP THE DESICCATED SOILS AND TO ELIMINATE ANY VOIDS, OR RILLING CLOSE TO THE SURFACE OF THE SLOPE OR BERM. THE CONTRACTOR WILL DEEP PLOW THE SLOPE OR BERM TO A MINIMUM DEPTH OF 2 FEET IN AREAS CONTAINING VOIDS AND/OR RILLING. IN AREAS OF VOIDS ONLY, THE SURFACE FROM WHICH THE 2 FEET DEPTH IS MEASURED WILL BE THE LEVEL OF THE SURROUNDING UNDISTURBED SOIL. IN AREAS OF RILLING, THE RILLS WILL FIRST BE KNOCKED DOWN AND LEVELED OFF. THE 2 FEET DEPTH WILL THEN BE MEASURED FROM THIS NEW SURFACE. THE CONTRACTOR WILL DETERMINE THE MEANS AND METHODS FOR DEEP PLOWING.)
14. TREES AND PLANTS LOCATED WITHIN A DESIGNATED TREE PROTECTION ZONE (TPZ) SHALL BE PRESERVED. REFER TO SPECIFICATION SECTION 01566 – TREE AND PLANT PROTECTION, FOR DETAILED INFORMATION ON TREE AND PLANT PRESERVATION PRACTICES AND PROCEDURES INCLUDING, BUT NOT LIMITED TO, ROOT PRUNING, VEGETATION TRIMMING, FENCING AND OTHER PRESERVATION OPERATIONS.
15. IF APPLICABLE, CONTRACTOR SHALL AVOID ANY WETLAND AREAS BEYOND THE LIMITS OF EXCAVATION AND CLEARING AS THE FIRST WORK ITEM CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING FENCING OR OTHER MATERIAL TO IDENTIFY AND PROTECT THE IDENTIFIED WETLAND AREAS, UNLESS WETLANDS HAVE BEEN IDENTIFIED AND FENCED BY HCFCD PRIOR TO CONSTRUCTION AND CONTRACTOR HAS WRITTEN EVIDENCE OF SUCH.

STORM WATER POLLUTION PREVENTION PLAN:

1. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILTER FABRIC BARRIER ALONG ROAD AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TYPICAL STORM WATER POLLUTION PREVENTION (SWPP) PLANS TO KEEP SILT AND OR EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STORM.
2. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATION MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALLS ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEPT BACK INTO THE EXCAVATED AREA.
3. CONTRACTOR SHALL CLEAN UP THE EXISTING STREET INTERSECTIONS AND DRIVEWAYS DAILY, AS NECESSARY, TO REMOVE ANY EXCESS MUD, SILT OR ROCK TRACKED FORM THE EXCAVATED AREA.
4. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.
5. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.
   - DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
   - AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
   - STRUCTURAL CONTROL MEASURES.
   - LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE.
6. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION ON BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.
7. CONTRACTOR SHALL REMOVE AND REPLACE INLET PROTECTION BARRIER PER REQUEST BY THE CITY RELATED TO SEVERE WEATHER EVENTS.

CENTERPOINT ENERGY NOTES:

CAUTION: UNDERGROUND GAS FACILITIES:

1. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1-800-545-6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.
   - WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 207-5463 OR (713- 945-8037 (7:00A.M. TO 4:30 P.M.) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
   - WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
   - WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THEFACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
   - FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-2111 OR (713) 207-4200.
2. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

WARNING: OVERHEAD ELECTRICAL LINES:

1. OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:
   - ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX(6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
   - OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILARAPPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
2. PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

ACTIVITIES ON/OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY

1. NO APPROVAL TO USE, CROSS OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT OF WAY DIVISION AT 713-207-6348 OR 713-207-5769

GENERAL CONSTRUCTION NOTES:

1. EXISTING UTILITY INFORMATION SHOWN IS NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE ALL EXISTING UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF HIS CONSTRUCTION. ANY CONFLICT OR DISCREPANCY DISCOVERED MUST BE BROUGHT TO THE ENGINEER'S ATTENTION.
2. ANY DAMAGE TO ANY EXISTING PAVEMENT AND/OR UTILITIES MUST BE REPAIRED IMMEDIATELY. THE CONTRACTORS MUST NOTIFY THE APPROPRIATE UTILITY OWNER, WHO WILL MAKE THE REPAIRS AT THE CONTRACTOR'S EXPENSE.
3. GUIDELINES SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC, DURING CONSTRUCTION.
4. THE AREA SHALL BE BARRICADED AND MAINTAIN ILLUMINATION CURRENTLY IN PLACE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIAL AND EQUIPMENT IN A SAFE AND WORKMANLIKE MANNER TO PREVENT INJURIES DURING AND AFTER WORKING HOURS UNTIL PROJECT COMPLETION.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING OF ALL MATERIALS, EXCEPT AS NOTED. THE LOADING AND UNLOADING OF ALL EQUIPMENT PIPE, VALVES, PUMPS, MANHOLES AND OTHER MATERIAL SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED PRACTICES AND SHALL AT ALL TIMES BE PERFORMED WITH CARE TO AVOID ANY DAMAGE TO THE MATERIAL. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE SUCH MATERIAL AT THE POINT OF DELIVERY AND REJECT ALL DEFECTIVE MATERIAL. THE DEFECTIVE MATERIAL MUST BE REPLACED WITH SOUND MATERIAL.
7. ALL PIPE AND REINFORCEMENT STEEL SHALL BE KEPT FREE OF DIRT AND OTHER DEBRIS. ANY DAMAGE TO THE COATING OF THE VARIOUS MATERIALS MUST BE REPAIRED.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION OF PROPOSED FACILITIES. NATURAL GROUND ADJACENT TO UTILITY TRENCH EXCAVATION SHALL BE GRUBBED PRIOR TO PLACEMENT OF EXCESS TRENCH MATERIAL (NO SEPARATE PAYMENT).
9. ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
10. THE CONTRACTOR IS REQUIRED TO FOLLOW ALL APPLICABLE OSHA RULES AND REGULATIONS.
11. NO CONNECTIONS SHALL BE MADE TO EXISTING WATER LINES OR SANITARY SEWERS UNTIL ALL PROPOSED LINES OR SEWERS HAVE BEEN THOROUGHLY CLEANED, TESTED AND APPROVED BY THE CITY.
12. ALL GEOTECHNICAL REPORTS FOR THIS PROJECT ARE AVAILABLE FOR REFERENCE AT THE OFFICE OF THE CITY.

GENERAL CONSTRUCTION NOTES (CONTINUED):

13. SURFACE RESTORATION: AT THE END OF ALL CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL RESTORE EXISTING FACILITIES OVER AND ABOVE THE CONTRACT DOCUMENTS, IE. SURROUNDING PROPERTY EQUAL TO OR BETTER THAN THE EXISTING SITE CONDITION PRIOR TO CONSTRUCTION. ALL DISTURBED AREAS ALONG THE ACCESS ROAD AND WITHIN THE PLANT SITE SHALL BE HYDROMULCH SEEDED OR SODDED IN ACCORDANCE WITH THE SPECIFICATIONS.
14. FINAL ACCEPTANCE OF THE UTILITIES WILL NOT BE GIVEN TO THE CONTRACTOR UNTIL THEY ARE INSPECTED AND APPROVED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY.
15. ALL MANHOLES ARE TO BE CONSTRUCTED TO ALLOW FOR A MINIMUM OF 1 FOOT OF VERTICAL ADJUSTMENT.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING AND RESTORING BACKSLOPE DRAINAGE SYSTEM.
17. ALL DISTURBED AREA WITHIN THE DRAINAGE DITCH EXCEPT THE CHANNEL BOTTOM S HALL BE SEEDED.
18. BACKFILL WITHIN THE DRAINAGE DITCH SHALL BE COMPACTED IN NO GREATER THAN ONE FOOT LIFTS TO THE DENSITY OF THE UNDISTURBED ADJACENT SOIL.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING FLOW IN CHANNEL DURING CONSTRUCTION AND RESTORING CHANNEL TO AT LEAST ORIGINAL CONDITIONS.
20. TO PREPARE AN ACCURATE BID AND CONSTRUCT THE SPECIFIC IMPROVEMENTS, THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING ALL MATERIAL AND METHOD OPTIONS IN THE PROJECT SPECIFICATION.
21. EXISTING PAVEMENTS, CURBS, SIDEWALKS AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED USING THE CITY OF HOUSTON STANDARDS.
22. THE CONTRACTOR IS RESPONSIBLE TO UNDERSTAND THAT THIS PROJECT INCLUDES ELEMENTS OF DEMOLITION, ADAPTATION AND NEW CONSTRUCTION, THESE DRAWINGS WERE DEVELOPED USING AVAILABLE HISTORICAL DATA COUPLED WITH ON-SITE RECONNAISSANCE SURVEYS. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF SITE CONDITIONS PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES. ALL DISCREPANCIES AND DISCOVERIES SHALL BE REPORTED TO THE CONSTRUCTION MANAGER.
23. ALL EXCAVATION SPOILS SHALL BE LAWFULLY DISPOSED OFFSITE BY CONTRACTOR AT NO ADDITIONAL COST TO THE CITY.
24. ALL WORK AT THE SITE THAT COULD POTENTIALLY INTERFERE WITH NORMAL PLANT OPERATIONS (AND/OR OFFSITE FACILITIES) SHALL BE COORDINATED WITH THE PLANT SUPERVISOR. CONTRACTOR SHALL SUBMIT A CONSTRUCTION SEQUENCING PLAN DEMOSTRATION THAT NO PLANT OPPERATIONS (OR OFFSITE FACILITIES) WILL BE ADVERSELY AFFECTED MORE THAN 4 HOURS IN ANY 24 HOUR PERIOD. ALL REQUESTS WHICH IMPACT NORMAL OPERATIONS OF THE PLANT SHALL BE SUBMITTED A MINIMUM OF 5 DAYS IN ADVANCE OF THE ACTIVITY.
25. ALL DRAWINGS DIMENSIONS SHOWN ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR. NECESSARY HORIZONTAL AND VERTICAL ALIGNMENT CHANGES SHALL BE APPROVED BY THE CITY.
26. CONTRACTOR SHALL REMOVE ALL TRASH, EXCESS DEBRIS ETC. FROM THE SITE AT PROJECT COMPLETION PRIOR TO INSPECTION AND APPROVAL BY APPROVING AGENCIES.
27. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND RELATED ACCESSORIES TO OPERATE IN THE MANNER INTENDED BY THE ENGINEER AND THE MANUFACTURER AND BE IN COMPLIANCE WITH ALL APPLICABLE CODES AND CONTRACT SPECIFICATIONS. THE CONTRACTOR WILL COORDINATE WORK BETWEEN ALL TRADES AND SUBCONTRACTORS TO PROVIDE A COMPLETE INSTALLATION SO THAT THE EQUIPMENT IS OPERATIONAL DURING SUBSTANTIAL AND FINAL COMPLETION OF THE PROJECT. THE COMPLETED WORK WILL NOT LACK ANY PART WHICH CAN BE REASONABLY IMPLIED AS INCIDENTAL FOR PROPER AND USEFUL OPERATION OF THE FACILITY. THIS INCLUDES ALL ITEMS OF EQUIPMENT, LABOR AND WILL BE IN ACCORDANCE WITH CODE REQUIREMENTS, STANDARDS, REGULATORY AGENCIES, MANUFACTURER'S RECOMMENDATIONS AND ACCEPTABLE INDUSTRY PRACTICE. THIS WORK WILL BE DONE AT NO ADDITIONAL COST TO THE CITY.
28. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHORING, STABILIZATION AND SUPPORT OF ALL UTILITIES AND STRUCTURES DURING CONSTRUCTION.
29. ALL DIMENSIONS AND QUANTITIES SHALL BE DETERMINED AND/OR VERIFIED BY THE CONTRACTOR.
30. DO NOT SCALE THE DRAWINGS UNLESS OTHERWISE NOTED. REPORT ANY DISCREPANCIES TO THE CONSTRUCTION MANAGER IMMEDIATELY
31. THE LOCATION AND LIMITS OF ALL ON-SITE WORK AND STORAGE AREAS SHALL BE REVIEWED/COORDINATED WITH AND ACCEPTABLE TO THE CITY OF HOUSTON. THE CONTRACTOR SHALL LIMIT THEIR ACTIVITIES TO THESE AREAS.
32. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE LOCATIONS AND ACTIVITIES OF THEIR FORCES WITH THE CITY OF HOUSTON TO MINIMIZE INTERFERENCE WITH NORMAL OPERATIONS.
33. SPECIFICATION SECTION 01110 – SUMMARY OF WORK PROVIDES A SUMMARY OF WORK TO BE COMPLETED AND ADDITIONAL INFORMATION OF CONSTRUCTION ACTIVITY.
34. CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITY.
35. CONTRACTOR IS RESPONSIBLE FOR THEIR OWN HORIZONTAL AND VERTICAL CONTROL REFERENCE POINTS AND CONSTRUCTION STAKING IN INCIDENTAL TO THE PROJECT.
36. CONTRACTOR SHALL KEEP ACCESS ROAD TO PLANT OPEN AND FREE FROM CONSTRUCTION RELATED DEBRIS AT ALL TIMES. CONTRACTOR STAGING AREA SHALL BE USED FOR CONTRACTOR'S PERSONNEL, PARKING, MATERIAL AND STORAGE, STOCKPILE, MATERIAL FABRICATION AND RELATED CONSTRUCTION WHICH WILL NOT BE ALLOWED TO INTERFERE WITH NORMAL PLANT OPERATION. CONTRACTOR TO PROVIDE TEMPORARY ALL-WEATHER ACCESS TO ALL UNLOADING AREAS, THROUGHOUT THE DURATION OF THE PROJECT.
37. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE FINAL DRAFT OF THE STORM WATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES. AS PREPARED BY HARRIS COUNTY, HCFCD AND THE CITY OF HOUSTON IN COMPLIANCE WITH NPDES REQUIREMENTS.
38. IN THE EVENT THAT GROUNDWATER IS ENCOUNTERED DURING EXCAVATION, GROUNDWATER SHOULD BE LOWERED TO A DEPTH OF AT LEAST THREE FEET BELOW THE DEEPEST EXCAVATION GRADE TO PROVIDE DRY WORKING CONDITIONS AND FIRM BEDDING. WATER ACCUMULATED IN THE EXCAVATION AREA SHALL BE REMOVED TO MAINTAIN THE WORKING AREA DRY.
39. IT IS CONTRACTOR'S RESPONSIBILITY TO DESIGN AND IMPLEMENT AN EFFECTIVE GROUNDWATER CONTROL SYSTEM. DEWATERING SYSTEM FOR GROUNDWATER AND SURFACE WATER CONTROL SHALL BE IN ACCORDANCE WITH THE CITY OF HOUSTON SPECIFICATION SECTION 01578 – CONTROL OF GROUNDWATER AND SURFACE WATER.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL

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SHEET 1 OF 2

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NASIR FAZLJOO, P.E.	

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GENERAL NOTES

GENERAL CONSTRUCTION NOTES (CONTINUED):

38. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY SUPPORTS AND BRACING FOR ALL STRUCTURAL ELEMENTS INCLUDING, BUT NOT LIMITED TO, PUMPS, PIPING, WALL AND FOUNDATION. ALL PROPOSED TEMPORARY BRACING AND SUPPORTS MUST BE SUBMITTED BY THE PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR. ITS IS THE CONTRACTOR'S RESPONSIBILITY TO INSURE THE SAFETY AND FUNCTIONALITY OF THE PIPING AND ASSOCIATED APPURTENANCES DURING ALL PHASES OF CONSTRUCTION. FURTHERMORE, SHOULD THE CONTRACTOR FEEL THAT ANY SUPPORTS OR BRACING ILLUSTRATED OR DEPICTED WITHIN THESE CONSTRUCTION DOCUMENTS PRESENT A POTENTIAL PROBLEM IN TERMS OF SAFETY OR INTERFERENCE WITH OPERATION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO IMMEDIATELY DOCUMENT THESE CONCERNS AND IMMEDIATELY PRESENT THIS SAID DOCUMENTATION TO THE CITY'S ATTENTION.

39. FIELD VERIFY EXISTING UNDERGROUND UTILITIES AND PROCESS PIPING SHOWN ON THE DRAWINGS BY WHATEVER MEANS NECESSARY (METAL DETECTION PROBES, EXCAVATION, SURVEY, OTHERS) PRIOR TO EXCAVATION. FIELD VERIFICATION WORK AND UTILITY ADJUSTMENTS SHALL BE COMPLETED PRIOR TO EXCAVATION AND CONSTRUCTION OF PROPOSED UTILITIES. THE CONSTRUCTION DOCUMENTS WERE PREPARED FROM THE CITY'S RECORD DRAWINGS. THE ACCURACY OF THE EXISTING UTILITIES AND INFRASTRUCTURE SHOWN ON THESE DOCUMENTS IS NOT GUARANTEED AND THE USE OF SUCH INFORMATION IN NO WAY RELIEVES THE CONTRACTOR OR OTHER OF ANY RESPONSIBILITY FOR ANY LOSS DUE TO INACCURACIES NO SEPARATE PAY ITEM.

40. NOTIFY TEXAS ONE CALL AT 811 OR 1-800-545-6005 AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

41. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SECURITY TO PROTECT HIS OWN PROPERTY.

42. CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY PROTECTING EXISTING EQUIPMENT, BUILDINGS, STRUCTURES, PIPING, ELECTRICAL CABLES, UTILITIES, TANKS, TREES, SHRUBS AND ASSOCIATED APPURTENANCES DURING CONSTRUCTION AS APPLICABLE AND REPAIR OR REPLACE DUE TO DAMAGE CAUSED BY CONTRACTOR AT NO COST TO THE CITY.

43. IDENTIFY AND OBTAIN ALL REQUIRED CONSTRUCTION PERMITS PRIOR TO COMMENCEMENT OF WORK.

44. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT FEDERAL, OSHA, STATE AND LOCAL LAWS AND REGULATIONS CONCERNING SAFETY OF HEALTH PRACTICES. THE DRAWING PREPARED BY THE DESIGN ENGINEERS FOR THE PROJECT DO NOT INCLUDE DESIGN OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR ITS EMPLOYEES OR AGENTS.

45. CONTRACTOR SHALL NOT OPERATE EXISTING VALVES, PLANT APPURTENANCES OR PLANT EQUIPMENT UNLESS, IN THE PRESENCE OF THE CITY CONSTRUCTION MANAGER AND/OR CITY WASTEWATER OPERATIONS. PROVIDE SUFFICIENT NOTIFICATION AND LEAD TIME FOR PLANT OPERATOR WHERE IT BECOMES NECESSARY TO ACTUATE OR DE-ACTUATE VALVES, PLANT APPURTENANCE OR PLANT EQUIPMENT.

46. THE CONTRACTOR SHALL PROVIDE TAPE, FITTINGS, PLUGS AND OTHER DEVICES FOR USE IN FILLING, FLUSHING, TESTING ETC. (NO SEPARATE PAYMENT).

GENERAL DEMOLITION NOTES:

1. THE CITY SHALL HAVE THE FIRST RIGHT OF REFUSAL TO RETAIN OR SALVAGE ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED, INCLUDING BUT NOT LIMITED TO PUMPS, HATCHES AND ELECTRICAL AND INSTRUMENTATION COMPONENTS. PRIOR TO INITIATING DEMOLITION WORK, THE CONTRACTOR AND THE DESIGNATED FIELD INSPECTOR SHALL MAKE A JOINT INSPECTION OF EACH SITE TO IDENTIFY ALL EQUIPMENT TO BE RETAINED BY THE CITY FOR SALVAGE OR REUSE. ITEMS IDENTIFIED FOR SALVAGE BY THE CITY SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ALL OTHER ITEMS SHOWN TO BE DEMOLISHED/REMOVED THAT ARE NOT RETAINED BY THE CITY SHALL BE PROPERLY REMOVED FROM THE SITE AND HANDLED PER SPECIFICATION 02220-DEMOLITION AT NO ADDITIONAL COST TO THE CITY. CONTACT DESIGNATED CITY REPRESENTATIVE (CAPITAL PROJECTS CONSTRUCTION INSPECTOR) FOR WASTEWATER TREATMENT PLANT SALVAGE AT LEAST 72 HOURS PRIOR TO DEMOLITION IN ORDER TO COORDINATE REMOVAL OF ANY ITEMS THE CITY WISHES TO CLAIM AND SALVAGE. THE CONTRACTOR SHALL DELIVER ALL SALVAGE ITEMS TO A LOCATION WITHIN THE CITY DETERMINED BY THE CITY.

2. SUBMIT CONSTRUCTION SEQUENCING PLAN BEFORE STARTING ANY DEMOLITION ACTIVITIES. CONTRACTORS METHOD OF DEMOLITION SHALL BE APPROVED BY CONSTRUCTION MANAGER PRIOR TO START OF WORK. REFER TO SPECIFICATION 01110 FOR ADDITIONAL INFORMATION ON CONSTRUCTION SEQUENCE.

3. DEMOLITION OF EXISTING STRUCTURE MECHANICAL SYSTEMS OR PROCESS SYSTEMS IS GENERALLY SHOWN OR INDICATED ON THE DRAWINGS UNLESS OTHERWISE INDICATED.THE DEMOLITION OF THE STRUCTURE OF PROCESS SYSTEMS MEANS THE DEMOLITION, REMOVAL, PROPER CLEANING AND DISPOSAL OF THE ENTIRE UNIT, INCLUDING SUBSTRUCTURE, SUPERSTRUCTURE AND APPURTENANCES OR CONTENTS OF THE STRUCTURE OR EQUIPMENT SYSTEM.PROCESS MECHANICAL DEMOLITION IN GENERAL SHALL CONSIST OF DISMANTLING, CLEANING AND REMOVAL OF EXISTING PIPING, TANKS, BLOWERS, PUMPS, MOTORS CONTROLS, INDICATED IN THE CONTRACT DOCUMENT OR REQUIRED FOR THE COMPLETION OF WORK.

4. DEMOLITION OR REMOVAL OF NOTED EQUIPMENT, PIPING SYSTEMS AND APPURTENANCES SHALL INCLUDE ALL SUPPORTS, BOLTS AND STRUCTURAL COMPONENTS.

5. PATCH AND REPAIR WITH MORTAR OR GROUT ALL EXPOSED FLOOR AND WALL PENETRATIONS FOR DEMOLITION ACTIVITIES IN ACCORDANCE WITH SPECIFICATION 03920 – CONCRETE SURFACE REPAIR AND SPECIFICATION 03930 – CONCRETE CRACK REPAIR.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PENETRATING NEEDS FOR PASSAGE OF PIPING THROUGH SOLID CONCRETE WALLS, FLOORS OR FOUNDATION WALLS.

7. REUSED EXISTING PIPING SYSTEMS SHALL BE PROPERLY CLEANED AND INSPECTED PRIOR TO REUSE.

8. ALL EQUIPMENT SHALL BE DE-ENERGIZED AND MADE SAFE PRIOR TO DEMOLITION WORK IN ACCORDANCE WITH SPECIFICATION SECTION 16060 – ELECTRICAL DEMOLITION USING LOCK OUT/TAG OUT SAFETY PROCEDURE. THE CONTRACTOR SHALL COORDINATE WITH CENTERPOINT ENERGY TO DISCONNECT THE ELECTRICAL POWER.

9. REFER TO CIVIL, STRUCTURAL, PROCESS MECHANICAL, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION.

10. CROSS-HATCHING INDICATES ITEMS TO BE REMOVED AS SHOWN ON THE DRAWINGS. THE DRAWINGS DO NOT NECESSARILY INDICATE ALL ITEMS REQURING DEMOLITION, REMOVAL, OR PATCHING/REPAIR. CONTRACTOR SHALL INCLUDE ALL WORK TO ACCOMMODATE NEW CONSTRUCTION IN CONTRACT PRICE.

11. CONTRACTOR SHALL DEMOLISH EVERYTHING WITHIN THE LIMITS OF DEMOLITION, INCLUDING ALL INTERIOR EQUIPMENT, PIPING, ALL CONCRETE AND REINFORCEMENT, APPURTENANCES OR OTHER MISCELLANEOUS ITEMS.

GENERAL NOTES FOR CIVIL DRAWINGS:

1. THE HORIZONTAL DATUM IS REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, NAD'83 (2011), ITRF (EPOCH 2010.0000) NAVD'88 (GD2012A). ALL NAD83 COORDINATES SHOWN HEREIN ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID BY MULTIPLYING THE COMBINED SCALE FACTOR OF 0.999923883870. (SURFACE X CSF = GRID)

2. THE VERTICAL DATUM IS REFERENCED TO FEMA ELEVATIONS (NAVD88 (2001 ADJ.)). TO CONVERT NAV88 PUBLISHED ELEVATIONS TO OBSERVED SUBTRACT 0.5 FEET. (NAVD88 (2001 ADJ.)–0.5= OBSERVED.)

3. FEMA BASE FLOOD ELEVATION LINE AND VALUE ELEVATION 79 (NAD83 DATUM ELEVATION) AS INDICATED BY THE 0.2% ANNUAL CHANCE FLOODPLAIN BOUNDARY.

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 LOCATION, 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, LOCATIONS AND DESIGNATION OF SUBSURFACE UTILITIES INDICATED IN THESE CONTRACT DOCUMENTS HAS BEEN PERFORMED TO QUALITY LEVEL C 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 TO A HIGHER LEVEL OF QUALITY. THE HIGHER QUALITY LEVEL FOR THE AFFECTED AREAS IS INDICATED IN THE CONTRACT DOCUMENTS.

5. ALL EXISTING STRUCTURE AND PIPING ELEVATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

6. "SCREENED"(LIGHT) DELINEATION INDICATED ON THE DRAWINGS DENOTES EXISTING FACILITIES "SCREENED" INFORMATION WAS TAKEN FROM THE EXISTING CONSTRUCTION DRAWINGS AND DATA, IS FOR REFERENCE ONLY,AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING OF MATERIALS AND BEGINNING OF CONSTRUCTION. "BOLD" DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS PROJECT. "DASHED" DELINEATION IS FOR FUTURE DESIGN WORK NOT CONSTRUCTED UNDER THIS CURRENT CONTRACT.

7. 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.

8. CALL 811 OR 1-800-545-6005 BEFORE YOU DIG FOR FIELD LOCATIONS OF BURIED ELECTRIC, TELEPHONE, GAS WATER, SEWER, AND CABLE TELEVISION FACILITIES (48 HOURS NOTIFICATION IS REQUIRED.) CONTRACTOR SHALL VERIFY PRECISE LOCATION 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 VERIFICATION, CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO DETERMINE ANY NECESSARY MODIFICATIONS TO PROPOSED NEW WORK.

9. BEFORE CONSTRUCTION IS STARTED, CONTRACTOR SHALL COORDINATE WITH THE OWNER OF EACH UTILITY AND DEFINE THE REQUIREMENTS AND ACCOMMODATE THE PROTECTION, TEMPORARY SUPPORT, ADJUSTMENT OR RELOCATION OF ANY UTILITIES AFFECTED BY THE PROPOSED NEW WORK.

10. 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 TO BRING CONTRACTORS ATTENTION TO SENSITIVE AREAS.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL PROPERTY CORNER MARKERS. PROPERTY CORNER MARKERS DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REESTABLISHED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF TEXAS.

12. THE LOCATION OF SOIL BORINGS INDICATED ON THE DRAWINGS IS APPROXIMATE. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL INVESTIGATION REPORT FOR ACTUAL BORING LOCATIONS AND THE FINDINGS OF THE GEOTECHNICAL INVESTIGATIONS.

13. CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING TREES, SHRUBS, AND PLANTS UNLESS OTHERWISE NOTED.

14. CONTRACTOR SHALL INSTALL ALL PIPELINES, PAVING, WALKWAYS, AND CURB AND GUTTER AT A UNIFORM GRADE BETWEEN ELEVATIONS DEPICTED ON THE DRAWINGS.

15. FOR ALL SITE GRADING, SMOOTH PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE. PARABOLIC ROUNDING SHALL APPLY TO ALL CUT AND FILL SECTIONS.

16. 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.

17. THE CONTRACTOR'S OPERATIONS SHALL CONFORM TO THE RULES AND REGULATION OF THE STATE CONSTRUCTION SAFETY ORDERS AND OSHA PERTAINING TO EXCAVATION AND TRENCHING.

18. ALL BURIED PIPES SHALL BE RESTRAINED UNLESS OTHERWISE NOTED ON THE DRAWINGS OR SPECIFICATIONS.

19. 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 SPECIFICATIONS SECTION 15140 AND PROVIDE A COMPLETE SUPPORT SYSTEM AS REQUIRED.

20. THE TERMS "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.

21. THE EXISTING PROCESS FACILITIES SHALL REMAIN IN OPERATION CONTINUOUSLY THROUGHOUT THE CONSTRUCTION ACTIVITIES. THE INDIVIDUAL PROCESS FACILITIES CAN BE TAKEN OUT OF SERVICE FOR LIMITED PERIODS OF TIME TO FACILITATE CONSTRUCTION AS SPECIFIED IN THE CONTRACT DOCUMENTS.

GENERAL NOTES FOR CIVIL DRAWINGS (CONTINUED):

21. CONTRACTOR SHALL RESTORE ANY EXISTING STRUCTURES THAT ARE DISTURBED, DAMAGED OR REMOVED BY CONSTRUCTION.

22. CONTRACTOR SHALL PROVIDE ANY TEMPORARY CULVERTS THAT MAY BE REQUIRED FOR CONTRACTOR'S OPERATIONS. CONTRACTORS SHALL COORDINATE REMOVAL AND REPLACEMENT OF ANY CULVERTS WITHIN PUBLIC RIGHT-OF-WAY WITH THE REGULATING AGENCY.

23. CONTRACTOR SHALL PROVIDE THE ACTUAL PIPE LENGTH TO BE DETERMINED BY THE SLOPE OR CURVE ON WHICH THE PIPE IS INSTALLED.

24. MINIMUM PIPE COVER SHALL BE FROM THE EXISTING, PROPOSED OR FUTURE GROUND SURFACE OR ROAD PROFILE, WHICHEVER GROUND SURFACE OR ROAD PROFILE IS APPLICABLE AS INDICATED ON THE DRAWINGS. IF THE PROPOSED GROUND SURFACE IS ABOVE THE EXISTING GROUND SURFACE INDICATED ON THE DRAWINGS AND IS NOT ACTUAL GROUND SURFACE AT THE TIME OF PIPELINE INSTALLATION, INSTALL THE PIPELINE TO PROVIDE MINIMUM PIPE COVER FROM THE ACTUAL GROUND SURFACE IF ACCEPTABLE TO THE ENGINEER. HIGH POINTS IN THE PIPELINE WILL NOT BE PERMITTED EXCEPT AT LOCATIONS OF AIR VALVES AS INDICATED ON THE DRAWINGS. REVIEW THE PIPELINE PROFILE REQUIREMENTS WITH THE ENGINEER PRIOR TO PREPARING LAYING SCHEDULE AND PERFORMING FIELD STAKING.

25. CONTRACTOR SHALL FIELD VERIFY PRECISE LOCATION, ELEVATION AND ARRANGEMENT OF CONNECTIONS OF NEW PIPELINES WITH EXISTING PIPELINES BASED ON FIELD CONDITIONS, 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 OFFSET 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. WHEN APPLICABLE, CONTRACTOR SHALL COORDINATE MAKING EACH CONNECTION WITH THE OWNER.

26. ALL DUCTILE IRON PIPE (DIP) SHALL BE PROTECTED WITH A MINIMUM OF ONE WRAP OF POLYETHYLENE ENCASEMENT LOCATIONS WHERE DIP IS TO BE DOUBLE WRAPPED WITH POLYETHYLENE ENCASEMENT AND PRESTRESSED CONCRETE CYLINDER PIPE (PCCP) IS TO BE WRAPPED (SINGLE OR DOUBLE) WITH POLYETHYLENE ENCASEMENT ARE SPECIFIED AND INDICATED ON THE DRAWING.

27. REMOVED PAVEMENT, SIDEWALK, CURB AND GUTTER ETC. SHALL BE DISPOSED OF OFFSITE BY THE CONTRACTOR AT ITS OWN EXPENSE AND SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS.

28. CONTRACTOR SHALL PROVIDE DUST CONTROL MEASURES TO PREVENT TRAFFIC HAZARDS OR CONDITIONS THAT MAY IMPACT THE HEALTH AND SAFETY OF PERSONS DOWN WIND.

29. CONSTRUCTION INGRESS-EGRESS SHALL BE CONFINED TO DEFINED, UTILITY EASEMENTS AND PUBLIC ROADWAYS. CONSTRUCTION EXITS SHALL BE CLEANED DAILY AS NEEDED TO PREVENT THE SPREAD OF SEDIMENTS OR DEBRIS ON EXISTING PAVEMENTS. MUD AND DEBRIS SHALL BE CLEANED FROM THE PAVEMENTS WHENEVER IT OCCURS AND AS REQUIRED BY THE CITY OR ROADWAY AUTHORITY.

30. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR THE PROPER BRACING, SHORING AND OTHER REQUIRED PROTECTION OF ALL UTILITIES BEFORE CONSTRUCTION BEGINS. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE UTILITIES AND ASSOCIATED STRUCTURES AND SHALL MAKE REPAIRS AS NECESSARY TO THE SATISFACTION OF THE UTILITY OWNER.

31. PLACE BALL MARKERS (PROVIDED BY OWNERS) ABOVE YARD PIPING GREATER THAN 3" DIAMETER AT 300' SPACING AND ALL HORIZONTAL BENDS TO DEPTH BETWEEN 1' AND 3' BELOW FINISHED GRADE.

MISCELLANEOUS NOTES:

1. CONTRACTOR SHALL VERIFY NUMBER AND SIZE OF ALL OPENINGS SHOWN ON THE DRAWINGS AND COORDINATE WITH CIVIL, ARCHITECTURAL, PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS AND EQUIPMENTS FURNISHED FOR EXACT LOCATIONS OF OPENINGS.

2. ALL NOZZLES, WEIRS, PIPE THIMBLES, GATES AND THIMBLES AND ALL OTHER EMBEDDED EQUIPMENTS SHALL BE LOCATED AND EMBEDDED ACCORDING TO THE CIVIL, MECHANICAL, STRUCTURAL DRAWINGS AND VENDOR RECOMMENDATIONS.

3. ALL EXPOSED OR ABOVE GROUND POTABLE AND NON-POTABLE WATER LINES ARE TO BE INSULATED.

4. ALL DISTURBED AREA SHALL BE HYDROMULCH SEEDED PER SPECIFICATION 02921-HYDROMULCH SEEDING.

5. EXISTING PAVEMENTS, CURBS, SIDEWALKS AND DRIVE-WAYS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED USING CITY OF HOUSTON STANDARDS.

APPLICABLE CODES:

1. DESIGN OF PLANT STRUCTURES IS BASED ON APPLICABLE PORTIONS OF:

   -2021 IBC WITH CITY OF HOUSTON AMENDMENTS
   -2021 UPC – UNIFORM PLUMBING CODE
   -2021 UMC – UNIFORM MECHANICAL CODE
   -2020 NEC – NATIONAL ELECTRICAL CODE
   -2021 IFC – INTERNATIONAL FIRE CODE
   -2021 IECC OR ASHRAE 90.1-2013
   -ACI 318 – BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE

2. ACI 350-01 ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES

3. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS

4. AISC 13TH ADDITION

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL

GENERAL NOTES
SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 6 OF 226	

G-000-006

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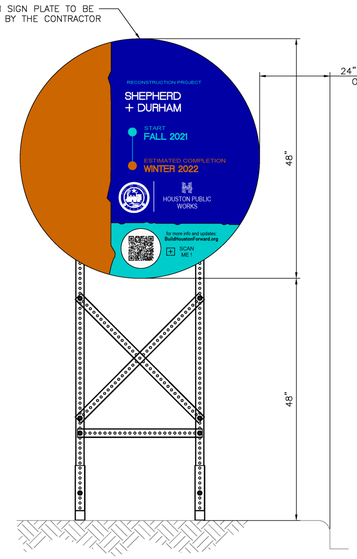
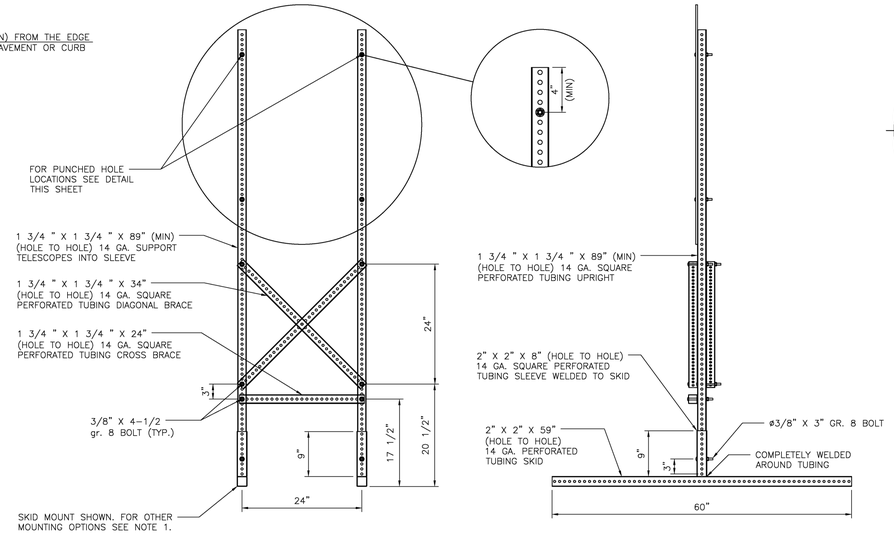
DISCLAIMER:
THE USE OF THIS STANDARD DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONCERNS ASSOCIATED WITH ITS USE. THE ENGINEER OR DESIGNER IS RESPONSIBLE FOR ESTABLISHING APPROPRIATE SAFETY AND HEALTH PRACTICES AND DETERMINING THE APPLICABILITY OF REGULATORY LIMITATIONS BEFORE USE. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



FRONT VIEW

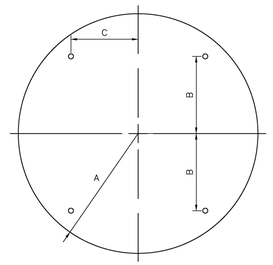
PROJECT SIGN – 48"



FRONT VIEW

SIDE VIEW

SKID MOUNTED SUPPORTS FOR 48" PROJECT SIGN



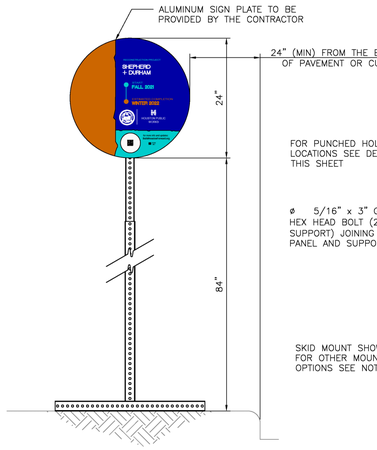
CIRCLE

A	B	C	T
24"	15"	12"	0.080"

48" SIGN PLATE HOLE DETAIL

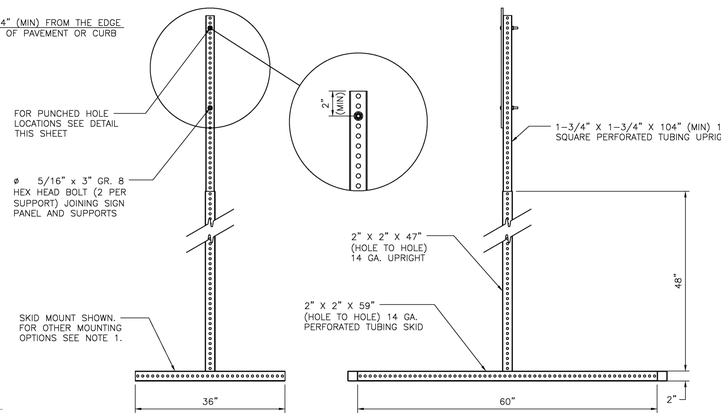
NOTES:

1. ALLOWABLE POST INSTALLATION METHODS ARE: CONCRETE FOOTING, SURFACE MOUNTING, SKID MOUNTING AND PILE DRIVEN POSTS.
2. FOR POST INSTALLATION WITH CONCRETE FOOTING, REFER TO DETAIL 01554–01.
3. FOR SURFACE MOUNTED POST INSTALLATION, REFER TO DETAIL 01554–02.
4. FOR SKID MOUNTING REQUIREMENTS REFER TO SPECIFICATION 01582.
5. PILE DRIVEN POSTS MUST BE DRIVEN TO A MINIMUM DEPTH OF 4–FEET INTO EXISTING GROUND.
6. LAYOUT, TEXT SIZE, AND OVERALL DESIGN OF THE SIGN WILL BE THE RESPONSIBILITY OF THE BUILD HOUSTON COORDINATOR.
7. ALL SIGN POSTS, SIGN TUBING, AND SIGN FASTENERS SHALL BE GALVANIZED STEEL PER SPECIFICATION 01582.



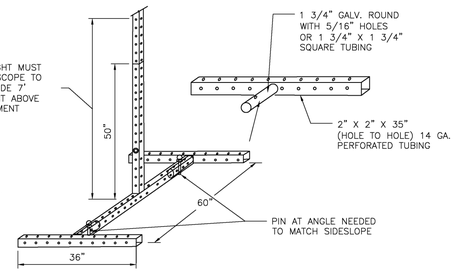
FRONT VIEW

PROJECT SIGN – 24"

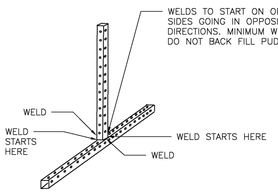


FRONT VIEW

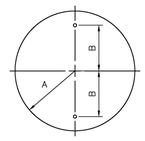
SIDE VIEW



ISO VIEW



ISO VIEW



A	B	C
12"	8"	0.080"

24" SIGN PLATE HOLE DETAIL

SKID MOUNTED SUPPORTS FOR 24" PROJECT SIGN

APPROVED BY:	APPROVED BY:
DocuSigned by: Sukant Kanwar	DocuSigned by: Carl Haddock
CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: NOV–27–2023	DWG NO: 01582–01

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

CONSTRUCTION SIGN BUILD HOUSTON FORWARD

	FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE	
NOT TO SCALE	

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961–1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL

CONSTRUCTION SIGN BUILD HOUSTON FORWARD

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 7 OF 226	

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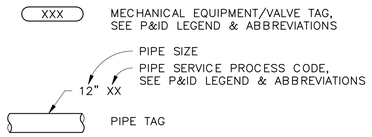
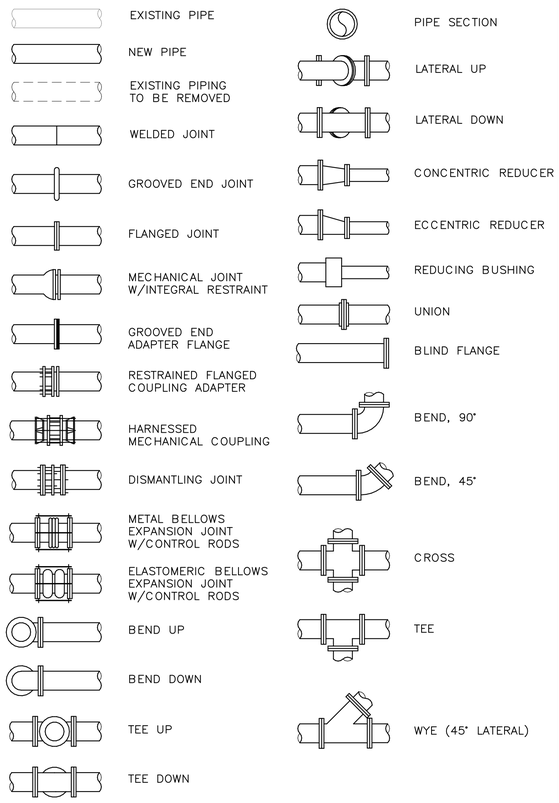
PIPE, EQUIPMENT & VALVE TAG LEGEND

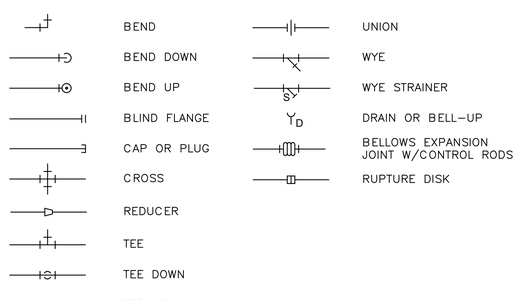


PIPE & FITTINGS SYMBOL LEGEND

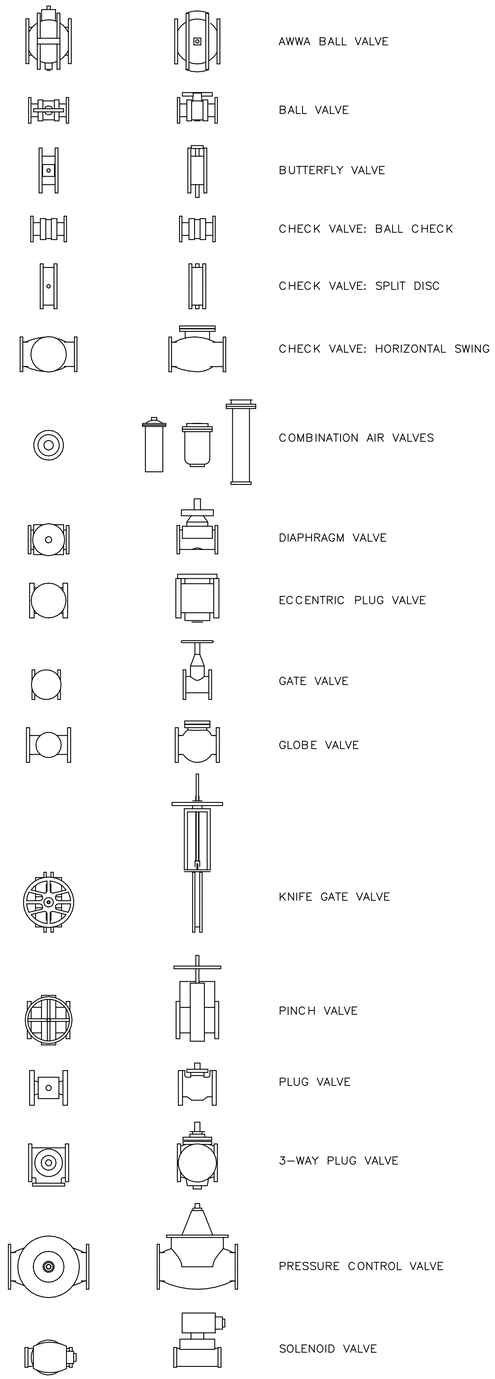
DOUBLE LINE



SINGLE LINE



VALVE SYMBOL LEGEND



GENERAL PROCESS MECHANICAL 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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10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

PROCESS MECHANICAL

LEGENDS AND GENERAL NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 8 OF 226	

M-000-001

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-000-GENERAL-BV.rvt

SYMBOLS	DESCRIPTION
52 CS	MEDIUM VOLTAGE DRAWOUT TYPE POWER CIRCUIT BREAKER CS-CONTROL SWITCH
(E.O.) FRAME TRIP	LOW VOLTAGE CIRCUIT BREAKER, 3 POLE UNLESS OTHERWISE NOTED. LSIG IF NOTED MCP IF NOTED ERMS IF NOTED
✳ OR	COMBINATION MOTOR CIRCUIT PROTECTOR AND MAGNETIC MOTOR STARTER, FULL VOLTAGE NON-REVERSING UNLESS OTHERWISE NOTED: ✳ FVR-FULL VOLTAGE REVERSING RVNR-REDUCED VOLTAGE NON-REVERSING 2S1W-TWO SPEED, ONE WINDING 2S2W-TWO SPEED, TWO WINDING
✳ OR	NON-FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE ✳ AMPERE RATING NOTED IF OTHER THAN 30A
✳ ✱ OR F	FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE, AMPERE RATING AND FUSE SIZE AS NOTED: ✳ AMPERE RATING NOTED IF OTHER THAN 30A ✱ FUSE RATING
MIS OR I	MOTOR ISOLATION SWITCH, HORSEPOWER RATED
	DRAWOUT TYPE EQUIPMENT OR DEVICE
	MEDIUM VOLTAGE CABLE TERMINATION
	MEDIUM VOLTAGE AIR INTERRUPTER SWITCH
	MEDIUM VOLTAGE FUSED AIR INTERRUPTER SWITCH
	MEDIUM VOLTAGE FUSED MOTOR CONTROLLER
30KVA 480V- 120/208Y K-*	TRANSFORMER, RATINGS AND CONNECTIONS AS NOTED. UNLESS OTHERWISE NOTED ON THE SINGLE LINE DIAGRAMS ALL DRY TYPE TRANSFORMERS SERVICING ADMINISTRATIVE AND LABORATORY SPACES SHALL HAVE A K FACTOR OF 13. ALL OTHER DRY TYPE TRANSFORMERS SHALL HAVE A K-4 RATING. ISOLATION TRANSFORMERS SHALL HAVE A K-20 RATING
✳ A:5	CURRENT TRANSFORMER: ✳ QUANTITY A= PRIMARY AMPERES
✳ PV-SV	POTENTIAL TRANSFORMER: ✳ QUANTITY PV= PRIMARY VOLTAGE SV= SECONDARY VOLTAGE
	GENERATOR, RATINGS AND CONNECTIONS AS NOTED
100A ATS-1 N S	TRANSFER SWITCH AUTOMATIC TRANSFER SWITCH (EG ATS-1) MANUAL TRANSFER SWITCH (EG MTS-1) "N" INDICATES NORMAL SOURCE "S" INDICATES STANDBY SOURCE 100A INDICATES CONTINUOUS CURRENT RATING
✳	VARIABLE SPEED DRIVE CONTROLLER ✳ D.C.= D.C. DRIVE CONTROLLER SCR= SILICON CONTROLLED RECTIFIER VFD= VARIABLE FREQUENCY DRIVE AFD= ADJUSTABLE FREQUENCY DRIVE
	VACUUM CONTACTOR
5KW OR E	UNIT HEATER - ELECTRIC HEATING COIL AND FAN
5KW OR U	UNIT HEATER - STEAM OR WATER HEATING COIL AND FAN
M	MOTOR, NUMERAL INDICATES HORSEPOWER
SPD	SURGE PROTECTION DEVICE
VFD	VARIABLE FREQUENCY DRIVE

SYMBOLS	DESCRIPTION
VM ✳	VOLTMETER (WITH SWITCH IF 3-PHASE)
AM ✳	AMMETER (WITH SWITCH IF 3-PHASE)
*	METER ✳ WM- WATTMETER WHM- WATTHOUR METER WHDM- WATTHOUR DEMAND METER WHDR- WATTHOUR DEMAND RECORDER PF- POWER FACTOR METER RT- RUNNING TIME METER TRANSDUCER AX- CURRENT TRANSDUCER WX- WATT TRANSDUCER
#	RELAY, NO. AS INDICATED 25- SYNCHRONISM CHECK RELAY 27- UNDER VOLTAGE RELAY 38- BEARING PROTECTIVE DEVICE 40- LOSS OF EXCITATION RELAY 42- RUNNING CONTACTOR/PILOT RELAY 46- REVERSE PHASE/PHASE BALANCE/CURRENT RELAY 47- PHASE SEQUENCE VOLTAGE RELAY 49- MACHINE OR TRANSFORMER THERMAL RELAY 50- INSTANTANEOUS OVERCURRENT RELAY 50G- INSTANTANEOUS GROUND 51- TIME OVER CURRENT RELAY 51G- TIME OVERCURRENT RELAY, GROUNDING RESISTOR TYPE 51N- TIME OVERCURRENT RELAY, RESIDUAL TYPE 51V- TIME OVERCURRENT RELAY WITH VOLTAGE RESTRAINT 60- NEGATIVE SEQUENCE VOLTAGE RELAY 62- TIME DELAY RELAY 63- OVER PRESSURE RELAY 67- AC DIRECTIONAL OVERCURRENT RELAY 83- AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY 86- LOCKING-OUT RELAY 87- DIFFERENTIAL PROTECTIVE RELAY B- SUFFIX INDICATES "BUS" G- SUFFIX INDICATES "GENERATOR" GF- GROUND FAULT ST- SHUNT TRIP T- SUFFIX INDICATES "TRANSFORMER" X- SUFFIX INDICATES "AUXILIARY"
*	SPECIAL CAPACITOR ✳ SC- SURGE CAPACITOR PF- POWER FACTOR CORRECTION CAPACITOR INCLUDING INDUCTIVE LINK AS NEEDED
	PUSH BUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY CLOSED
	PUSH BUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY OPEN
E-STOP	EMERGENCY STOP PUSH BUTTON WITH RED MUSHROOM HEAD OPERATOR (MAINTAINED CONTACT)
✳ N	STOP PUSH BUTTON WITH RED HEAD OPERATOR (MAINTAINED CONTACT) WITH LOCKABLE OPTION ✳: E-STOP ✳: STOP
STOP START	START-STOP PUSH BUTTON CONTROL STATION (MOMENTARY CONTACT) "L" DENOTES LOCKOUT TYPE
STOP START	START-STOP PUSH BUTTON CONTROL STATION, MAINTAINED CONTACT WITH LOCKOUT DEVICE ON STOP
OFF ON	OFF/ON SELECTOR SWITCH
A B C ✳ (XOO) (OOX)	3 POSITION SELECTOR SWITCH, MAINTAINED CONTACT O-OPEN X-CLOSED

POSITION	TOP CONTACT	MIDDLE CONTACT	BOTTOM CONTACT
A	X	O	O
B	0	0	O
C	0	O	X

✳ NAMEPLATE (A/B/C)
HOA- HAND/OFF/AUTO
HOR- HAND/OFF/REMOTE
LOR- LOCAL/OFF/REMOTE
RSL- RAISE/STOP/LOWER
TOA- TEST/OFF/AUTO

NOTE: 2 POSITION MULTI-CONTACT SWITCH FOLLOWS SAME CONVENTION

M #	MOTOR STARTER COIL, NUMBER AS INDICATED
CR #	CONTROL RELAY COIL, NUMBER AS INDICATED
	RVSS: REDUCED VOLTAGE STATIC SOLID SOFT STARTER

SYMBOLS	DESCRIPTION
*	PILOT LIGHT, COLOR AS NOTED ✳ R- RED G- GREEN B- BLUE W- WHITE A- AMBER
* PTT	PILOT LIGHT, PUSH-TO-TEST TYPE, COLOR AS NOTED ABOVE.
TD	TIME DELAY RELAY RANGE AS NOTED SET POINT AS NOTED TDD-TIME DELAY AFTER DE-ENERGIZATION-OFF DELAY TDE-TIME DELAY AFTER ENERGIZATION-ON DELAY
	NOTC-NORMALLY OPEN, TIMED CLOSING WHEN ENERGIZED
	NCTO-NORMALLY CLOSED, TIMED OPENING WHEN ENERGIZED
	NOTO-NORMALLY OPEN, TIMED OPENING WHEN DE-ENERGIZED
	NCTC-NORMALLY CLOSED, TIMED CLOSING WHEN DE-ENERGIZED
⊗	FIELD INSTRUMENT, TAG NO. OR LOOP # AS INDICATED ✳INDICATES INSTRUMENT TYPE DEFINED ON LOOP SHEETS ## - INDICATES LOOP NO.
OR ⊗	LIQUID LEVEL (FLOAT) SWITCH NORMALLY OPEN, CLOSES ON RISING LEVEL NORMALLY CLOSED, OPENS ON RISING LEVEL NORMALLY OPEN, CLOSES ON DROPPING LEVEL NORMALLY CLOSED, OPENS ON DROPPING LEVEL
OR ⊗	PRESSURE OR VACUUM SWITCH NORMALLY OPEN, CLOSES ON RISING PRESSURE NORMALLY CLOSED, OPENS ON RISING PRESSURE NORMALLY OPEN, CLOSES ON DROPPING PRESSURE NORMALLY CLOSED, OPENS ON DROPPING PRESSURE
OR ⊗	TEMPERATURE SWITCH OR THERMOSTAT NORMALLY OPEN, CLOSES ON RISING TEMPERATURE NORMALLY CLOSED, OPENS ON RISING TEMPERATURE NORMALLY OPEN, CLOSES ON DROPPING TEMPERATURE NORMALLY CLOSED, OPENS ON DROPPING TEMPERATURE
OR ⊗	FLOW SWITCH (AIR, WATER, ETC.) NORMALLY OPEN, CLOSES ON INCREASED FLOW NORMALLY OPEN, CLOSES ON DROPPING FLOW NORMALLY CLOSED, OPENS ON INCREASED FLOW NORMALLY CLOSED, OPENS ON DROPPING FLOW
OR ⊗	POSITION (LIMIT) SWITCH NORMALLY OPEN NORMALLY OPEN - HELD CLOSED NORMALLY CLOSED NORMALLY CLOSED - HELD OPEN
OR ⊗	TORQUE SWITCH NORMALLY CLOSED, OPENS ON HIGH TORQUE
	CONDUCTORS OR CONDUITS CROSSING PATHS BUT NOT CONNECTED
	CONDUCTORS ELECTRICALLY CONNECTED
FAN	SUPPLY/EXHAUST FAN

SYMBOLS	DESCRIPTION
LA SC	LIGHTNING ARRESTER/SURGE CAPACITOR
OR	GROUND ROD GROUND ROD WELL
30A	FUSE, AMPERE RATING AS NOTED
OR HTR	HEATER
	INDUCTOR
TG	TACHOMETER GENERATOR
	CONTACT, NORMALLY OPEN (NO)
	CONTACT, NORMALLY CLOSED (NC)
	OVERLOAD RELAY HEATER
K	KEY INTERLOCK
TB	TERMINAL OR TEST BLOCK
RTD	RESISTANCE TEMPERATURE DETECTOR
VE	VIBRATION DETECTOR
DM	DAMPER MOTOR
ETM OR	ELAPSED TIME METER
MOV	MOTOR OPERATED VALVE
	PUSH BUTTON STATION, REFER TO ELECTRICAL SCHEMATIC FOR NUMBER OF DEVICES.
J	JUNCTION BOX
JP	POWER JUNCTION BOX
JI	4-20mA SIGNAL JUNCTION BOX
JC	CONTROL JUNCTION BOX
PB	PULL BOX
TC	TERMINATION CABINET
	REMOTE DEVICES
5	MOV WITHOUT INTEGRATED DISCONNECT
5	MOV WITH INTEGRATED DISCONNECT
	INDICATES LIMITS OF EQUIPMENT OR WIRING ENCLOSURE
MPR	(MPR) MOTOR PROTECTION RELAY

GENERAL NOTE

THIS IS A STANDARD LEGEND. SOME SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

ELECTRICAL

ELECTRICAL LEGENDS & SYMBOLS SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 9 OF 226	

E-000-001

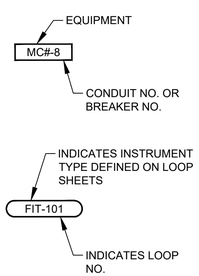
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\GENERAL E-000-001.dwg

SYMBOLS	DESCRIPTION
A LA-3 b	REFER TO LIGHT FIXTURE SCHEDULE FOR TYPE FIXTURE: "A"- FIXTURE TYPE "b"- CONTROLLED BY SWITCH "b" "LA-3"- CIRCUIT 3 FROM PANEL LA
b A LA-3	REFER TO LIGHT FIXTURE SCHEDULE FOR TYPE FIXTURE, NOTATIONS SAME AS ABOVE
A LA-3 OR A LA-3 NS	INDICATES LIGHT FIXTURES WHICH ARE NONSWITCHED, NOTATIONS SAME AS ABOVE "NS" - NONSWITCHED
A LA-3 b	WALL MOUNTED LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
A LA-3 b	POLE MOUNTED LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
A LA-3	EMERGENCY LIGHTING BATTERY UNIT WITH TWO LAMP HEADS, NOTATIONS SAME AS ABOVE
A	REMOTE EMERGENCY ADJUSTABLE WALL LIGHTING FIXTURE WITH TWO LAMP HEADS, NOTATIONS SAME AS ABOVE
A LA-3	CEILING MOUNTED EXIT SIGN, NOTATIONS SAME AS ABOVE
A LA-3	WALL OUTLET EXIT SIGN. ARROW INDICATES DIRECTION OF EGRESS, NOTATIONS SAME AS ABOVE
	CONDUIT, EXPOSED/SURFACE MOUNTED
	CONDUIT OR DUCTBANK, CONCEALED
	CONDUIT, EXPOSED/SURFACE MOUNTED, TURNING UP
	CONDUIT, EXPOSED/SURFACE MOUNTED, TURNING DOWN
	CONDUIT STUBBED OUT AND CAPPED
2(3#3/0+1#2G, 3"C)	DENOTES A QUANTITY OF 2 SETS OF THREE (3) NO.3/0 AWG CONDUCTORS AND 1 NO.AWG GROUND CONDUCTOR EACH INSTALLED IN 3" CONDUIT.
2(2/C#16TS)	DENOTES A QUANTITY OF TWO INSTRUMENT CABLES. EACH CONSISTS OF TWO NO.16 AWG CONDUCTORS TWISTED TOGETHER AND COVERED WITH A METALLIC SHIELD AND AN OVERALL PROTECTIVE JACKET. REFER TO THE SPECIFICATIONS FOR THE EXACT CABLE TO BE PROVIDED.
3(4"C)	DENOTES A QUANTITY OF THREE 4-INCH CONDUITS.
	FLEXIBLE METAL CONDUIT "WHIP" (2#12, #12G, 3/4"C UNLESS OTHERWISE NOTED) FOR RECESSED LIGHTING FIXTURES AND LIQUID TIGHT MOTOR CONNECTIONS
LP#-1,3	HOMERUN, CIRCUITS 1 AND 3 RUN TO PANEL LP-1
$b	SINGLE POLE SWITCH "b"- INDICATES SWITCH LEG SHALL CONTROL LIGHT FIXTURES WITH "b" DESIGNATION
$b^x	MULTI POLE SWITCH "x"- INDICATES NUMBER OF POLE "b"- NOTATIONS SAME AS ABOVE
$b^P	SINGLE POLE SWITCH AND PILOT LIGHT, "b"- NOTATIONS SAME AS ABOVE
$b^D	DIMMER LIGHTING CONTROL SWITCH, "b"- NOTATIONS SAME AS ABOVE
$b^TM	TIME SWITCH, "b"-NOTATIONS SAME AS ABOVE
$^M	MANUAL MOTOR STARTER /DISCONNECT
$^OS	SINGLE POLE SWITCH WITH OCCUPANCY SENSOR
$^DM	SINGLE POLE DIMMER SWITCH
$b^xx	SWITCH ENCLOSURE "x"- NOTATIONS SAME AS ABOVE "b"- NOTATIONS SAME AS ABOVE "xx"- INDICATES ENCLOSURE TYPE
LC-1	LIGHTING CONTACTOR WITH NUMBER OF POLES AS INDICATED

SYMBOLS	DESCRIPTION
L*-## OR L*-##	LIGHTING PANELBOARD (TYPICAL 120V/240V OR 120V/208V)
H*-## OR H*-##	DISTRIBUTION PANELBOARD (TYPICAL 277V/480V)
LA-3	DUPLEX RECEPTACLE, 20A, 120V, 2P, 3W GFI- GROUND FAULT INTERRUPTER TYPE WP- WEATHERPROOF "LA-3"- CIRCUIT 3 FROM PANEL LA
	WELDING RECEPTACLE
	20A, 240V, 2P, 3W, RECEPTACLE
	CLASS 1, DIVISION 1, RATED TWIST LOCK RECEPTACLE, VOLTAGE AND AMPERAGE RATING AS NOTED
	SINGLE FACE, SINGLE GANG PEDESTAL WITH 20A, 120V, 2P, 3W DUPLEX RECEPTACLE, FURNISHED AND INSTALLED UNDER DIVISION 16 UNLESS OTHERWISE NOTED. * DENOTES FURNISHED UNDER OTHER DIVISIONS OF THE SPECIFICATIONS BUT INSTALLED UNDER DIVISION 16
D	DOUBLE FACE, SINGLE GANG PEDESTAL WITH 20A, 120V, 2P, 3W DUPLEX RECEPTACLE AND 20A, 240V, 2P, 3W SINGLE RECEPTACLE, FURNISHED AND INSTALLED UNDER DIVISION 16 UNLESS OTHERWISE NOTED. * DENOTES FURNISHED UNDER OTHER DIVISIONS OF THE SPECIFICATIONS BUT INSTALLED UNDER DIVISION 16
	DOUBLE RECEPTACLE, 20A, 120V, 2P, 3W MOUNTED IN BOX CURB FURNISHED UNDER OTHER DIVISIONS OF THE SPECIFICATIONS BUT INSTALLED UNDER DIVISION 16
	SINGLE GANG 20A, 120V, 3P, 3W RECEPTACLE
	QUAD RECEPTACLE
OS	OCCUPANCY SENSOR CAPABLE OF VACANCY
PC	PHOTOCELL
	QUICK CONNECT TERMINALS

TAGGING		
EQUIPMENT	EQUIPMENT TAG	CONDUIT TAG
MOTOR CONTROL CENTER	MCC-1	MC1-XX
SWITCHBOARD	SWBD-1	SB1-XX
SWITCHGEAR	SWGR-1	SG1-XX
PROGRAMMABLE LOGIC CABINET	PLC-1	PL1-XX
VARIABLE FREQUENCY DRIVE	VFD-1	VF1-P
LOW VOLTAGE TRANSFORMER	TX-LX OR TX-HX	TXLX-P OR TXHX-P
SERVICE TRANSFORMER	TX-1	TX1-P
GENERATOR	GEN-1	GN1-X
LIGHTING/POWER PANELBOARD	LP/PP-XX	XX-XX
AUTOMATIC TRANSFER SWITCH	ATS-1	AT1-XX
TYPICAL TAG FOR CONDUIT FROM THIS EQUIPMENT TO DOWN STREAM LOAD FOR EXAMPLE.		

EXAMPLE LEGEND:



SYMBOLS	DESCRIPTION
COMMUNICATIONS SYSTEMS	
	TELEPHONE OUTLET
	DATA OUTLET
P	DATA INPUT/OUTPUT CABLE OUTLET. "P" DENOTES PROCESS COMPUTER SYSTEM
	VOICE/DATA OUTLET
S	PAGING SPEAKER HORN
S	PAGING SPEAKER BI-DIRECTIONAL
S	PAGING SPEAKER, CEILING MOUNTED TYPE
S	PAGING SPEAKER, WALL MOUNTED TYPE
SECURITY SYSTEMS	
SAP	SECURITY ALARM PANEL
DS	SECURITY ALARM DOOR SWITCH
KP	SECURITY ALARM KEY PAD
CR	SECURITY SYSTEM CARD ACCESS READER
WS	SECURITY ALARM WINDOW SWITCH
MD	SECURITY ALARM MOTION DETECTOR
	SECURITY CAMERA CCTV- CLOSED CIRCUIT TV CAMERA PTZ- PAN, TILT, ZOOM CAMERA LENS CONTROLS
GB	GLASS BREAK DETECTOR
ACP	ACCESS CONTROL PANEL
FIRE ALARM SYSTEMS	
FACP	FIRE ALARM CONTROL PANEL
SD	SMOKE DETECTOR : D- DENOTES DUCT SMOKE DETECTOR R- DENOTES FIXED TEMPERATURE RATE-OF-RISE TYPE.
F	FIRE ALARM MANUAL PULL STATION, MOUNT AT 4'-0"
	ALARM HORN, MOUNT AT 7'-6" : F- DENOTES FIRE ALARM
	ALARM STROBE, MOUNT AT 6'-8" : F- DENOTES FIRE ALARM
	ALARM HORN AND STROBE LIGHT COMBINATION, MOUNT AT 6'-8" : F- DENOTES FIRE ALARM

ABBREVIATIONS

AC	ALTERNATING CURRENT
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AG	ABOVE GRADE
ALUM	ALUMINUM
AMP/A	AMPERE
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DI	DOOR INTERLOCK
DN	DOWN
DWG	DRAWING
EHH	ELECTRICAL HANDHOLE
EC	EMPTY CONDUIT
ELEC	ELECTRICAL
ELEV	ELEVATION
EM	EMERGENCY
EMH	ELECTRICAL MANHOLE
EO	ELECTRICALLY OPERATED
ERMS	ENERGY-REDUCING MAINTENANCE SWITCH
FBO	FURNISHED BY OTHERS
FO	FIBER OPTIC
FRP	FIBERGLASS REINFORCED POLYESTER
FU	FUSE
GCP	GENERATOR CONTROL PANEL
GEN	GENERATOR
G, GRD	GROUND
GFI	GROUND FAULT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GO	GATE OPERATOR
GRS	GALVANIZED RIGID STEEL
HH	HANDHOLE
HT	HEIGHT
HTP	HEAT TRACE PANEL
HZ	HERTZ
IMH	INSTRUMENT MAN HOLE
INST	INSTRUMENT
LA	LIGHTNING ARRESTER
LC	LIGHTNING CONTACTOR
LCP	LOCAL CONTROL PANEL
LGTS	LIGHTS
LP	LIGHTING PANEL
	CONTINUED ABOVE RIGHT

	CONTINUED BELOW LEFT
LSIG	LONG TIME/SHORT TIME/ INSTANTANEOUS/GROUND FAULT FEATURE INCLUDED
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR	MANUFACTURER
MH	MANHOLE
MLO	MAIN LUGS ONLY
MTG	MOUNTING
MTD	MOUNTED
MTS	MANUAL TRANSFER SWITCH
NC	NORMALLY CLOSED
NO	NORMALLY OPEN OR NUMBER
NTS	NOT TO SCALE
OL	OVERLOAD
OLX	OVERLOAD CONTROL RELAY
PB	PUSH BUTTON OR PULL BOX
PCC	PUMP CONTROL CONSOLE
PPR	PHASE PROTECTIVE RELAY
PFR	PHASE FAILURE RELAY
PH	PHASE
PNLBD	PANELBOARD
PR	PAIR
PT	POTENTIAL TRANSFORMER
PTT	PUSH TO TEST TYPE
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RCP	RELAY CONTROL PANEL
RECP	RECEPTACLES
RVSS	REDUCED VOLTAGE SOFT STARTER
SC	SURGE CAPACITOR
SCH	SCHEMATIC
SCCR	SHORT CIRCUIT CURRENT RATING
SEC	SECONDS OR SECONDARY
SH	SHIELDED OR SHEET
SHT	SHEET
SM	MOTOR RATED SWITCH
SN	SOLID NEUTRAL
SS	STAINLESS STEEL
ST	STARTER
SV	SOLENOID VALVE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TC	TERMINATION CABINET
TEL	TELEPHONE
TO	TIME DELAY ON OPENING
TS	TEMPERATURE SWITCH
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TSW	TWISTED SHIELDED WIRE
TYP	TYPICAL
UG	UNDERGROUND
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
VO	VALVE OPERATOR
W	WIRE
WP	WEATHERPROOF
XP	EXPLOSION PROOF
XFMR	TRANSFORMER

GENERAL NOTE

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UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

ELECTRICAL

ELECTRICAL
LEGENDS & SYMBOLS
SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 10 OF 226	

E-000-002

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\GENERAL E-000-002.dwg

LUMINAIRE SCHEDULE

FIXTURE TYPE	VOLTAGE	LAMP TYPE	TOTAL INPUT WATTS	TOTAL OUTPUT LUMENS	MOUNT	DESCRIPTION	MAKE/MODEL
A	120/277V UNIVERSAL DRIVER	LED	42	4000	SUSPENDED	LINEAR LED LUMINAIRE, UV-STABILIZED, INJECTION-MOLDED, IMPACT-RESISTANT, FROSTED POLYCARBONATE HOUSING, -29°C TO 40°C OPERATING TEMPERATURE, 4000K COLOR TEMPERATURE, 80CRI, UV-STABILIZED, INJECTION-MOLDED, IMPACT-RESISTANT CLEAR POLYCARBONATE LENS, UL 1598 WET LOCATION LISTED.	LITHONIA ARCHWAY VAP LED SERIES VAP-4000L-PCL-WD-MVOLT-40K-80CRI-VAPCMB DAY-BRITE CFI VAPORLUME LED V2 V2WPB70L840-4-UNV TBK OR WBK ACESSORY & FKR-126
B	120/277V UNIVERSAL DRIVER	LED	13	---	STEM MOUNT	RED POLYCARBONATE LENS SUITABLE FOR WET LOCATIONS - 120V, SERIES 105 XBR	---
C	120/277V UNIVERSAL DRIVER WITH EMERGENCY BATTERY PACK WITH PHOTO CELL	LED	12	1500	WALL	POWDER COATED DIE-CAST ALUMINUM HOUSING, NATURAL ALUMINUM FINISH, -30°C TO 40°C OPERATING TEMPERATURE, 4000K COLOR TEMPERATURE, 70CRI, GASKETED LENS, IESNA TYPE III DISTRIBUTION, NEMA 4X RATED, WET LOCATION RATED, WITH EMERGENCY BATTERY PACK.	LITHONIA LIGHTING WST LED SERIES WST LED P1 40K VF MVOLT E20WC GARDCO LED WALL SCONCE 101L SERIES 101L-16L-530-NW-G1-3-EBPC-UNV-MGY
D	120/277V UNIVERSAL DRIVER WITH EMERGENCY BATTERY PACK	LED	70	-	POLE MOUNT	HIGH EFFICIENCY LED UNIT; UL LISTED FOR WET LOCATION	LIHONIA LIGHTING D-SERIES SIZE 1 DSX1 LED P2 50K T3S MVOLT RPA DDBXD OR EQUAL
E	120/277V UNIVERSAL DRIVER WITH EMERGENCY BATTERY PACK	LED	1.2	536	WALL 8-FT ABOVE FLOOR	LED STANDBY EMERGENCY LUMINAIRE, WHITE ENGINEERING GRADE THERMOPLASTIC HOUSING, 16°C TO 32°C OPERATING TEMPERATURE, IMPACT RESISTANT, CORROSION-PROOF, DAMP LOCATION RATED, EMERGENCY BATTERY PACK INCLUDED.	LITHONIA ELM6 LED SERIES LV-S-W1R-120/277-EL-N-UM-DL
F	MVOLT (120/277 UNIVERSAL DRIVER)	LED	30	-	STANCHION MOUNT	BODY MOUNTING MODULES AND GUARD-COPPER-FREE AL WITH CORRO-FREE EPOXY POWDER COAT. SUITABLE FOR CLASS I, DIVISION I HAZARDOUS LOCATIONS.	CROUSE-HINDS EV LED J4C701
X	120/277V UNIVERSAL DRIVER WITH EMERGENCY BATTERY PACK	LED	18.2	N/A	UNIVERSAL	EMERGENCY EXIT SIGN, CAST-ALUMINUM, NEMA-4X, CLEAR UV-STABLE POLYCARBONATE COVER, SINGLE WHITE POLYCARBONATE, FACEPLATE WITH DIRECTIONAL CHEVRON KNOCKOUTS. WHITE HOUSING, UNIVERSAL MOUNT, SEALED MAINTENANCE-FREE NICKEL CADMIUM BATTERY WITH 90 MINUTE CAPACITY.	LITHONIA LIGHTING LV EL N LED SERIES LV-S-W-2-R-120/277-EL N-UM-4X
TPA	N/A	N/A	N/A	N/A	BASE MOUNTED POLE	ROUND STRAIGHT ALUMINUM POLE, 4" DIAMETER WITH 2-3/8" TENON, 8' POLE WITH LOW PROFILE BASE COVER, HANDHOLE WITH RECESSED COVER. RATED FOR 150 MPH. MATCH TENON TO LUMINAIRE TYPE.	LITHONIA LIGHTING FLORIDA RATED POLE RSALP 8 4C T20 VD DNA
TPB	N/A	N/A	N/A	N/A	BASE MOUNTED POLE	ROUND STRAIGHT ALUMINUM POLE, 5" DIAMETER WITH 2-3/8" TENON, 16' POLE WITH LOW PROFILE BASE COVER, HANDHOLE WITH RECESSED COVER. RATED FOR 150 MPH. MATCH TENON TO LUMINAIRE TYPE.	LITHONIA LIGHTING FLORIDA RATED POLE RSALP 16 5C T20 VD DNA

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GENERAL ELECTRICAL LIGHTING FIXTURE SCHEDULE

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ELECTRICAL GENERAL NOTES

1. THE NOTES CONTAINED ON THIS SHEET ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR WHEN WORKING IN THE FIELD, AND CONTAIN EXCERPTS FROM THE SPECIFICATION SECTIONS. HOWEVER THE CONTRACTOR IS HEREBY ADVISED THAT THE CONTRACT DOCUMENTS CONSIST OF BOTH THE DRAWINGS AND THE SPECIFICATIONS, AND THAT THE CONTRACTOR MUST COMPLY FULLY WITH BOTH THE BOUND DRAWINGS AND THE BOUND SPECIFICATIONS.

2. ALL EQUIPMENT WIRING, RACEWAYS, ETC. SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, LOCAL CODES, AND INDUSTRY STANDARDS (IE. UL, NEMA, IEEE, ANSI, ETC.) THE DRAWING NOTES AND DETAILS SHALL BE COMPLIED WITH IN ADDITION TO THE REQUIREMENTS IN THE SPECIFICATIONS. REFER TO EACH SPECIFICATION SECTION FOR SPECIFIC REQUIREMENTS.

3. ALL RACEWAY INSTALLATIONS SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. ALL EXPOSED RACEWAY SHALL BE INSTALLED PARALLEL TO BEAMS, CEILINGS, FLOORS AND WALLS. SEE SPECIFICATION ON RACEWAYS FOR ADDITIONAL REQUIREMENTS.

4. CONDUITS SHALL BE TERMINATED IN A NEAT MANNER AND STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWING DETAILS.

5. CONDUITS TERMINATED INTO ENCLOSURES SHALL BE PERPENDICULAR TO THE WALLS OF THE ENCLOSURE. THE USE OF SHORT SEALTIGHT ELBOW FITTINGS FOR SUCH TERMINATIONS IS NOT PERMITTED.

6. ALL RACEWAY INSTALLATIONS, CROSSING EXPANSION JOINTS OR TRANSITIONS FROM BELOW GRADE TO EXPOSED ABOVE GRADE, SHALL HAVE EXPANSION OR EXPANSION/DEFLECTION TYPE FITTINGS AS SPECIFIED FOR THE APPLICATION. SEE THE DRAWINGS AND THE SPECIFICATION ON RACEWAYS FOR THE EXACT TYPE OF FITTING TO BE USED.

7. NO CONDUIT SMALLER THAN 3/4", NOR WIRE SMALLER THAN NO. 12 AWG, SHALL BE USED UNLESS SPECIFICALLY NOTED.

8. ALL UNDERGROUND SINGLE CONDUITS AND DUCTBANKS OF MULTIPLE CONDUITS SHALL BE RIGID PVC CONDUIT ENCASED IN REINFORCED RED CONCRETE. CONCRETE DYED RED BEFORE PLACEMENT. MINIMUM SIZE IS 2 INCH. FIELD VERIFY THE ROUTING OF ALL EXISTING UNDERGROUND CONDUIT AND DUCTBANKS. COORDINATE ROUTING OF NEW CONDUIT AND DUCTBANKS TO AVOID INTERFERENCE WITH EXISTING CONDUIT, DUCTBANKS, AND OTHER UNDERGROUND UTILITIES.

9. ALL CHANGES OF DIRECTION GREATER THAN 20 DEGREES IN UNDERGROUND SINGLE, OR DUCTBANKS OF MULTIPLE CONDUITS, SHALL BE ACCOMPLISHED USING PVC COATED RIGID ALUMINUM LONG RADIUS BENDS. BENDS OF PVC CONDUIT GREATER THAN 20 DEGREES, OR THE USE OF FLEXIBLE CONDUIT OF ANY TYPE, WILL NOT BE PERMITTED. SEE THE SPECIFICATIONS FOR MORE REQUIREMENTS.

10. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL BE USED FOR THE PRIMARY AND SECONDARY OF TRANSFORMERS, GENERATOR TERMINATIONS AND OTHER EQUIPMENT WHERE VIBRATION IS PRESENT. USE IN OTHER LOCATIONS IS NOT PERMITTED, EXCEPT FOR CONNECTIONS TO INSTRUMENTATION TRANSMITTERS, WHERE MULTIPLE PENETRATIONS ARE REQUIRED. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL HAVE A MAXIMUM LENGTH NOT GREATER THAN THAT OF A FACTORY MANUFACTURED LONG RADIUS ELBOW OF THE CONDUIT SIZE BEING USED. THE MAXIMUM BENDING RADIUS SHALL NOT BE LESS THAN THAT SHOWN IN THE NEC CHAPTER 9, TABLE 2, "OTHER BENDS". BX OR AC TYPE PREFABRICATED CABLES WILL NOT BE PERMITTED.

11. THE WIRING DIAGRAMS, BLOCK DIAGRAMS, QUANTITY/SIZES OF WIRES/CONDUITS REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY APPROVED. ALL MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFIED.

12. ALL JUNCTION BOXES, PULL BOXES AND TERMINATION BOXES IN NEMA 12 AREAS SHALL BE ALUMINUM. FOR NEMA 4X AREAS SEE SPECIFICATIONS FOR BOX DETAILS AND SPECIFICATIONS.

13. SEAL ALL RACEWAYS ENTERING JUNCTION BOXES OR CONTROL PANELS CONTAINING ELECTRICAL OR INSTRUMENTATION EQUIPMENT WITH WATERTIGHT SEALANT. REFER TO THE SPECIFICATIONS FOR DETAILS.

14. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURE LOCATIONS, OR TERMINAL BOX LOCATIONS, ARE APPROXIMATE. THE EXACT LOCATIONS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER, DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.

15. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES DIMENSIONS ARE APPROXIMATE. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES OR TERMINAL BOX DIMENSIONS SHALL BE VERIFIED WITH THE EQUIPMENT SUPPLIER. ALLOW FOR LOCATION CHANGES AND INCLUDE IN THE CONTRACT PRICE. THE EXACT LOCATIONS OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF ALL CABLES AND CONDUITS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER DURING CONSTRUCTION.

16. CORING OF AN EXISTING STRUCTURE SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER. CORING THROUGH STRUCTURAL BEAMS IS STRICTLY PROHIBITED WITHOUT PRIOR WRITTEN APPROVAL FROM THE OWNER/ENGINEER.

17. THE LOCATION OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF CABLES AND CONDUITS SHALL BE COORDINATED AND APPROVED BY THE OWNER.

18. THE DUCTBANK ROUTING AS SHOWN ON THE DRAWING IS APPROXIMATE. FIELD VERIFY THE EXACT DUCTBANK ROUTING, CABLE LENGTH AND CONDUIT LENGTH.

19. PROVIDE CONDUIT SEALS FOR CONDUIT PENETRATIONS AS PER NEC AND NFPA820.

20. COORDINATE ALL WORK WITH THE OWNER.

21. LOCATE ALL UNDERGROUND UTILITIES BEFORE DIGGING. COORDINATE THE EFFORT WITH THE OWNER.

22. ALL SLOTTED CHANNEL, SLOTTED CHANNEL SUPPORT MATERIAL, WASHERS, SCREWS, NUTS, CONDUIT CLAMPS, ALL THREAD SPRING NUTS AND MISC. MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL.

23. LIGHTING FIXTURES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS. THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE BOTTOM OF THE LIGHTING FIXTURE TO THE FINISHED FLOOR.

24. CONDUIT AND WIRE FOR THE HVAC EQUIPMENT AND MISCELLANEOUS DEVICES SHALL BE:

    A. 3/4" (MIN) RIGID ALUMINUM.

    B. NO.14 XHHW CU. WIRE XHHW (MIN.).

    C. IN ACCORDANCE WITH ALL ELECTRICAL AND HVAC SPECIFICATIONS REQUIREMENTS.

25. CONDUITS AND WIRES SHOWN ON THE INTERFACE DIAGRAM SHALL BE INSTALLED BY THE CONTRACTOR. GROUPING OF CONDUIT AND WIRE MAY BE CHANGED, IF APPROVED BY THE ENGINEER AND OWNER.

26. ALL CONDULETS SHALL BE FORM 7 AND SHALL HAVE 316 SS CLAMP COVERS WITH 316 SS CLAMPS AND SCREWS. SCREW DOWN COVERS ARE UNACCEPTABLE. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.

27. ALL BARE COPPER GROUNDING CONDUCTORS SHALL BE TINNED, ALL GROUND RODS SHALL BE 3/4" BY 10' LONG. ALL EXPOSED COPPER GROUND CABLES SHALL BE GREEN INSULATED CONDUCTORS. PROVIDE XHHW INSULATION.

28. WHERE NOTES ON THE DRAWING INDICATE THAT THE CONTRACTOR SHALL FIELD-VERIFY, THE INTENT IS FOR THE CONTRACTOR TO INVESTIGATE TO THE EXTENT NECESSARY TO PROVIDE THE WORK AND MATERIALS PRIOR TO BIDDING AND INCLUDE ALL COSTS IN THE BID PRICE. THE CONTRACT PRICE SHALL NOT BE INCREASED WHEN THE CONTRACTOR HAS NOT INVESTIGATED PER THE NOTES DIRECTING THAT BE DONE.

TYPICAL ENCLOSURE TYPES BY AREA TYPE

NON-HAZARDOUS AREAS	BOXES & ENCLOSURES 1	3R	4X	4X*	12	CONDUIT
OUTDOOR; GENERAL AREAS		X	X			PVC COATED ALUMINUM
OUTDOOR; CHEMICAL AREAS				X		SCHEDULE 80 PVC
INDOOR; CHEMICAL ROOM				X		SCHEDULE 80 PVC
INDOOR; CONDITIONED SPACE					X	RIGID ALUMINUM
INDOOR; NON-CONDITIONED SHOP SPACE					X	RIGID ALUMINUM
INDOOR; NON-CONDITIONED PROCESS AREA			X			RIGID ALUMINUM
INDOOR, ADMIN BUILDING	X					EMT/RIGID ALUMINUM
CLASS I, DIVISION 1	REFER TO NEC, NFPA-820, AND CONTRACT CONSTRUCTION SPECIFICATIONS					
CLASS I, DIVISION 2	REFER TO NEC, NFPA-820, AND CONTRACT CONSTRUCTION SPECIFICATIONS					

GENERAL NOTES:

- EQUIPMENT SUCH AS MOTOR CONTROL CENTER, SWITCHGEAR, VFDS, AND OTHER STAND-ALONE MOTOR STARTERS ARE TO BE SPECIFIED UNIQUELY.
- NEMA 1 ENCLOSURES ARE TO BE NEMA 1 GASKETED.
- NEMA 4X* ENCLOSURES ARE TO BE NON-METALLIC (ie PVC) NEMA 4X
- CONDUIT INSIDE ADMIN BUILDING LOCATION IS TO BE EMT IF CONCEALED IN DRY WALL (AKA SHEET ROCK WALL): OTHERWISE RIGID ALUMINUM.
- OUTDOOR GENERAL AREAS COULD BE 3R OR 4X DEPENDING ON OWNER PREFERENCE AND WHETHER WTP OR WWTP - REFER TO DRAWINGS.

CONDUIT TYPE	LOCATION
RIGID GALVANIZED CONDUIT	NOT ACCEPTABLE FOR USE ON THIS PROJECT EXCEPT FOR THE UTILITY COMPANY'S CONDUCTORS. ALL UTILITY COMPANY'S DUCTS SHALL BE AS SPECIFIED BY UTILITY COMPANY.
PVC COATED ALUMINUM CONDUIT	ALL EMBEDDED CONDUIT BENDS, UNDERGROUND DUCTBANK OF MORE THAN 20 DEGREES, AND ALL CONDUIT STUB-UPS TO A MINIMUM OF 6" ABOVE FINISHED FLOOR OR GRADE AND IN CHLORINE AND CAUSTIC ROOMS.
LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT	RACEWAY CONNECTION TO VIBRATING EQUIPMENT ONLY, IN ALL AREAS.
RIGID NON-METALLIC, SCHEDULE 40 PVC CONDUIT	UNDERGROUND ENCASED IN RED DYE REINFORCED CONCRETE. (AS WHERE SPECIFIED)
RIGID NON-METALLIC, SCHEDULE 80 PVC CONDUIT	FOR USE IN CHLORINE AND CAUSTIC ROOMS, AND UNDERGROUND. ENCASED IN RED DYED REINFORCED CONCRETE. (AS WHERE SPECIFIED)
FLEXIBLE ALUMINUM CONDUIT	FIXTURE WHIP CONNECTION TO LIGHTING FIXTURES IN NEMA 12 AREAS (MAXIMUM 3-FT). BX OR AC TYPE PREFABRICATED CABLES ARE NOT PERMITTED.
ALUMINUM RIGID METAL CONDUIT	ALL ABOVE GRADE AREAS, EXCEPT FOR CONCRETE EMBEDDED AND THOSE AREAS ALREADY DESCRIBED IN THIS TABLE
ELECTRIC METALLIC TUBING (EMT) CONDUIT	FOR USE ONLY ON CONCEALED, ABOVE GROUND, INTERIOR ELECTRICAL WIRING IN AIR-CONDITIONED ADMINISTRATIVE BUILDINGS REMOTE TO THE PROCESS AREA, AND CLEARLY DEFINED AS SUCH ON THE DRAWINGS OR IN THE SPECIFICATIONS.

DEMOLITION NOTES

1. COORDINATE THE DEMOLITION OF ELECTRICAL CONDUIT, WIRE, EQUIPMENT AND DEVICES WITH THE GENERAL DEMOLITION AND SCHEDULE. THE DRAWINGS ARE INTENDED TO CONVEY THE GENERAL NATURE AND SCOPE OF THE DEMOLITION WORK. EVERY ITEM TO BE DEMOLISHED MAY NOT BE SHOWN. FIELD VERIFY, AND INCLUDE ALL DEMOLITION WORK IN THE CONTRACT PRICE.

2. PROVIDE TEMPORARY WIRE AND CONDUIT FOR THE EQUIPMENT WHICH MAY BE AFFECTED BY THE DEMOLITION BUT TO REMAIN IN SERVICE.

3. RELOCATE AND RECONNECT POWER AND CONTROL RACEWAYS AND CONDUCTORS TO EQUIPMENT AFFECTED BY DEMOLITION WORK.

4. ALL CONDUCTORS BEING DEMOLISHED SHALL BE DISCONNECTED AND REMOVED FROM THE LOAD TO THE SOURCE. SURFACE MOUNTED CONDUITS AND MOUNTING HARDWARE SHALL BE REMOVED. UNDERGROUND CONDUITS WHICH ARE NOT BEING REMOVED OR OTHERWISE NOT BEING MADE UNUSABLE SHALL BE CAPPED AND TAGGED AS SPARE, WITH INFORMATION CLEARLY INDICATING THE LOCATION OF THE OTHER END.

5. ALL SURFACES WHERE DEMOLISHED EQUIPMENT OR CONDUIT IS REMOVED SHALL BE CLEANED, PATCHED AND PAINTED TO MATCH THE SURROUNDING SURFACE.

6. CHECK THE FUNCTION OF EACH CONDUCTOR BEFORE REMOVING OR DISCONNECTING.

7. IF A CONDUCTOR WHICH HAS TO STAY IN SERVICE (NOT BEING DEMOLISHED) IS INSTALLED IN A COMMON CONDUIT WITH CONDUCTORS WHICH ARE BEING DEMOLISHED, THE CONTRACTOR SHALL REMOVE ALL CONDUCTORS FROM THE CONDUIT, PROVIDE NEW CONDUCTORS WHICH ARE REPLACEMENTS FOR THE CONDUCTORS THAT ARE TO REMAIN IN SERVICE AND RE-INSTALL THE NEW CONDUCTORS. AFTER THE CONDUCTORS ARE PULLED, MEGGER OR VFL TEST EACH CONDUCTOR. CONNECT BOTH ENDS OF THE NEW CONDUCTORS AND TEST THE SYSTEM FOR PROPER FUNCTION. DO NOT RE-PULL USED CONDUCTORS UNLESS SPECIFIED.

8. WHERE EQUIPMENT IS BEING RE-FED FROM A NEW SOURCE, EXISTING CONDUIT MAY BE REUSED ONLY IF THE CONDUIT AND FITTINGS ARE OF THE TYPE SPECIFIED FOR NEW WORK ON THIS CONTRACT. IF NOT, THE CONDUIT AND CONDUCTORS SHALL BE REPLACED WITH NEW MATERIAL MEETING THE SPECIFICATIONS, AT NO ADDITIONAL COST TO THE OWNER.

9. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER/ENGINEER TO FLAG EXISTING UNDERGROUND CONDUITS BEFORE DIGGING.

10. THE OWNER HAS THE RIGHT OF FIRST REFUSAL TO THE EQUIPMENT BEING REMOVED. THE CONTRACTOR SHALL DELIVER THE EQUIPMENT WHICH THE OWNER WISHES TO KEEP AT A LOCATION DESIGNATED BY THE OWNER. SEE SPECIFICATIONS.

11. DO NOT MAKE ANY MODIFICATIONS TO THE EXISTING ELECTRICAL EQUIPMENT UNTIL THE FOLLOWING HAS BEEN DONE:

    A. THE OWNER/CONTRACTOR SHALL WITNESS AND RECORD THE CONDITION OF THE EXISTING EQUIPMENT, THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.

    B. THE OWNER SHALL OPERATE THE EQUIPMENT TO DEMONSTRATE THE CURRENT CONDITIONS. THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.

    C. A WRITTEN AND PHOTOGRAPHIC RECORD OF THE OPERATION AND EXISTING CONDITION SHALL BE KEPT IN A THREE RING BINDER AT THE OWNER/CONTRACTOR TRAILER, IN FORM OF PICTURES AND INFORMATION.

    D. A FORM SHALL BE GENERATED BY THE CONTRACTOR TO RECORD THE OBSERVATIONS. BOTH PARTIES SHALL SIGN ON THE FORM.

    E. REPLACE ALL MATERIAL OR EQUIPMENT DAMAGED DURING THE COURSE OF WORK.

    F. AFTER THE CHANGES ARE MADE, THE EQUIPMENT SHALL BE INSPECTED AND RE-TESTED TO DEMONSTRATE THAT IT FUNCTIONS CORRECTLY.

    G. NO PORTION OF EXISTING CONDUCTORS SHALL BE SPLICED TO NEW CONDUCTORS FOR RE-USE WITHOUT SPECIFIC APPROVAL FROM THE OWNER/ENGINEER ON A CASE-BY-CASE BASIS.

MCC, CONTROL PANELS, PANELBOARDS

THESE NOTES APPLY TO CONTROL PANELS, MCC ETC WHICH HAS TO BE REFURBISHED, MODIFIED, DISCONNECTED & RECONNECTED OR REWORKED. SEE SECTION 16060:

THE CONTRACTOR SHALL NOT MAKE ANY MODIFICATION UNTIL THE FOLLOWING HAS BEEN DONE:

A. THE OWNER/CONTRACTOR SHALL WITNESS THE CONDITION OF THE EXISTING EQUIPMENT, THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCY.

B. THE OWNER SHALL OPERATE THE EQUIPMENT TO DEMONSTRATE THE CURRENT CONDITIONS. THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.

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PRIMARY FLOW ELEMENTS

	MAGNETIC FLOW METER
	ULTRASONIC DOPPLER FLOW METER
	ULTRASONIC TIME TRANSIT FLOW METER
	VORTEX FLOW METER
	VENTURI TUBE
	TURBINE OR PROPELLER TYPE METER
	ROTAMETER
	PITOT TUBE
	WEIR FLOW METER
	PARSHALL FLUME OR TRAPEZOIDAL FLUME
	ORIFICE PLATE
	THERMAL MASS FLOWMETER

PRIMARY LEVEL ELEMENTS

	ULTRASONIC LEVEL TRANSDUCER
	RADAR LEVEL TRANSDUCER
	PRIMARY ELEMENT PRESSURE PROBE LEVEL TRANSMITTER
	BUBBLER LEVEL TUBE ELEMENT
	CONDUCTIVE LEVEL PROBE
	FLOAT SWITCH

VALVES

	VALVE - OTHER IN-LINE TYPE NOT OTHERWISE IDENTIFIED
	THREE-WAY VALVE
	BALL VALVE
	GLOBE VALVE
	PINCH VALVE
	GATE VALVE
	NEEDLE VALVE
	DIAPHRAGM VALVE
	BUTTERFLY VALVE
	CHECK VALVE WITH FLOW DIRECTION
	PLUG VALVE
	PRESSURE-REDUCING REGULATOR INTERNAL PRESSURE TAP
	BACK PRESSURE REGULATOR INTERNAL PRESSURE TAP
	PRESSURE-REDUCING REGULATOR EXTERNAL PRESSURE TAP
	BACK PRESSURE REGULATOR EXTERNAL PRESSURE TAP

VALVES

S	SOLENOID ACTUATED VALVE
	"X" / AIR CYLINDER (P) / OIL CYLINDER (O) / HYDRAULIC CYLINDER (H) / ELECTRIC MOTOR (E) / SOLENOID VALVE (S)
OR NO SYMBOL	MANUAL VALVE

MISC PROCESS SYMBOLS

	ANNULAR TYPE SEAL
	CHEMICAL INJECTION POINT
	STRAINER
	DRAIN
	NORMAL OPERATING LEVEL
UV	UV CHAMBER
	FLOW STRAIGHTENER
	LOAD CELL
	SPRAY NOZZLE
	BLIND FLANGE
	FLANGE
	DIAPHRAGM SEAL
	PRESSURE RELIEF (OUT)
	VACUUM RELIEF (IN)

GATES

	SLUICE/SLIDE GATE
	FLOW CONTROL GATE

MOTORS

M	VARIABLE SPEED MOTOR
M	CONSTANT SPEED MOTOR

PUMPS, BLOWERS AND MISC EQUIPMENT

	CENTRIFUGAL BLOWER
	CENTRIFUGAL PUMP
	DIAPHRAGM PUMP AND MOTOR
	PROGRESSIVE CAVITY PUMP
	SUBMERSIBLE PUMP
	POSITIVE DISPLACEMENT BLOWER

PUMPS, BLOWERS AND MISC EQUIPMENT

	MIXER/FLOCCULATOR/AERATOR
	VERTICAL PUMP-1 USED WHEN DISCHARGE LINE IS IN WETWELL
	VERTICAL PUMP-2 USED WHEN DISCHARGE LINE IS EXPOSED.
	VERTICAL PUMP SHAFT USED WHEN INTAKE OF PUMP IS ENCASED.
	SUBMERSIBLE MIXER
	COMPRESSOR
	HEAT EXCHANGER
	FEED PUMP
	GRINDER/MACERATOR
	METERING PUMP
	PLUNGER PUMP
	PERISTALTIC METERING PUMP
	CENTRIFUGE
	PULSATION DAMPENER
	TURBO BLOWER

PUMPS, BLOWERS AND MISC EQUIPMENT

	ROTARY SCREEN

CONTROL ENCLOSURE, INSTRUMENTS AND SCADA

XXX / P AAA YY / BBB CCC D / ZZZ	DIGITAL/ANALOG INSTRUMENT AAA ISA TAG (REFER TO TABLE) BBB LOOP NUMBER CCC LOOP NUMBER SUB D DIVISION NUMBER P POWER REQUIREMENT XXX DESCRIPTION (USED ON PANEL INSTRUMENTS) YY CHEMICAL ZZZ LOCATION DIGITAL/ANALOG INSTRUMENT -LOCATED IN THE FIELD -NOT INSIDE OF PANEL -VISIBLE AT FIELD LOCATION -NORMALLY OPERATOR ACCESSIBLE
XXX / P AAA YY / BBB CCC D / ZZZ	DIGITAL/ANALOG INSTRUMENT -LOCATED ON PANEL -VISIBLE TO OPERATOR -NORMALLY OPERATOR ACCESSIBLE
XXX / P AAA YY / BBB CCC D / ZZZ	DIGITAL/ANALOG INSTRUMENT -LOCATED INSIDE PANEL -NOT VISIBLE TO OPERATOR -NORMALLY NOT ACCESSIBLE
XXX / AAA / BBB CCC	DISPLAY (INDICATION/CONTROLLER) AAA ISA TAG (REFER TO TABLE) BBB LOOP NUMBER CCC LOOP NUMBER SUB XXX DESCRIPTION DISPLAY (INDICATION/CONTROLLER) -LOCATED IN THE FIELD -NOT INSIDE OF PANEL -VISIBLE AT FIELD LOCATION -NORMALLY OPERATOR ACCESSIBLE
XXX / AAA / BBB CCC	DISPLAY (INDICATION/CONTROLLER) -LOCATED ON PANEL -VISIBLE TO OPERATOR -NORMALLY OPERATOR ACCESSIBLE
XXX / AAA / BBB CCC	DISPLAY (INDICATION/CONTROLLER) -LOCATED INSIDE PANEL -NOT VISIBLE TO OPERATOR -NORMALLY NOT ACCESSIBLE
-	INTERLOCKING RELAY

CONTROL ENCLOSURE AND SCADA

	DIGITAL INPUT
	DIGITAL OUTPUT
	ANALOG INPUT
	ANALOG OUTPUT
	SURGE SUPPRESSOR
	OPTO ISOLATOR
/	SIGNAL CONVERTER/ ISOLATOR */* - (INPUT/OUTPUT) * DEFINED AS FOLLOWS: E - VOLTAGE I - CURRENT P - PNEUMATIC PD - PULSE DURATION H - HYDRAULIC O - ELECTROMAGNETIC, SONIC R - RESISTANCE (ELECTRIC)

CONTROL ENCLOSURE, INSTRUMENTS AND SCADA

F(X)	PLC/RTU LOGIC FUNCTION SYMBOLS AND ABBREVIATIONS K PROPORTIONAL GAIN OR ATTENUATE (INPUT:OUTPUT) - K REVERSE PROPORTIONAL GAIN OR ATTENUATE (INPUT:OUTPUT) Σ SUMMING Σ/n AVERAGING Δ SUBTRACTING √ EXTRACT SQUARE ROOT ÷ DIVIDE X MULTIPLY S INTEGRATE + BIAS POSITIVE - BIAS NEGATIVE F(x) NONLINEAR OR UNSPECIFIED FUNCTION > HIGH SELECT < LOW SELECT ⊦ HIGH LIMIT ⊣ LOW LIMIT

INSTRUMENT (COMMON HOUSING)	INSTRUMENT (SEPERATOR HOUSING)	INSTRUMENT (PART OF MAJOR EQUIPMENT)

GENERAL NOTES:

1. THIS IS A GENERAL LEGEND SHEET, SOME SYMBOLS AND ABBREVIATIONS MAY NOT APPLY TO THIS SPECIFIC PROJECT.
2. THIS LEGEND APPLIES TO INSTRUMENTATION DIAGRAMS ONLY AND MAY DIFFER FROM LEGENDS FOR OTHER SHEETS.
3. IN GENERAL THIS LEGEND SHEET AND THE INSTRUMENTATION DIAGRAMS ARE BASED ON INTERNATIONAL SOCIETY OF AUTOMATION, STANDARDS FOR PRACTICES FOR INSTRUMENTATION, STANDARD S5.1 SOME MODIFICATIONS, ADDITIONS AND ALTERATIONS HAVE BEEN MADE AS REQUIRED TO ACCOMMODATE THE PROJECT REQUIREMENTS.
4. SOME PROCESS ITEMS, SUCH AS EQUIPMENT ISOLATION VALVES, BYPASS LINES, ETC., WHICH ARE NOT CRITICAL FOR AN UNDERSTANDING OF THE INSTRUMENTATION AND CONTROL FUNCTIONS ARE NOT SHOWN ON THE INSTRUMENTATION SHEETS.
5. SEE ELECTRICAL SHEETS AND SPECIFICATIONS FOR ADDITIONAL CONTROL AND INTERLOCK REQUIREMENTS FOR EQUIPMENT NOT SHOWN OR NOT PROVIDED BY THE INSTRUMENTATION SUPPLIER.
6. IN THE EVENT OF DISCREPANCY BETWEEN THE PROCESS & INSTRUMENTATION DIAGRAMS AND THE LOOP DIAGRAMS, THE INFORMATION FROM THE LOOP DIAGRAMS SHALL BE USED.

HAND SWITCH ABBREVIATIONS:

HOA	HAND/OFF/AUTO
HOR	HAND/OFF/REMOTE
LOC	LOCAL/OFF/COMPUTER
LOR	LOCAL/OFF/REMOTE
LOS	LOCKOUT STOP
OSC	OPEN/STOP/CLOSE
RSL	RAISE/STOP/LOWER
L/C	LOCAL/COMPUTER
L/R	LOCAL/REMOTE
O/C	OPEN/CLOSE
S/S	START/STOP
A/M	AUTO/MANUAL
H/C	HAND/COMPUTER
PB	PUSHBUTTON

GENERAL NOTE

THIS IS A STANDARD LEGEND. SOME SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

INSTRUMENTATION

INSTRUMENTATION LEGENDS & SYMBOLS SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 13 OF 226	

I-000-001

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\GENERAL I-000-001.dwg,p1010-000

LINE SYMBOLS

	MAJOR PROCESS LINE
	MINOR PROCESS LINE
	FUTURE PROCESS LINE
	EXISTING PROCESS LINE
	HARDWIRED SIGNAL
	SOFT LINK
— L — L —	HYDRAULIC LINK
— // — // —	PNEUMATIC LINK
— x — x —	CAPILLARY TUBE OR FILLED SYSTEM SIGNAL
	ELECTROMAGNET OR SONIC SIGNAL (GUIDED)
DESCRIPTION X SHEET# Y	(USED WHEN REFERRING TO A SHEET IN THE DESIGN SET) DESCRIPTION - WHERE FLOW IS GOING SHEET# - WHAT SHEET PROCESS CONTINUES ON X - USED WHEN TWO OR MORE ARROWS ARE REFERING TO THE SAME SHEET. Y - USED WHEN TWO OR MORE ARROWS ARE REFERRING TO THE SAME SHEET.
DESCRIPTION	(USED WHEN REFERRING TO A SHEET NOT IN THE DESIGN SET) DESCRIPTION - WHERE FLOW IS GOING
CAT5e — CAT5e	CAT-5e ETHERNET CABLE
CAT6 — CAT6	CAT-6 ETHERNET CABLE
- -	MODBUS PLUS CABLE
--	RS-485 CABLE
RS-232 — RS-232	RS-232 CABLE
POE — POE	POWER OVER ETHERNET CABLE
T1 — T1	T1 FIBER CONNECTION
FO — FO	NON-SPECIFIC FIBER OPTIC CABLE
100 — 100	FIBER 100BASE-FX
1000 — 1000	FIBER 1000BASE-FX
	SIGNAL CROSSING
	PROCESS LINE CROSSING
	PROCESS LINE/ HARDWIRE SIGNAL CROSSING

EQUIPMENT/LOOP TAGGING

X	EQUIPMENT TAG USED TO IDENTIFY NON-INSTRUMENT EQUIPMENT
X	LOOP TAG USED TO TIE THE PROCESS FLOW DIAGRAM TO A LOOP DIAGRAM

STANDARD VALVE AND PIPING USAGE

PDIT 1	BLOCK/BLEED VALVE ARRANGEMENT
PI 1	INSTRUMENTS WITH VALVE ONLY
PI 1	INSTRUMENTS WITH DIAPHRAGM SEAL
PI 1	INSTRUMENTS WITH ANNULAR SEAL

PANEL DETAIL SYMBOLS

RUN	INDICATING LIGHT -R RED (ACTIVE EQUIPMENT) -G GREEN (EQUIPMENT OFF) -W WHITE (POWER) -B BLUE (CONDITION IE BACKWASH IN PROGRESS) -A AMBER (ALARM CONDITION)
H/O/A	SWITCH -L/R (LOCAL - REMOTE) -L/O/A (LOCAL - OFF - AUTO) -L/O/R (LOCAL - OFF - REMOTE) -H/O/A (HAND - OFF - AUTO) -H/O/R (HAND - OFF - REMOTE)
START	PUSHBUTTON
START	PUSHBUTTON
	HORN
	BEACON
OIT	OPERATOR INTERFACE TERMINAL

SECURITY SYSTEM SYMBOLS

CCTV	CLOSED CIRCUIT TELEVISION CAMERA
PTZ	PAN, TILT, ZOOM CAMERA

GENERAL ABBREVIATIONS

AI	ANALOG INPUT
AL	ALARM PILOT LIGHT
AO	ANALOG OUTPUT
AS	AIR SUPPLY
ASP	APPLICATION SERVICE PROVIDER
BFV	BUTTERFLY VALVE
CCTV	CLOSED CIRCUIT TELEVISION
CH4	METHANE
CL2	CHLORINE
COND	CONDUCTIVITY
COMP	COMPUTER
CP	CONTROL PANEL
CPU	CENTRAL PROCESSING UNIT
CRC	CONTROL ROOM CONSOLE
CTU	CENTRAL TELEMETRY UNIT
DCU	DISTRIBUTED CONTROL UNIT
DI	DIGITAL OR DISCRETE INPUT
DO	DISSOLVED OXYGEN OR DIGITAL OUTPUT
DPU	DISTRIBUTED PROCESSING UNIT
EPP	ETHERNET PATCH PANEL
ES	EMERGENCY STOP
ESW	ETHERNET SWITCH
ETM	ELAPSED TIME METER
FC	FAIL CLOSED
FCP	FIELD CONTROL PANEL
FCS	FILTER CONTROL STATION
FCV	FLOW CONTROL VALVE
FLP	FAIL LAST POSITION
FO	FAIL OPEN
FOPP	FIBER OPTIC PATCH PANEL
FPR	FEEDER PROTECTION RELAY
H2S	HYDROGEN SULFIDE
HMI	HUMAN MACHINE INTERFACE
JB	JUNCTION BOX
IO	INPUT/OUTPUT
IR	INFARED
LAS	LIQUID AMMONIA SULFATE
LCP	LOCAL CONTROL PANEL
LCS	LOCAL CONTROL STATION
LT	LEVEL TRANSMITTER
LPU	LOCAL PROCESSING UNIT
LTS	LOCAL TERMINAL SYSTEM
MC	MOTOR CONTROLLER
NAOCL	SODIUM HYPOCHLORIDE
NC	NORMALLY CLOSED
NH3	AMMONIA
NIM	NETWORK INTERFACE MODULE
NO	NORMALLY OPEN
MCC	MOTOR CONTROL CENTER
MM	MULTI MODE FIBER OPTIC CABLE
MPR	MOTOR PROTECTION RELAY
OIT	OPERATIONS INTERFACE TERMINAL
OL	OVERLOAD
OWS	OPERATOR WORKSTATION
PB	PUSH BUTTON
PCSI	PROCESS CONTROL SYSTEM INTEGRATOR
pH	HYDROGEN ION
PLC	PROGRAMMABLE LOGIC CONTROLLER
PMCS	PROCESS MONITORING CONTROL SYSTEM
POLY	POLYMER
PQM	POWER QUALITY METER
PS	POWER SUPPLY
PSU	POWER SUPPLY UNIT
PV	PINCH VALVE
RBC	REMOTE BASE CONTROLLER
RIO	REMOTE INPUT OUTPUT
RTU	REMOTE TERMINAL UNIT
SCADA	SUPERVISORY CONTROL AND DATA AQUISITION
SM	SINGLE MODE FIBER OPTIC CABLE
SO2	SULFUR DIOXIDE
SOL	SOLENOID
SPD	SURGE PROTECTION DEVICE
UPS	UNINTERRUPTIBLE POWER SUPPLY
TC	TERMINATION CABINET
TURB	TURBIDITY
VIB	VIBRATION
VFD	VARIABLE FREQUENCY DRIVE
VLV	VALVE

MEANINGS OF IDENTIFICATION LETTERS

THIS TABLE APPLIES ONLY TO THE FUNCTIONAL IDENTIFICATION OF INSTRUMENTS.

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS/ANALYTICAL		ALARM		
B	BURNER, COMBUSTION			CLOSE, STOP, DECREASE (1)	
C	CONDUCTIVITY			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL		OPEN START, INCREASE (1)	
E	VOLTAGE (EMF)		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			FAIL (1)
G	GAUGING (DIMENSIONAL)		GLASS VIEWING DEVICE		
H	HAND				HIGH OR OPEN
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE	TIME RATE OR CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW OR CLOSED
M	MOISTURE, HUMIDITY, MOTOR, MOTION	MOMENTARY		MOTOR (1)	MIDDLE OR INTERMEDIATE
N	USERS CHOICE		USER'S CHOICE		ON OR OPERATE (1)
O	USER'S CHOICE		ORIFICE (RESTRICTION)		OVERLOAD (1)
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)	PUMP (1)	
Q	QUANTITY (2)	INTEGRATE OR TOTALIZE			
R	RADIATION		RECORD		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE (2)		MULTIFUNCTION (2)	MULTIFUNCTION (2)	MULTIFUNCTION (2)
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		UNCLASSIFIED (2)
X	UNCLASSIFIED (2)	X AXIS	UNCLASSIFIED (2)	UNCLASSIFIED (2)	UNCLASSIFIED (2)
Y	EVENT, STATE, PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

COMMON HMI/INSTRUMENT ISA TAGGING

ABBREVIATION	MEANING
AIT	ANALYTICAL INDICATING TRANSMITTER
AE	ANALYTICAL ELEMENT
AI	CHEMICAL RESIDUAL/INDICATION
CT	CYCLE TIMER
FIT	FLOW INDICATING TRANSMITTER
FE	FLOW ELEMENT
FI	FLOW INDICATION
FS	FLOAT SWITCH
HS	HAND SWITCH
JAL	POWER ALARM LOW
II	CURRENT INDICATION
LIT	LEVEL INDICATING TRANSMITTER
LE	LEVEL ELEMENT
LI	LEVEL INDICATION
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
LAL	LEVEL ALARM LOW
LAH	LEVEL ALARM HIGH
PIT	PRESSURE INDICATING TRANSMITTER
PE	PRESSURE ELEMENT
PI	PRESSURE INDICATION
PPU	PERPETUAL POWER UNIT
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
SI	SPEED INDICATION
SIC	SPEED INDICATING CONTROLLER
TIT	TEMPERATURE INDICATING TRANSMITTER
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATION
TSH	TEMPERATURE SWITCH HIGH
WIT	WEIGHT INDICATING TRANSMITTER
WE	WEIGHT ELEMENT
WI	WEIGHT INDICATION
XA	FAULT ANNUNCIATION
YL	MISC. EVENT LIGHT (IN REMOTE)

COMMON HMI/INSTRUMENT ISA TAGGING

ABBREVIATION	MEANING
ZCH	OPEN GATE/VALVE
ZCL	CLOSE GATE/VALVE
ZSH	POSITION SWITCH HIGH
ZSL	POSITION SWITCH LOW
ZLH	VALVE/GATE OPEN
ZLL	VALVE/GATE CLOSED
ZIT	POSITION INDICATING TRANSMITTER

GENERAL NOTE

THIS IS A STANDARD LEGEND. SOME SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

PRELIMINARY
NOT FOR CONSTRUCTION

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

INSTRUMENTATION

INSTRUMENTATION LEGENDS & SYMBOLS SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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DRAWING SCALE	
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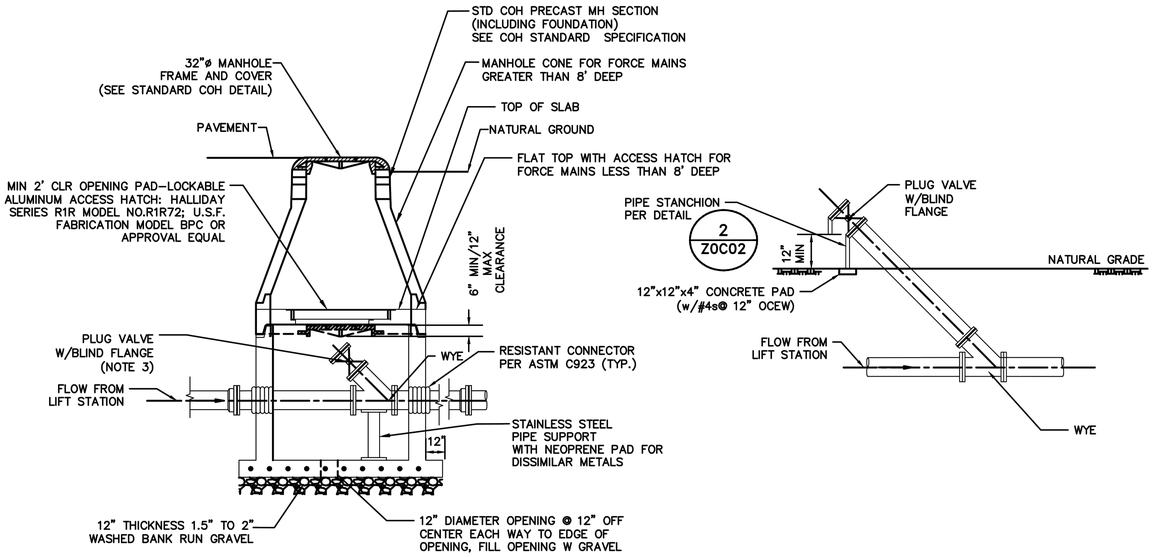
SHEET NO. 14 OF 226	

I-000-002

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\GENERAL I-000-002.dwg

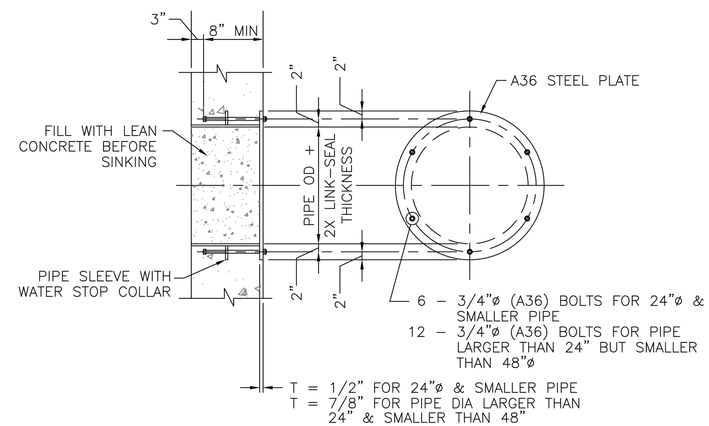


BELOW GROUND BYPASS DETAIL

BYPASS MANHOLE DETAIL 1 Z0C12
SCALE: NONE

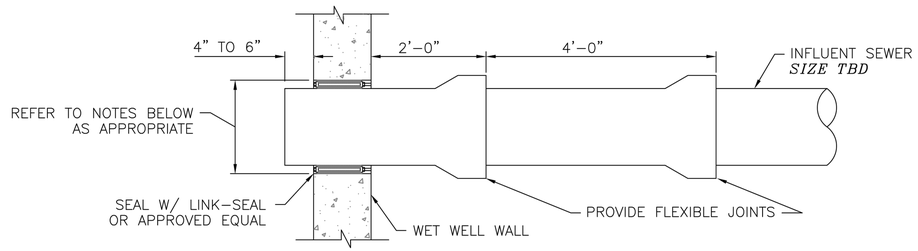
NOTES:

1. PROVIDE LINED DUCTILE IRON PIPE, THICK, CLASS 53, FOR FORCE MAIN WITHIN 12" OF OUTSIDE FACE OF MANHOLE. JOINTS WITHIN MANHOLE MAY BE FLANGED (AS SHOWN OR GROOVED (PER ASTM 606) WITHIN MANHOLE, WITH 316 STAINLESS STEEL BOLTS.
2. MANHOLE TOP MAY BE CONCENTRIC CONE, OR FLAT TOP WITH ECCENTRIC OPENING. PROVIDE 32" FRAME AND COVER.
3. ENSURE MIN CLEARANCE OF 18" ON ALL SIDES. OFFSET VALVE ON HATCH/MH OPENING AS NEEDED TO OBTAIN CLEARANCE.
4. PROVIDE PROTECTIVE COATINGS TO EXPOSED PIPING, VALVES, AND APPURTENANCES PER SPECIFICATION 09901.



TYPICAL PIPE BLOCK-OUT DETAIL FOR CAISSON CONSTRUCTION

DETAIL 13A Z0C07



FOR OPENINGS TO BE CORED (CAISSON CONSTRUCTION):

1. IDENTIFY PIPE PENETRATION LOCATION WITH 1" DIA PLASTIC PIPE SLEEVE.
2. DIAMETER OF PENETRATION OEPNING SHALL BE EQUAL TO PIPE OUTER DIAMETER PLUS 2 TIME LINK-SEAL THICKNESS.
3. PROVIDE ADDITIONAL REINFORCEMENT AROUND PENETRATION OPENING AS PER DRAWINGS Z0S01 BEFORE CASTING WALL.

FOR OPENINGS TO BE SLEEVED OR FORMED (CAISSON CONSTRUCTION):

1. IDENTIFY PIPE PENETRATION LOCATION.
2. DIAMETER OF PENETRATION OPENING SHALL BE EQUAL TO PIPE OUTER DIAMETER PLUS 2 TIMES LINK-SEAL THICKNESS. SEE "TYPICAL PIPE BLOCK-OUT DETAIL FOR CAISSON CONSTRUCTION," THIS SHEET.
3. PROVIDE ADDITIONAL REINFORCEMENT AROUND PENETRATION OPENING AS PER DRAWING Z0S01 BEFORE CASTING WALL.

FOR OPENINGS TO BE FORMED OR SLEEVED (OPEN CUT CONSTRUCTION):

1. IDENTIFY PIPE PENETRATION LOCATION.
2. DIAMETER OF PENETRATION OPENING SHALL BE EQUAL TO PIPE OUTER DIAMETER PLUS 2 TIMES LINK-SEAL THICKNESS.
3. PROVIDE ADDITIONAL REINFORCEMENT AROUND PENETRATION OPENING AS PER DRAWING Z0S01 BEFORE CASTING WALL.

TYP INFLUENT SEWER ENTRY DETAIL

DETAIL 13 Z0C07

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

GENERAL

CIVIL DETAILS
SHEET 1 OF 9

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C-000-501

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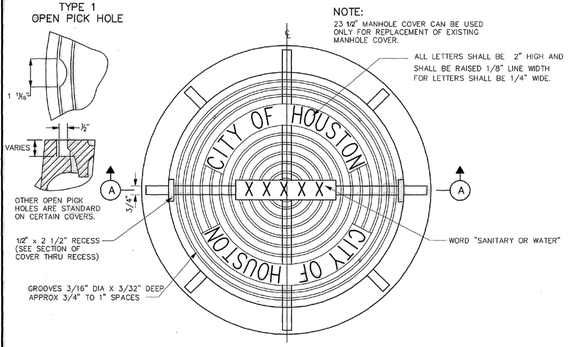
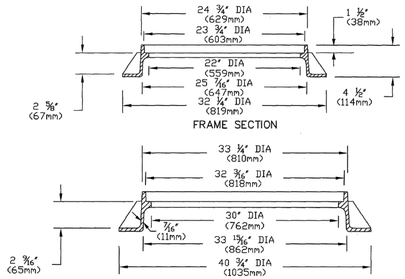
TYPE 1
OPEN PICK HOLE

NOTE:
23 1/2" MANHOLE COVER CAN BE USED ONLY FOR REPLACEMENT OF EXISTING MANHOLE COVER.



PLAN

23 1/2" MANHOLE COVER WITH FRAME



SECTION (A)

32" MANHOLE COVER WITH FRAME

1) NOTE: APPROXIMATE WEIGHTS.
FRAME- 170 LBS 77 kg
COVER- 270 LBS 123 kg
UNIT- 440 LBS 200 kg
2) MATERIAL- GRAY IRON ASTM A48 CL35B
3) CASTING TO MEET M306 PROOF LOAD SPECIFICATION
4) MODEL V-14240 ASY OR APPROVED EQUAL

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

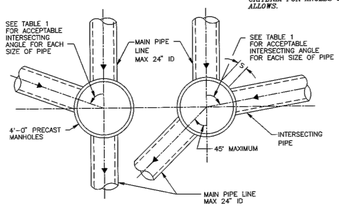
SANITARY SEWER AND WATER MANHOLE FRAME AND COVER
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JUL-01-2016 DWG NO: 02090-01

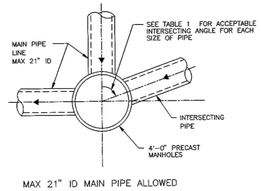
NOTES ON USE OF STANDARD DETAIL 02082-02

NOTES TO SPECIFIER:

1. *"-" INDICATES THAT A SPECIAL DESIGN OR THE NEXT LARGER MANHOLE SIZE SHALL BE USED.*
2. *TABLE 1 IS BASED ON A MIN SEPARATION DISTANCE "S" OF 15.6" OR INTERSECTION PIPE OD/2, WHICHEVER IS GREATER, BETWEEN MAIN AND INTERSECTING PIPES ALONG THE MANHOLE INSIDE WALL ARC.*
3. *PIPE WALL THICKNESS USED IN TABLE 1 ARE BASED ON RCP. THE DESIGN ENGINEER MAY CALCULATE TO SEE IF THINNER WALL PIPES CAN MEET THE SEPARATION CRITERIA FOR ANGLES SMALLER THAN THE TABLE ALLOWS.*



MAX 24" ID MAIN PIPE ALLOWED FOR STRAIGHT THROUGH TO 45° DEFLECTION



MAX 21" ID MAIN PIPE ALLOWED FOR 45° TO 90° DEFLECTION

TABLE 1
MIN ANGLE AND INTERSECTING PIPE SIZES FOR A 4'-0" DIA MANHOLE

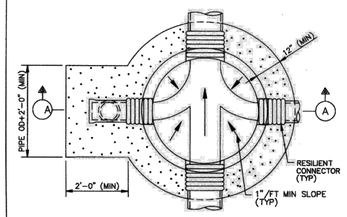
INTERSECTING PIPE SIZE (INCHES)	MIN INTERSECTING ANGLE IN DEGREES FOR FOR VARIOUS MAIN PIPE SIZES IN INCHES							
	6"	8"	10"	12"	15"	18"	21"	24"
6	55	58	60	65	70	75	80	85
8		60	63	68	73	77	82	87
10			66	71	75	80	85	90
12				76	80	85	90	–
15					85	90	–	–
18	NOT APPLICABLE UNLESS HYDRAULICS DICTATE (INTERSECTING PIPE > MAIN PIPE)					–	–	–
21							–	–
24								–

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION

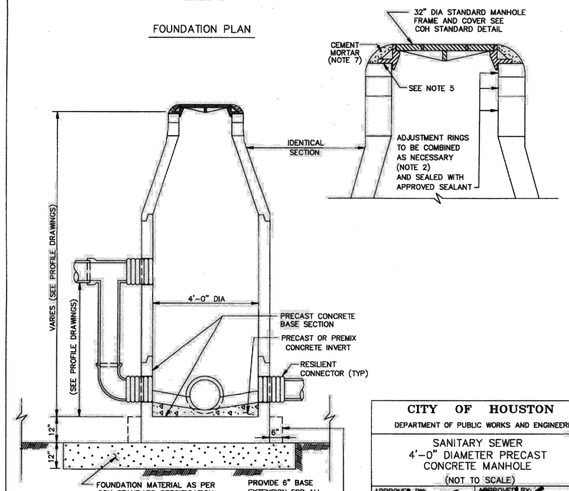
SANITARY SEWER 4'-0" DIAMETER PRECAST CONCRETE MANHOLE NOTES
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 DWG NO: 02082N-02

NOTES:
1. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
2. PRECAST CONCRETE RINGS SHALL BE PROVIDED FOR A COMBINED ADJUSTMENT HEIGHT OF AT LEAST 12". THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 1'-8".
3. MANHOLE WALL THICKNESS FOR DEPTH EXCEEDING 12'-0" SHALL BE DETERMINED TO MEET LOADING CONDITIONS. MIN THICKNESS 5".
4. MANHOLE DROP AND INTERSECTING PIPES SHALL BE INSTALLED ONLY WHEN CALLED FOR IN PLAN AND PROFILE DRAWING.
5. SEAT MANHOLE FRAME IN SEALANT PER COH STANDARD SPECIFICATION.
6. ECCENTRIC PRECAST CONCRETE MANHOLE MAY BE USED.
7. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREAS.
8. MIN REINFORCING IN THE PRECAST CONCRETE BASE SHALL BE # 5 @ 8 EW.



FOUNDATION PLAN



SECTION (A)

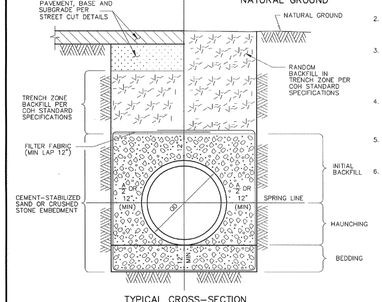
CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

SANITARY SEWER 4'-0" DIAMETER PRECAST CONCRETE MANHOLE
(NOT TO SCALE)

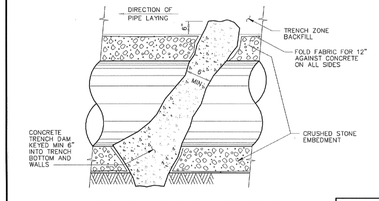
APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JULY-01-2010 DWG NO: 02082-02

HALF SECTION UNDER PAVEMENT

HALF SECTION UNDER NATURAL GROUND



TYPICAL CROSS-SECTION



LONGITUDINAL SECTION ALONG PIPE ℄ AT EMBEDMENT TRENCH DAM

NOTES:
1. MIN TRENCH WIDTH SHALL BE PIPE OD PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

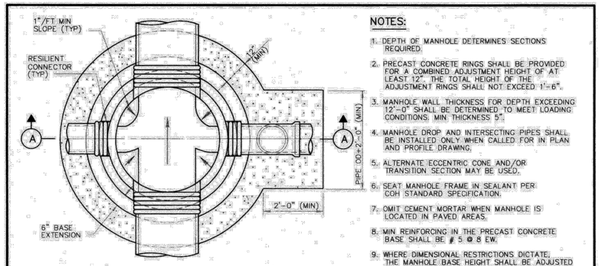
NOMINAL PIPE SIZE	"A"
18" TO 30"	24"
OVER 30"	36"

2. MAX TRENCH WIDTH SHALL BE NOT GREATER THAN MIN TRENCH WIDTH PLUS 24 INCHES, UNLESS OTHERWISE NOTED.
3. TRENCH DAM MAY BE FORMED OR UNIFORMED.ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING MINIMUM THICKNESS AND KEY DEPTH REQUIREMENTS.
4. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT AWAY FROM ANY PIPELINE STRUCTURE.SEE SPECIFICATIONS FOR OTHER REQUIREMENTS.
5. PLACE TRENCH DAMS IN CLASS I EMBEDMENTS AT THE MIDPOINT OF LINE SEGMENTS LONGER THAN 100 FEET BETWEEN MANHOLES.
6. CEMENT-STABILIZED SAND IS PREFERRED FOR EMBEDMENT, BUT CRUSHED STONE MAY BE USED ONLY WHEN SPECIFIED ON THE PLANS.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

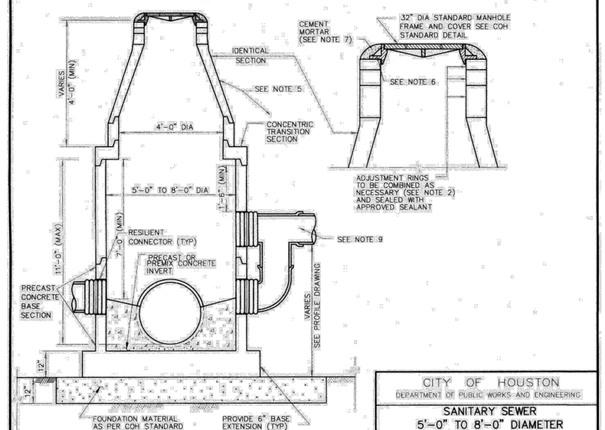
SANITARY SEWER EMBEDMENT AND TRENCH ZONE BACKFILL FOR DRY OR WET STABLE TRENCH
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JUL-01-2016 DWG NO: 02317-01



FOUNDATION PLAN

NOTES:
1. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
2. PRECAST CONCRETE RINGS SHALL BE PROVIDED FOR A COMBINED ADJUSTMENT HEIGHT OF AT LEAST 12". THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 1'-6".
3. MANHOLE WALL THICKNESS FOR DEPTH EXCEEDING 12'-0" SHALL BE DETERMINED TO MEET LOADING CONDITIONS. MIN THICKNESS 5".
4. MANHOLE DROP AND INTERSECTING PIPES SHALL BE INSTALLED ONLY WHEN CALLED FOR IN PLAN AND PROFILE DRAWING.
5. ALTERNATE ECCENTRIC CONE AND/OR TRANSITION SECTION MAY BE USED.
6. SEAT MANHOLE FRAME IN SEALANT PER COH STANDARD SPECIFICATION.
7. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREAS.
8. MIN REINFORCING IN THE PRECAST CONCRETE BASE SHALL BE # 5 @ 8 EW.
9. WHERE DIMENSIONAL RESTRICTIONS DICTATE, THE MANHOLE BASE HEIGHT SHALL BE ADJUSTED TO HAVE THE UPPER INLET PIPE OF THE DROP ENTER INTO THE 4'-0" DIAMETER RISER SECTION.



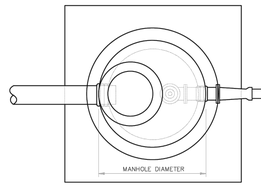
SECTION (A)

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

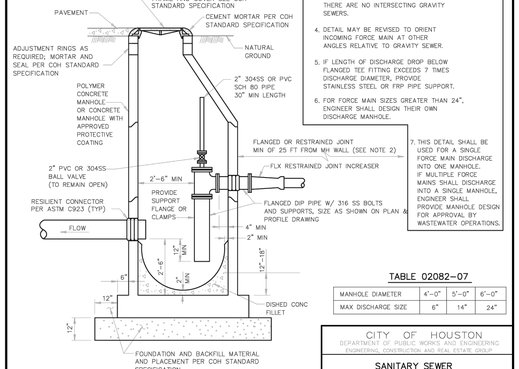
SANITARY SEWER 5'-0" TO 8'-0" DIAMETER PRECAST CONCRETE MANHOLE
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JULY-01-2010 DWG NO: 02082-03

NOTES:
1. SEAT MANHOLE FRAME IN SEALANT PER COH STANDARD SPECIFICATION.
2. IF FORCE MAIN HAS BENDS WITHIN 25 FT OF MANHOLE, EXTEND RESTRAINED JOINTS TO 25 FT MINIMUM UPSTREAM OF BEND.
3. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREA.
4. MINIMUM REINFORCING IN BASE SHALL BE # 5 @ 8 E W.
5. PRECAST RINGS SHALL BE PROVIDED FOR A COMBINED ADJUSTMENT HEIGHT OF AT LEAST 12". THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 1'-6".



PLAN VIEW



ELEVATION VIEW

NOTES TO SPECIFIER:
1. INDICATE SIZE OF FORCE MAIN, INCREASER AND DISCHARGE EITHER ON THIS DETAIL OR ON PLAN AND PROFILE.
2. PROVIDE INVERT ELEVATIONS OR FORCE MAIN AND SEWER CONNECTIONS TO MH, ON THIS DETAIL OR PLAN AND PROFILE.
3. THIS DETAIL IS TO BE USED ONLY WHEN THERE ARE NO INTERSECTING GRAVITY SEWERS.
4. DETAIL MAY BE REVISED TO ORIENT INCOMING FORCE MAIN AT OTHER ANGLES RELATIVE TO GRAVITY SEWER.
5. IF LENGTH OF DISCHARGE DROP BELOW FLANGED TEE FITTING EXCEEDS 7 TIMES DISCHARGE DIAMETER, PROVIDE STAINLESS STEEL OR FRP PIPE SUPPORT.
6. FOR FORCE MAIN SIZES GREATER THAN 24", ENGINEER SHALL DESIGN THEIR OWN DISCHARGE MANHOLE.
7. THIS DETAIL SHALL BE USED FOR A SINGLE FORCE MAIN DISCHARGE INTO ONE MANHOLE. IF MULTIPLE FORCE MAINS SHALL DISCHARGE INTO A SINGLE MANHOLE, ENGINEER SHALL PROVIDE MANHOLE DESIGN FOR APPROVAL BY WASTEWATER OPERATIONS.

TABLE 02082-07

MANHOLE DIAMETER	4'-0"	5'-0"	6'-0"
MAX DISCHARGE SIZE	6"	14"	24"

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP

SANITARY SEWER MANHOLE FOR FORCE MAIN DISCHARGE
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER
APPROVED BY: DIRECTOR OF PUBLIC WORKS
EFF DATE: OCT-01-2002 DWG NO: 02082-07

C-000-502

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR | HOUSTON, TX 77042 | 713.428.2400
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/1/12

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 2 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R - 000267 - 0172 - 4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 16 OF 226	

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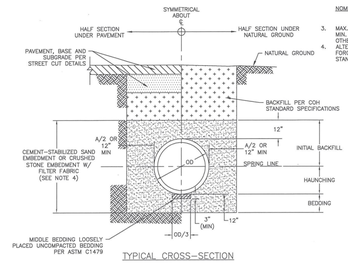
02317–03

NOTES:
1. PIPE DETAIL MAY BE USED ONLY FOR DRY STABLE TRENCH CONDITIONS PER COH STANDARD. SEE COH STANDARD SPECIFICATION FOR REQUIREMENTS IN OTHER CONDITIONS.
2. MIN. TRENCH WIDTH SHALL BE PIPE OD PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

NOMINAL PIPE SIZE	"A"
18" TO 30"	24"
OVER 30"	36"

3. MAX. TRENCH WIDTH SHALL BE NOT GREATER THAN MIN. TRENCH WIDTH PLUS 24 INCHES, UNLESS OTHERWISE NOTED.
4. ALTERNATIVE EMBEDMENT BACKFILL MATERIALS FOR FORCE MAINS MAY BE ALLOWED, SEE COH STANDARD SPECIFICATIONS.

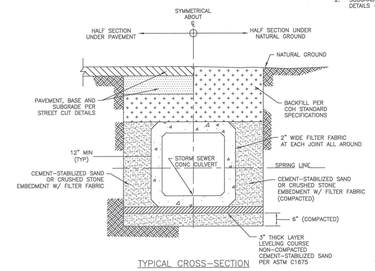


TYPICAL CROSS–SECTION

SANITARY OR STORM SEWER BEDDING AND BACKFILL FOR DRY STABLE TRENCH
NTS

02317–05

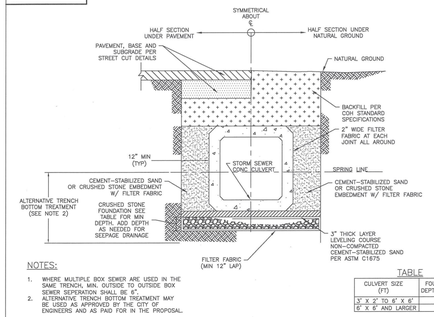
NOTES:
1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN. OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. SUBGRADE AND PAVEMENT FOR STREET CUT DETAILS – 02951.



TYPICAL CROSS–SECTION

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR DRY STABLE TRENCH
NTS

02317–06



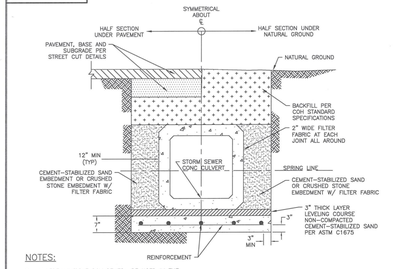
NOTES:
1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN. OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. ALTERNATIVE TRENCH BOTTOM TREATMENT MAY BE USED AS APPROVED BY THE CITY OF ENGINEERS AND AS PAID FOR IN THE PROPOSAL.

TABLE

CULVERT SIZE (FT)	FOUNDATION DEPTH(INCHES)
3' X 2' TO 6' X 6'	12
6' X 6' AND LARGER	18

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR WET STABLE TRENCH
NTS

02317–07



NOTES:
1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. REINFORCED CONCRETE SLAB PIPE BEDDING TO BE PLACED IN DRY TRENCH ONLY.
3. CONCRETE IN SLAB TO REACH MIN COMPRESSIVE STRENGTH IN 10,000 PSI BASED ON MAX DESIGN LOADING PIPE CAN TAKE.
4. PRECAST SEAL SLAB MAYBE USED AS APPROVED BY CITY ENGINEER.

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL WITH SEAL SLAB
NTS

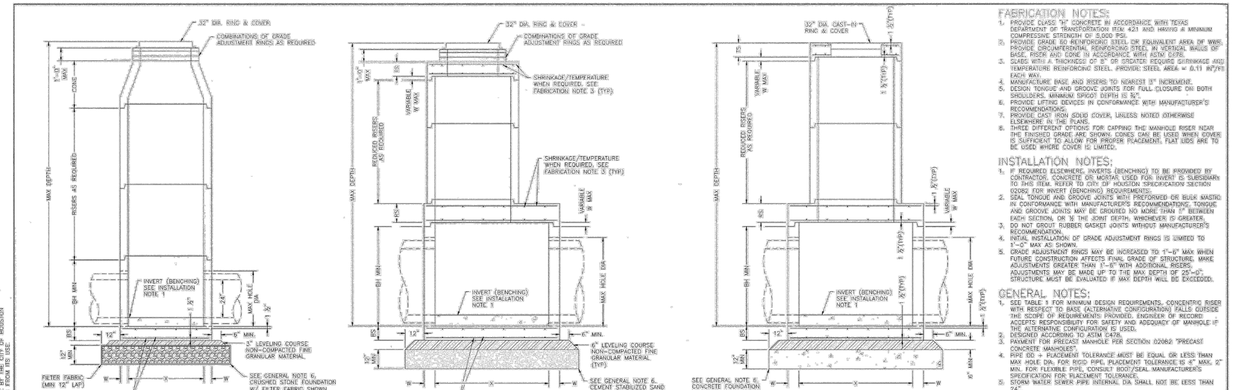
FIRM INFORMATION | ENGINEER'S SEAL

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STORM SEWER
02317–03 THROUGH 07

APPROVED BY: CITY ENGINEER | APPROVED BY: DEPUTY DIRECTOR
APPROVED BY: DIRECTOR
EFFECTIVE DATE: JUL–01–2019
FOR CITY OF HOUSTON USE ONLY

SHEET NO.



FABRICATION NOTES:
1. PROVIDE CLASS "H" CONCRETE IN ACCORDANCE WITH TEXAS DEPARTMENT OF TRANSPORTATION ITEM 421 AND HAVING A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI.
2. PROVIDE GRADE 60 REINFORCING STEEL OR EQUIVALENT AREA OF WWR. PROVIDE CIRCUMFERENTIAL REINFORCING STEEL IN VERTICAL WALLS OF BASE, RISER AND CONE IN ACCORDANCE WITH ASTM D478. CURED WITH A THICKNESS OF 8" OR GREATER REQUIRE SHRINKAGE AND TEMPERATURE REINFORCING STEEL. PROVIDE STEEL AREA = 0.11 IN²/FT EACH WAY.
3. MANUFACTURE BASE AND RISERS TO NEAREST 1" INCREMENT.
4. SEAL TONGUE AND GROOVE JOINTS FOR FULL CLOSURE ON BOTH SIDES/ENDS. MINIMUM GROUT DEPTH IS 1".
5. PROVIDE LIFTING DEVICES IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. PROVIDE CAST IRON SOLID COVER, UNLESS NOTED OTHERWISE ELSEWHERE IN THE PLANS.
7. THREE DIFFERENT OPTIONS FOR CAPPING THE MANHOLE RISER NEAR THE FINISHED GRADE ARE SHOWN. CONES CAN BE USED WHEN COVER IS SUFFICIENT TO ALLOW FOR PROPER PLACEMENT. FLAT LIDS ARE TO BE USED WHERE COVER IS LIMITED.

INSTALLATION NOTES:
1. IF REQUIRED ELSEWHERE, INVERTS (BENCHING) TO BE PROVIDED BY CONTRACTOR. CONCRETE OR MORTAR USED FOR INVERT IS SUBSEQUENT TO THIS ITEM. REFER TO CITY OF HOUSTON SPECIFICATION SECTION 02060 FOR INVERT (BENCHING) REQUIREMENTS.
2. SEAL TONGUE AND GROOVE JOINTS WITH PREFORMED OR BULK MASTIC IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS. TONGUE AND GROOVE JOINTS MAY BE GROUTED NO MORE THAN 1" BETWEEN EACH SECTION, OR TO THE JOINT DEPTH, WHICHEVER IS GREATER.
3. DO NOT GROUT RUBBER GASKET JOINTS WITHOUT MANUFACTURER'S RECOMMENDATION.
4. INITIAL INSTALLATION OF GRADE ADJUSTMENT RINGS IS LIMITED TO 1'–0" MAX AS SHOWN.
5. GRADE ADJUSTMENT RINGS MAY BE INCREASED TO 1'–6" MAX WHEN FUTURE CONSTRUCTION AFFECTS FINAL GRADE OF STRUCTURE. WHERE ADJUSTMENTS GREATER THAN 1'–6" WITH ADDITIONAL RISERS. ADJUSTMENTS MAY BE MADE UP TO THE MAX DEPTH OF 25'–0". STRUCTURE MUST BE EVALUATED IF MAX DEPTH WILL BE EXCEEDED.

GENERAL NOTES:
1. SEE TABLE 1 FOR MINIMUM DESIGN REQUIREMENTS. CONCENTRIC RISER WITH RESPECT TO BASE (ALTERNATIVE CONFIGURATION) FALLS OUTSIDE THE SCOPE OF REQUIREMENTS PROVIDED. ENGINEER OF RECORD ACCEPTS RESPONSIBILITY FOR SAFETY AND ADEQUACY OF MANHOLE IF THE ALTERNATIVE CONFIGURATION IS USED.
2. DESIGNED ACCORDING TO ASTM D478.
3. PAYMENT FOR PRECAST MANHOLE PER SECTION 02060 "PRECAST CONCRETE MANHOLES".
4. PIPE OD + PLACEMENT TOLERANCE MUST BE EQUAL OR LESS THAN MAX HOLE DIA. FOR RIGID PIPE, PLACEMENT TOLERANCE IS 4" MAX, 2" MIN. FOR FLEXIBLE PIPE, CONSULT MFG'S/EQUAL MANUFACTURER'S SPECIFICATION FOR PLACEMENT TOLERANCE.
5. STORM WATER SEWER PIPE INTERNAL DIA. SHALL NOT BE LESS THAN 24".
6. FOUNDATION/SUBGRADE TO BE DESIGNED BY ENGINEER AND MEET MINIMUM REQUIREMENTS ACCORDING TO SECTION 02060.
7. ALL STORM WATER MANHOLES ARE TO BE PRECAST CONCRETE, UNLESS OTHERWISE NOTED ELSEWHERE IN THE PLANS.
8. ECCENTRIC REDUCED RISER WITH RESPECT TO BASE IS THE PREFERRED MANHOLE CONFIGURATION. CONCENTRIC REDUCED RISER WITH RESPECT TO BASE MANHOLE CONFIGURATION IS AN ALTERNATIVE DESIGN THAT WILL BE ACCEPTED BASED ON THE NEEDS OF THE CITY OF HOUSTON.
9. CONES MAY BE CONCENTRIC OR ECCENTRIC. REDUCTION CONES ARE ACCEPTABLE. REFER TO MANUFACTURER FOR CONE DIMENSIONS.
10. MANHOLE BASE SHALL CONSIST OF A CONTINUOUS FOOTING. ECONOMY DETAIL IS NOT APPLICABLE TO ROUND MANHOLES LARGER THAN 8–FOOT DIA.

TABLE 1
PRECAST ROUND MANHOLE (PRM) MINIMUM REQUIREMENTS FOR 24 IN. TO 42 IN. INTERNAL DIA STORM SEWER PIPES

	SIZE	BASE SLAB THICKNESS	BASE UNIT OR RISER THICKNESS	REDUCED RISER DIA	REDUCING SLAB THICKNESS	TOP SLAB THICKNESS	MAX. DEPTH TO TOP OF BASE SLAB	MIN. HEIGHT	MAX. HOLE DIA
	X	'BS'	W	ID	RS	TS	MAX. DEPTH	BH MIN.	MAX. HOLE DIA
	FT	IN.	IN.	IN.	IN.	IN.	FT.	IN.	IN.
PRM	4	9	5	–	9	9	25	42	33
	5	9	6	48	9	9	25	42	42
	6	9	7	48/60*	12	9	25	42	56

(*) 60–IN REDUCED RISER IS TO BE USED WHEN DEEMED NECESSARY TO SATISFY WALL PENETRATION SPACING REQUIREMENTS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STORM SEWER TYPE 'C'
PRECAST ROUND MANHOLE
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL–01–2021 | DWG NO: 02082–12

PAPE–DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961–1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS · JOHN W. LACY · 90202 · LICENSED PROFESSIONAL ENGINEER · 10/15/19

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 3 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R - 000267 - 0172 - 4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 17 OF 226	

C–000–503

DISCLAIMER:
THE ENGINEER IS EMPLOYED BY THE TXDOT ENGINEERING PRACTICE ACT. THE DESIGN REQUIREMENTS ON THIS STANDARD DO NOT RELIEVE TO ACCEPT ALL OF THE SAFETY CONCERNS ASSOCIATED WITH SUCH USE. THE ENGINEER OF RECORD FOR EACH PROJECT IS TO REVIEW THESE DESIGN REQUIREMENTS AND MODIFY AS NECESSARY TO ADDRESS SITE SPECIFIC CONDITIONS. THE ENGINEER OF RECORD SHALL SEAL, SIGN AND DATE THE FINAL PLANS. THE USE OF THIS STANDARD IS AT THE SOLE RISK OF THE USER AND THE PROFESSIONAL ENGINEER EMPLOYED BY THE USER. NEITHER TXDOT NOR ANY OFFICER OR EMPLOYEE THEREOF ASSUMES ANY RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

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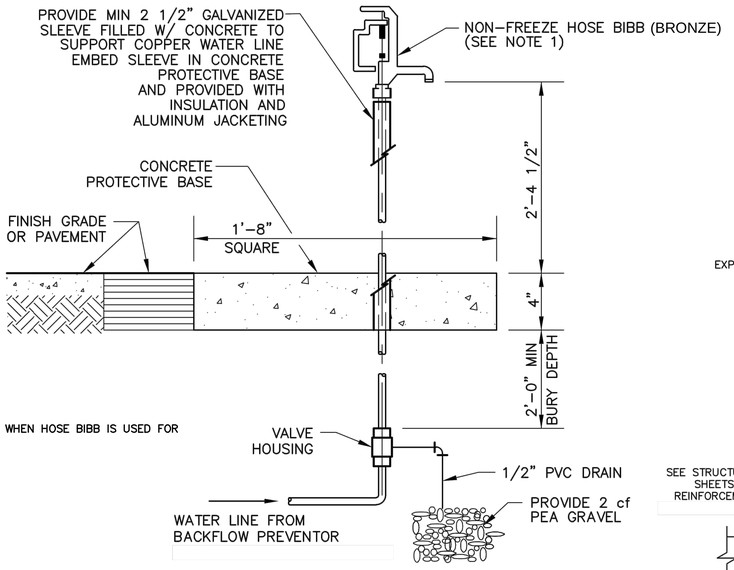
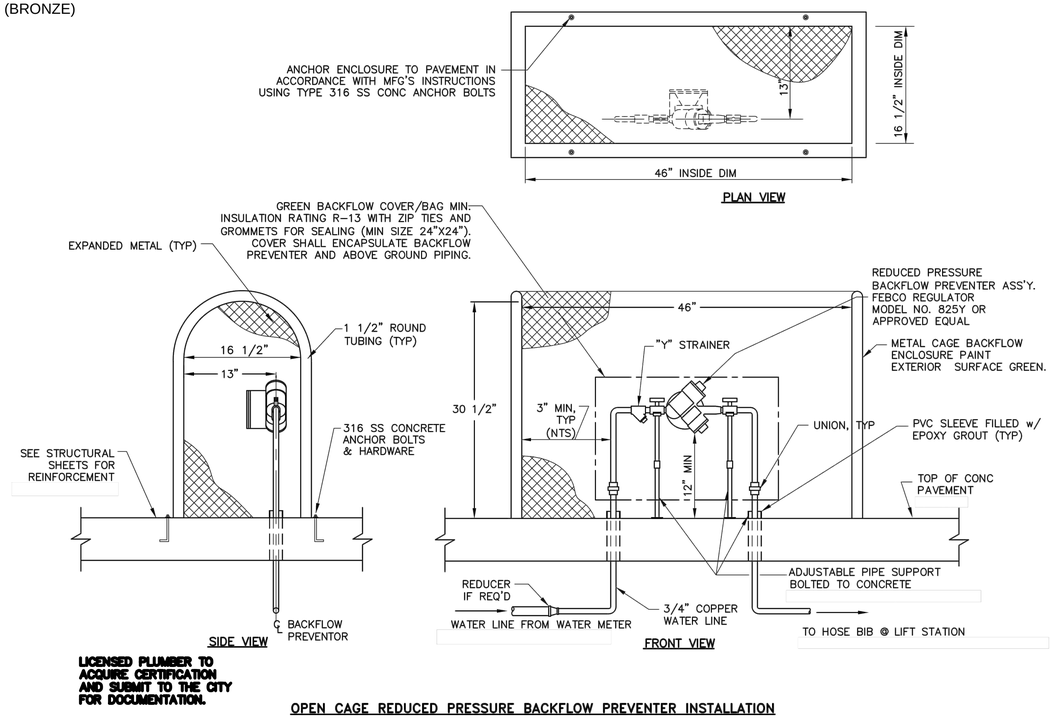


NOTES:

1. PROVIDE WARNING SIGN WHEN HOSE BIBB IS USED FOR POTABLE WATER.

TYP NON-FREEZE HOSE BIBB DETAIL

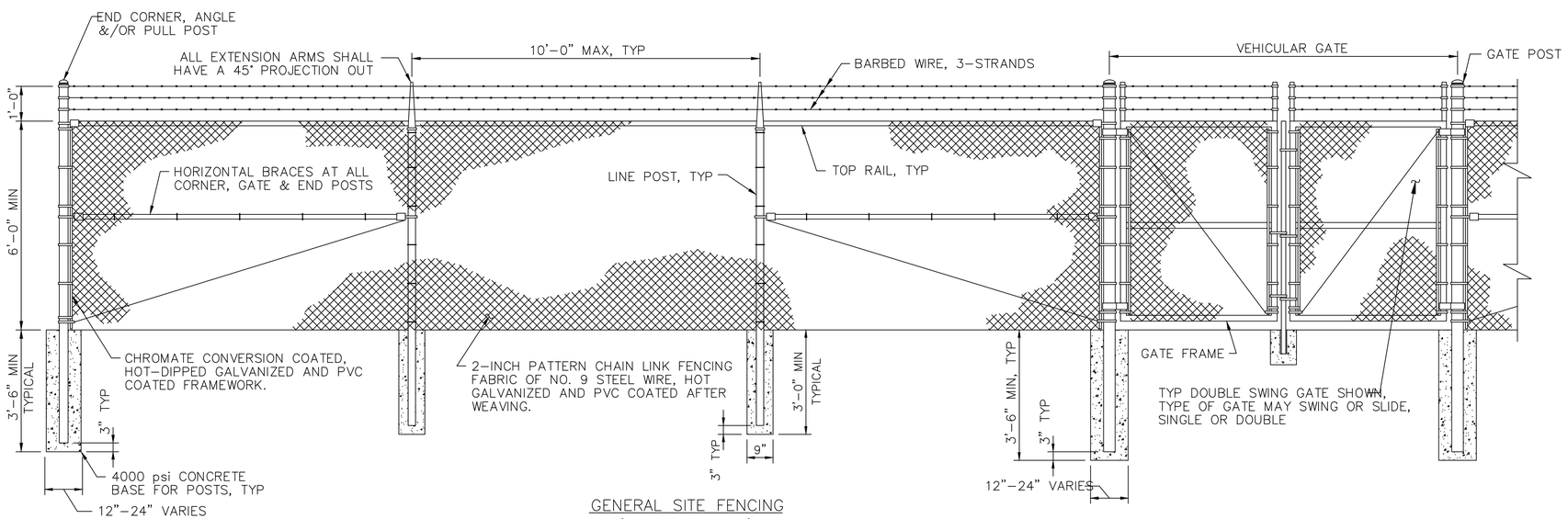
DETAIL 12 Z0C07



LICENSED PLUMBER TO ACQUIRE CERTIFICATION AND SUBMIT TO THE CITY FOR DOCUMENTATION.

OPEN CAGE REDUCED PRESSURE BACKFLOW PREVENTER INSTALLATION

DETAIL 2 Z0C10



GENERAL SITE FENCING
(SEE NOTES 1 & 2)

NOTES:

1. ALL FENCING SHALL BE MANUFACTURED AND INSTALLED PER SPECIFICATIONS.
2. PROVIDE ***(BLACK, DARK GREEN)*** PVC COATED FENCE FABRIC, POSTS AND HARDWARE. PROVIDE ***DARK GREEN*** PVC FENCE SLATS.

DETAIL 17 Z0C08

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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS — JOHN W. LACY — 90202 — LICENSED PROFESSIONAL ENGINEER — 10/1/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL

CIVIL DETAILS
SHEET 4 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 18 OF 226	

C-000-504

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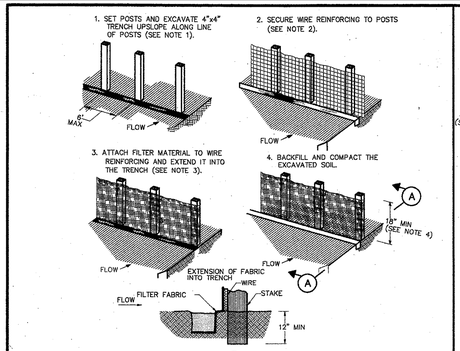
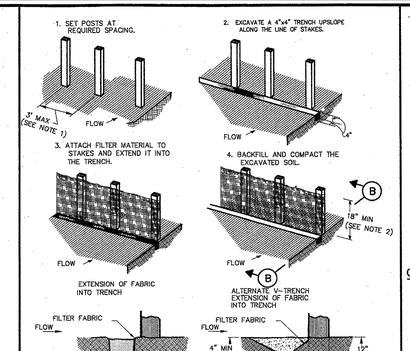


CONSTRUCTION NOTES:

1. SET 2 INCH BY 2 INCH WOODEN STAKES SPACED A MAX OF 6 FEET APART AND EMBEDDED A MIN OF 12 INCHES.
2. WOVEN WIRE REINFORCING TO BE FASTENED SECURELY TO BARRIER POSTS WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE REINFORCING, WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
6. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

SYMBOL

REINFORCED FILTER FABRIC BARRIER

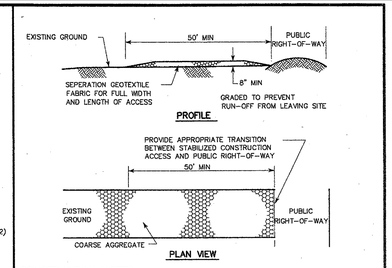


CONSTRUCTION NOTES:

1. 2 INCH THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAX SPACING OF 3 FEET AND EMBEDDED A MIN OF 8 INCHES. IF PREASSEMBLED BARRIER WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAX.
2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC BARRIER SHALL HAVE A MIN HEIGHT OF 18 INCHES AND MAX HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
4. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

SYMBOL

FILTER FABRIC BARRIER

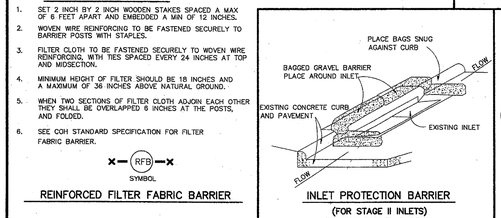


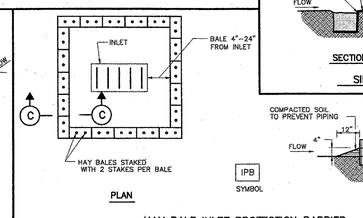
CONSTRUCTION NOTES:

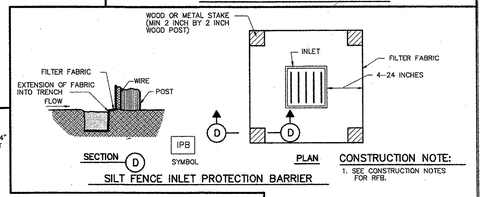
1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION ACCESS, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED OR LENGTHENED TO ACCOMODATE A WASHING AREA. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE WASHING AREA.
6. COH STANDARD SPECIFICATION FOR STABILIZED CONSTRUCTION ACCESS.
7. STABILIZED CONSTRUCTION ACCESS SHALL BE MAINTAINED FREE OF SEDIMENT FOR THE DURATION OF THE PROJECT.

SC
SYMBOL

STABILIZED CONSTRUCTION ACCESS







CONSTRUCTION NOTE:

1. SEE CONSTRUCTION NOTES FOR RFB.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

STORM WATER POLLUTION PREVENTION PLAN DETAILS

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER; DIRECTOR OF PUBLIC WORKS AND ENGINEERING

EFF DATE: JULY-01-2010 | DWG NO: 01571-01

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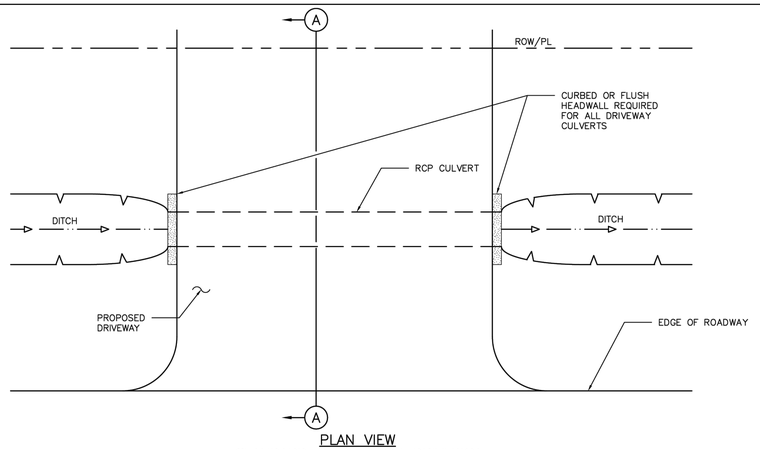
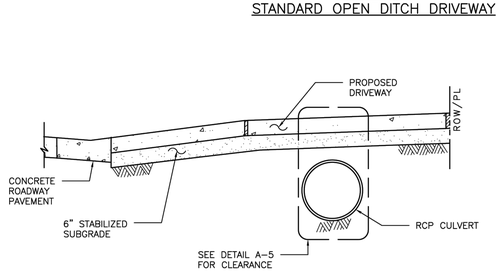
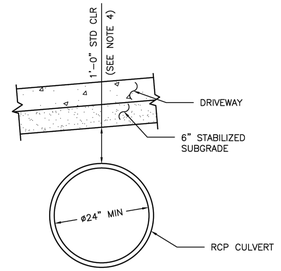


NOTES:

1. PIPE CULVERTS SHALL CONFORM TO CHAPTER 9 DESIGN REQUIREMENTS OF THE INFRASTRUCTURE DESIGN MANUAL AND MATERIAL REQUIREMENTS OF STANDARD CONSTRUCTION SPECIFICATION SECTION 02631.
2. RCP CULVERT SIZE WILL BE APPROVED BY CITY ENGINEER WITH 24" DIAMETER MINIMUM.
3. DRIVEWAY MATERIAL WITHIN THE RIGHT OF WAY SHALL BE CONCRETE OR ASPHALT.
4. WHERE STANDARD 1'-0" CLEARANCE IS NOT FEASIBLE, MINIMUM CLEARANCE OF 6" IS ALLOWED WHEN APPROVED BY THE OFFICE OF THE CITY ENGINEER (OCE).
5. DITCH FLOW LINE DIRECTION DEPICTED IS SHOWN AS AN EXAMPLE AND MAY NOT MATCH SITE SPECIFIC CONDITIONS. REFER TO CONTRACT DRAWINGS FOR FLOW LINE DIRECTION AND ELEVATIONS.





CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

DRIVEWAYS WITH CULVERTS ON OPEN DITCH TYPE STREETS

(SCALE: NOT TO SCALE)

APPROVED BY:

Docusigned by: Suhail Kanawar — CITY ENGINEER
Docusigned by: KHANG NGUYEN — CITY TRAFFIC ENGINEER
Docusigned by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV-27-2023 | DWG NO: 02754-02

DISCLAIMER:
IN THE USE OF THIS STANDARD IS OFFERED BY THE TEXAS ENGINEERING PRACTICE ACT. THE DESIGN REQUIREMENTS ON THIS STANDARD DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONCERNS ASSOCIATED WITH THEIR USE. THE ENGINEER OF RECORD (EOR) IS TO REVIEW THESE DESIGN REQUIREMENTS AND BY AUTHORIZING THEIR USE, ACCEPTS RESPONSIBILITY FOR THEIR APPLICABILITY, ADEQUACY AND SAFETY. NO WARRANTY OF ANY KIND IS MADE BY THE CITY OF HOUSTON FOR ANY PURPOSES WHATSOEVER. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

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PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS — JOHN W. LACY — 90202 — LICENSED PROFESSIONAL ENGINEER — 10/13/23

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 5 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 19 OF 226	

C-000-505

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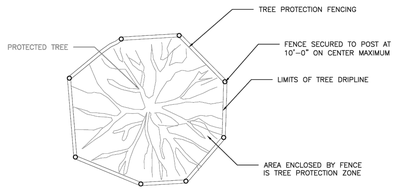
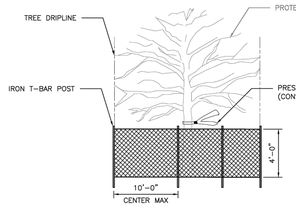
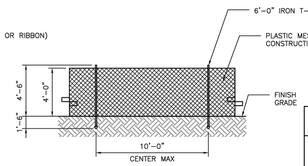
THE CITY OF HOUSTON MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THE CONTENTS OF THIS STANDARD INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR ACCURACY, RESULTS OR DAMAGES RESULTING FROM ITS USE.



PLAN VIEW
TREE PROTECTION FENCING DETAIL



FRONT VIEW
TREE PROTECTION FENCING DETAIL



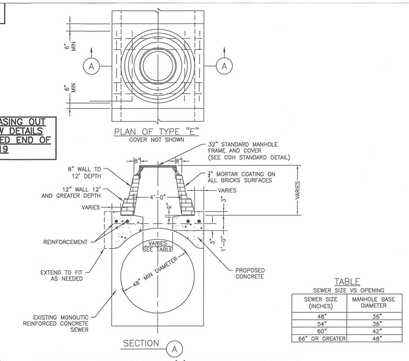
DETAIL B-4
PROTECTIVE PLASTIC MESH FENCE

NOTES:

FENCE LOCATION MAY BE ADJUSTED TO ACTUAL SITE CONDITIONS.

CITY OF HOUSTON HOUSTON PUBLIC WORKS STANDARD	
TREE PROTECTION GENERAL REQUIREMENTS (SCALE: NOT TO SCALE) APPROVED BY:	
Docusigned by: Sukut Iraswar CITY ENGINEER	Docusigned by: Carol Haddock DIRECTOR OF HPW
EFF DATE: NOV-27-2023	DWG NO: 01562-01

02081-05



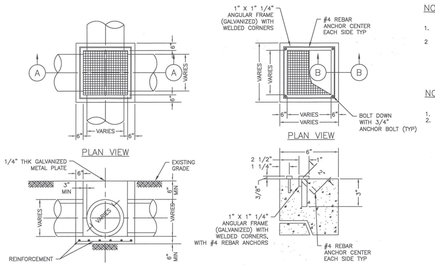
COH IS PHASING OUT BRICK, NEW DETAILS TO BE POSTED END OF 2019

TABLE
SEWER SIZE VS. OPENING

SEWER SIZE (INCHES)	MANHOLE BASE DIAMETER
48"	96"
54"	96"
60"	42"
66" OR GREATER	48"

STORM SEWER MANHOLE TYPE "E" FOR EXISTING MONOLITIC REINFORCED CONCRETE 48" DIAMETER AND GREATER
NTS

02081-06



NOTES:

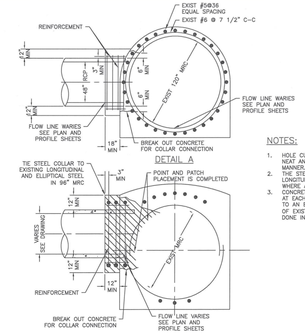
1. DETAIL TO BE USED WHERE STORM SEWER SIZE IS 24" DIA OR LESS.
2. FOR SEWER GREATER 24" DIA USE TYPE 'C' MANHOLE.

NOTES TO SPECIFIER:

1. WALL TO BE 6" CONCRETE.
2. NOT TO BE USED IN STREET. FOR AREA BETWEEN CURB AND PROPERTY LINE ONLY.

STORM SEWER
JUNCTION BOX WITH LID OR GRATE TOP FOR MAXIMUM OF 24" DIAMETER STORM SEWE4R5
NTS

02081-07



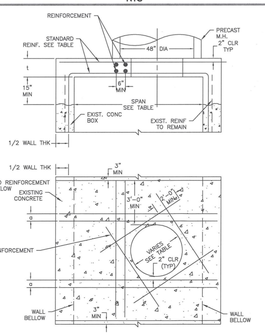
CONCRETE COLLAR DETAIL

NOTES:

1. HOLE CUT IN WALL OF 120" MRC TO BE NEAT AND DONE IN WORKMAN LIKE MANNER.
2. THE STEEL COLLAR TO EXIST LONGITUDINAL AND ELLIPTICAL STEEL WHERE APPLICABLE.
3. CONCRETE COLLAR SHALL BE CONSTRUCTED TO AID IN CONNECTION OF A PROPOSED RCP TO AN EXISTING MRC. HOLE CUT IN WALL OF EXISTING 96" MRC TO BE NEAT AND DONE IN WORKMAN LIKE MANNER.

LATERAL CONNECTION TO EXISTING MONOLITHIC REINFORCED CONCRETE STORM SEWER
NTS

02081-08



PROPOSED MANHOLE ON EXISTING BOX STORM SEWER
NTS

FIRM INFORMATION	ENGINEER'S SEAL
CITY OF HOUSTON HOUSTON PUBLIC WORKS	
STORM SEWER 02081-05 THROUGH 08	
APPROVED BY: Mark J. Ojeda, CITY ENGINEER	APPROVED BY: DEPUTY DIRECTOR
APPROVED BY: Carol Haddock, DIRECTOR	
EFFECTIVE DATE: JUL-01-2019 FOR CITY OF HOUSTON USE ONLY	
SHEET NO.	

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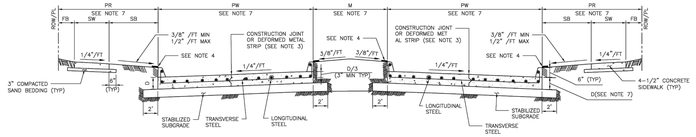
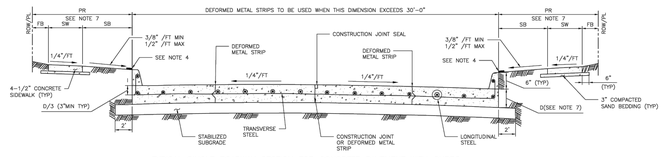


TYPICAL DOUBLE ROADWAY SECTION FOR CONCRETE PAVEMENT WITH CURBS



TYPICAL SINGLE ROADWAY SECTION FOR CONCRETE PAVEMENT WITH CURBS

TABLE 1

REINFORCING STEEL BAR SIZES AND SPACINGS FOR VARIOUS PAVEMENT THICKNESSES (D) WITH MAXIMUM TRANSVERSE CONTROL JOINT SPACING = 20'-0"
MAXIMUM EXPANSION JOINT SPACING = 80'-0"
f'c = 4,000 PSI/28 DAYS AND fY = 60,000 PSI

PAVEMENT THICKNESS 'D' (IN)	PAVEMENT WIDTH 'PW' (FT)	LONGITUDINAL STEEL									TRAVERSE STEEL		
		#4 BARS			#5 BARS			#6 BARS			#4 BARS	#5 BARS	#6 BARS
		NUMBER OF BARS	SPACING (IN)	END BAR SPACING (IN)	NUMBER OF BARS	SPACING (IN)	END BAR SPACING (IN)	NUMBER OF BARS	SPACING (IN)	END BAR SPACING (IN)	SPACING (IN)	SPACING (IN)	SPACING (IN)
6	28	17	20.50	4.00	–	–	–	–	–	–	36	–	–
7	25	17	18.25	4.00	–	–	–	–	–	–	36	–	–
7	35	24	18.00	3.00	–	–	–	–	–	–	36	–	–
7	36	25	17.75	3.00	–	–	–	–	–	–	36	–	–
7	37	25	18.25	3.00	–	–	–	–	–	–	36	–	–
7	41	28	18.00	3.00	–	–	–	–	–	–	36	–	–
7	45	31	17.75	3.75	–	–	–	–	–	–	36	–	–
8	25	20	15.50	2.75	13	24.50	3.0	–	–	–	36	36	–
8	34	27	15.50	2.50	17	25.00	4.0	–	–	–	36	36	–
8	35	27	16.00	2.00	18	24.25	4.0	–	–	–	36	36	–
8	36	28	15.75	3.25	18	25.00	3.0	–	–	–	30	36	–
8	44	24	15.75	4.00	22	24.75	4.0	–	–	–	30	36	–
8	45	35	15.75	2.25	23	24.25	3.0	–	–	–	30	36	–
9	25	22	14.00	3.00	14	22.50	4.0	–	–	–	36	36	–
9	34	31	13.50	2.00	19	22.25	3.5	–	–	–	30	36	–
9	35	31	13.75	3.75	20	21.75	3.5	–	–	–	30	36	–
9	36	32	13.75	3.00	21	21.25	3.5	–	–	–	30	36	–
9	44	39	13.75	2.75	25	21.75	3.0	–	–	–	24	36	–
9	45	39	14.00	4.00	26	21.25	4.5	–	–	–	24	36	–
10	25	24	12.75	3.50	17	18.25	4.0	–	–	–	36	36	36
10	34	33	12.50	4.00	21	20.00	4.0	–	–	–	30	36	36
10	35	34	12.50	3.75	23	18.75	4.0	–	–	–	30	36	36
10	36	35	12.50	3.50	24	18.50	3.0	–	–	–	30	36	36
10	44	44	12.00	4.00	29	18.50	4.5	–	–	–	24	36	36
10	45	44	12.50	3.00	29	19.00	3.0	–	–	–	24	36	36
11	25	27	11.25	3.00	17	18.25	4.0	12	26.75	3	36	36	36
11	34	36	11.50	2.75	24	17.50	2.5	17	25.00	4	24	36	36
11	35	37	11.50	3.00	24	18.00	3.0	17	25.75	4	24	36	36
11	36	40	11.00	2.00	25	17.75	3.0	17	26.50	4	24	36	36
11	44	48	11.125	2.50	30	18.00	3.0	21	26.00	4	24	36	36
11	45	49	11.125	3.00	31	17.75	4.0	22	25.50	3	24	36	36
12	25	–	–	–	19	16.25	4.0	13	24.50	3	36	36	36
12	34	–	–	–	26	16.00	4.0	18	23.50	4	24	36	36
12	35	–	–	–	26	16.50	4.0	19	23.00	3	24	36	36
12	36	–	–	–	27	16.25	4.5	20	22.25	4.5	24	36	36
12	44	–	–	–	33	16.25	4.0	24	22.50	5	24	30	36
12	45	–	–	–	35	15.75	3.0	25	22.25	3	24	30	36

MINIMUM LAP LENGTH (L):
A. # 4 BARS ; L = 22 INCHES
B. # 5 BARS ; L = 27 INCHES
C. # 6 BARS ; L = 32 INCHES

NOTES:

1. THE MAXIMUM WIDTH BETWEEN LONGITUDINAL JOINTS SHALL NOT EXCEED 15'-0".
2. ALL EARTHEN AREAS ARE TO BE HYDROMULCHED UNLESS SHOWN OTHERWISE ON DRAWINGS.
3. CONTRACTOR MAY SAW CUT IN LIEU OF DEFORMED METAL STRIP.
4. USE STRIP OF SOD GRASS TO PREVENT EROSION UNTIL STAND OF GRASS IS ESTABLISHED.
5. AN EQUAL OR LARGER AREA OF WELDED REINFORCEMENT BAR CONFORMING TO ASTM A497, MAY BE SUBSTITUTED FOR REBARS LISTED IN TABLE 1.
6. IF AVAILABLE ROW IS NOT SUFFICIENT TO ACCOMMODATE SIDEWALK WIDTH (SW) ACCORDING TO IDM REQUIREMENTS, ENGINEER SHALL OBTAIN A VARIANCE FROM THE CITY ENGINEER.
7. REFER TO CONTRACT DRAWINGS FOR PAVEMENT WIDTH (PW) AND PAVEMENT THICKNESS (D), MEDIAN (M), PEDESTRIAN REALM (PR), SIDEWALK (SW), FRONTAGE BUFFER (FB), AND SAFETY BUFFER (SB) WIDTHS.

APPROVED BY:	APPROVED BY:
Docusigned by: Sukut Iraswar CITY ENGINEER	Docusigned by: Larry Meiner CITY TRAFFIC ENGINEER
APPROVED BY: Docusigned by: Carol Haddock DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV-27-2023	DWG NO: 02751-01
CITY OF HOUSTON HOUSTON PUBLIC WORKS STANDARD	
CONCRETE PAVEMENT DETAILS	
	FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE	
NOT TO SCALE	

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS · JOHN W. LACY · 90202 · LICENSED PROFESSIONAL ENGINEER · 10/17/23

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 6 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R - 000267 - 0172 - 4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 20 OF 226	

C-000-506

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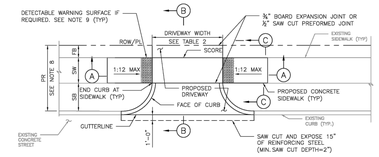
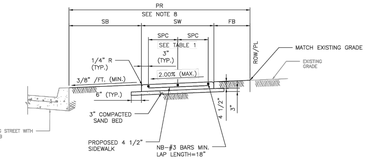
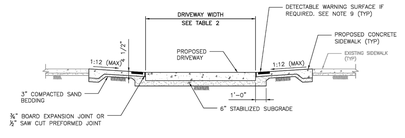


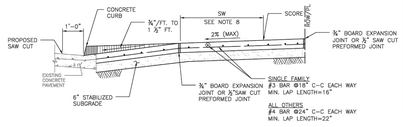
PLAN VIEW
DRIVEWAY



SECTION C–C
TYPICAL SIDEWALK SECTION



SECTION A–A
PROPOSED SIDEWALK THROUGH DRIVEWAY
WITH EXCESSIVE ELEVATION DIFFERENCE
WITH EXISTING SIDEWALK



SECTION B–B
TYPICAL DRIVEWAY SECTION

NOTES:

1. REPAIR, RECONSTRUCTION OR REPLACEMENT OF SIDEWALKS SHALL MEET PERMITTING REQUIREMENTS OF CODE OF ORDINANCES SECTION 40–552.
2. FOR REPAIR, RECONSTRUCTION, OR REPLACEMENT OF EXISTING SIDEWALKS:
   - 2.1. EXISTING SIDEWALKS LESS THAN OR EQUAL TO 20 FEET IN TOTAL LENGTH:
     - 2.1.1. THE PROPOSED SIDEWALK WIDTH WILL BE ALLOWED TO MATCH THE EXISTING SIDEWALK.
   - 2.2. EXISTING SIDEWALKS GREATER THAN 20 FEET IN TOTAL LENGTH:
     - 2.2.1. THE SIDEWALK WIDTH FOR THE ENTIRE PROPERTY WIDTH SHALL BE IMPROVED TO MEET WIDTH REQUIREMENTS ACCORDING TO THE LATEST INFRASTRUCTURE DESIGN MANUAL.
   - 2.3. 20 FOOT TOTAL LENGTH IS DEFINED AS:
     - 2.3.1. UP TO 10 FEET ON BOTH SIDES OF THE DRIVEWAY; OR
     - 2.3.2. UP TO 20 FEET WHEN SIDEWALK AFFECTED IS LOCATED ONLY ON ONE SIDE OF THE DRIVEWAY.
3. ALL JOINTS ALONG THE SIDEWALK SHALL BE CONSTRUCTED ACCORDING TO DRAWING 02752–02 AND SPECIFICATION 02752.
4. DRIVEWAYS SHALL BE MINIMUM 6" THICK FOR SINGLE FAMILY AND DUPLEXES. DRIVEWAYS SHALL BE MINIMUM 7" THICK FOR ALL OTHERS (I.E. COMMERCIAL, INDUSTRIAL, ETC.)
5. DRIVEWAYS AND SIDEWALKS SHALL BE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE AND INCLUDE 5 1/2 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
6. ALL RAMPS AND SIDEWALKS/WALKWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH HOUSTON PUBLIC WORKS STANDARDS, TEXAS ACCESSIBILITY STANDARDS (TAS) AND AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. IF THERE IS A CONFLICT IN THE REQUIREMENTS, THE STRICTEST REQUIREMENTS SHALL GOVERN.
7. CURB RAMPS THAT ARE STEEPER THAN A 1:12 MAX SLOPE WILL NOT BE ACCEPTED BY THE CITY OF HOUSTON.
8. REFER TO CONTRACT DRAWINGS FOR PEDESTRIAN REALM (PR), SIDEWALK (SW), FRONTAGE BUFFER (FB), AND SAFETY BUFFER (SB) WIDTHS.
9. DETECTABLE WARNING SURFACES:
   - 9.1. SIDEWALK SHALL HAVE A DETECTABLE WARNING SURFACE WHERE:
     - 9.1.1. SIDEWALK INTERSECTS TYPE C DRIVEWAYS (COMMERCIAL DRIVEWAYS) THAT ARE STOP, YIELD, OR TRAFFIC SIGNAL CONTROLLED; OR
     - 9.1.2. SIDEWALK SLOPE IS GREATER THAN 1:20 AND INTERSECTS A TYPE C DRIVEWAY (COMMERCIAL DRIVEWAY)
   - 9.2. DETECTABLE WARNING SURFACES ARE OPTIONAL WHERE SIDEWALKS INTERSECT TYPE A DRIVEWAYS (SINGLE FAMILY RESIDENTIAL HOUSES OR DUPLEXES) OR TYPE B DRIVEWAYS (SHARED ACCESS/SHARED DRIVEWAYS).
   - 9.3. REFER TO STANDARD DETAILS 02775–06 TO 02775–07 FOR DETECTABLE WARNING SURFACE STANDARDS.

TABLE 1

REINFORCING STEEL INFORMATION
FOR 4 ½ " THICK SIDEWALKS
EXPANSION JOINT SPACING = 40 FT
f'_c = 3,500 PSI AND f_y = 60,000 PSI
REFER TO CONTRACT DRAWINGS FOR SIDEWALKS WIDER THAN 6 FEET.

SIDEWALK THICKNESS (IN)	SIDEWALK WIDTH (FT)	LONGITUDINAL STEEL #3 BARS			TRANSVERSE STEEL #3 BARS SPACING (IN)
		NO. OF BARS "NB"	SPACING "SPC" (IN)	END BAR SPACING (IN)	
4.5	5	3	27	3	48
4.5	6	4	22	3	48

TABLE 2

DRIVEWAY DESIGN CRITERIA (1)(2)

TRAFFIC TYPE	TYPE A DRIVEWAY (FOR SINGLE FAMILY RESIDENTIAL HOUSES OR DUPLEXES)				TYPE B DRIVEWAY (SHARED ACCESS/SHARED DRIVEWAY)				TYPE C DRIVEWAY (COMMERCIAL DRIVEWAY)			
	WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
ONE–WAY	10	12	4	10	12(5)	16(5)	4(5)	10(5)	15	20	10	20
TWO–WAY	10(3)	24(4)	4	10	16(6)	24	4	10	24	35	10	20

(1) REFER TO INFRASTRUCTURE DESIGN MANUAL ARTICLE 15.2.07.C.1.F FOR DRIVEWAYS THAT REQUIRE A VEHICLE SWEPT PATH ANALYSIS.
(2) REFER TO INFRASTRUCTURE DESIGN MANUAL ARTICLES 15.2.07.C.1.d.(1) AND 15.2.07.C.1.d.(2) FOR TYPE 1 PAE AND TYPE 2 PAE REQUIREMENTS.
(3) THE MINIMUM WIDTH FOR JOINT ACCESS DRIVEWAY IS 12 FT.
(4) REFER TO CHAPTER 42 OF THE CODE OF ORDINANCES FOR DRIVEWAY WIDTHS FOR NARROW LOTS.
(5) ONLY MURS AND COURTYARD STYLE DEVELOPMENTS ON CORNER LOTS CAN HAVE ONE–WAY DRIVEWAYS.
(6) REFER TO CHAPTER 42, SECTION 42–146 OF THE CODE OF ORDINANCES FOR EXCEPTIONS TO THE MINIMUM DRIVEWAY WIDTH FOR SHARED DRIVEWAYS.

APPROVED BY:	APPROVED BY:
Docusigned by: Sulal Kanwar	Docusigned by: HANG NGUYEN
CITY ENGINEER	CITY TRAFFIC ENGINEER
APPROVED BY: Docusigned by: Carl Haddock	
DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV–27–2023	DWG NO: 02754–01B

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

DRIVEWAY DETAIL WITH 6" CURBED STREETS

	FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE	
NOT TO SCALE	

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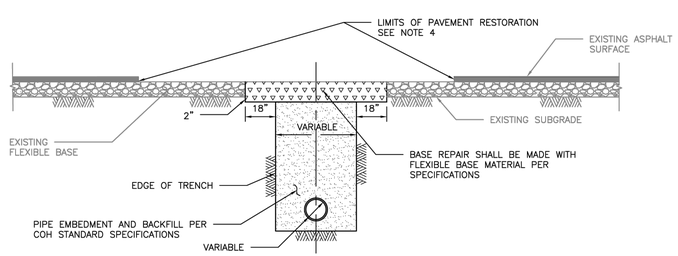
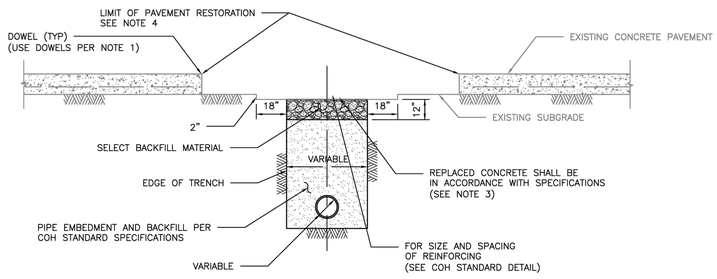


ELEVATION A
REPAIR OF FLEXIBLE BASE PAVEMENT



ELEVATION B
REPAIR OF REINFORCED CONCRETE PAVEMENT

NOTES:

1. EXPOSE 15" OF REINFORCING STEEL AT PROPOSED SAWED JOINT. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 BAR, 24" LONG, 24" C–C, DRILLED AND EMBEDDED 8" INTO THE CENTER OF THE EXISTING SLAB. WITH "PO ROC" OR EQUAL.
2. IF REINFORCED CONCRETE IS OVERLAYED WITH ASPHALT, REPLACE WITH 2" MIN HMAC SURFACING.
3. REFER TO STANDARD DETAIL 02751–01 FOR REINFORCING STEEL REQUIREMENTS.
4. REFER TO STANDARD DETAIL 02951–01 THROUGH 03 FOR PAVEMENT RESTORATION LIMITS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

PAVEMENT REPAIR DETAIL
FOR STREET CUTS
(FLEX–BASE PAVEMENT & CONCRETE PAVEMENT)
(SCALE: NOT TO SCALE)

APPROVED BY:

Docusigned by: Sulal Kanwar — CITY ENGINEER	Docusigned by: Carl Haddock — DIRECTOR OF HPW
Docusigned by: HANG NGUYEN — CITY TRAFFIC ENGINEER	
EFF DATE: NOV–27–2023	DWG NO: 02951–04

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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961–1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS — JOHN W. LACY — 90202 — LICENSED PROFESSIONAL ENGINEER — 10/19/23

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 7 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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DRAWING SCALE	
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CITY OF HOUSTON PM	
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SHEET NO. 21 OF 226	

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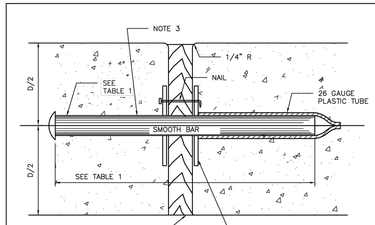
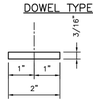


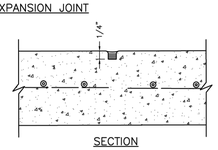
SECTION

DOWEL TYPE EXPANSION JOINT



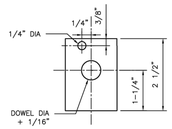
PLAN VIEW

JOINT PLATE



SECTION

CONTROL JOINT

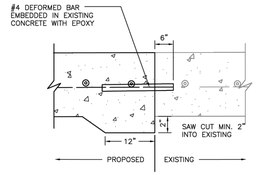


ELEVATION VIEW

JOINT PLATE

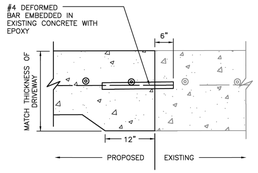
TABLE 1

PAVEMENT THICKNESS (IN)	DOWEL SIZES AND SPACINGS		
	DIAMETER (IN)	LENGTH (IN)	SPACING (IN)
4 1/2	1/2	18	12
5	1/2	18	12
6	3/4	18	12
7	1	18	12



SECTION

SIDEWALK TO EXISTING SIDEWALK



SECTION

SIDEWALK TO EXISTING DRIVEWAY

NOTES:

1. STEEL TO MEET ASTM STANDARD SPECIFICATIONS FOR CONCRETE REINFORCING BARS.
2. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED AT A MAXIMUM DISTANCE OF 3 FEET MAXIMUM SPACING FOR CONTROL JOINTS SHALL BE 5 FEET.
3. CENTER DOWEL HORIZONTALLY ON JOINT.
4. CENTER DOWEL VERTICALLY IN CONCRETE AS NEEDED TO MAINTAIN A 2 INCH MINIMUM COVER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

SIDEWALK EXPANSION AND CONSTRUCTION JOINT DETAILS

(SCALE: NOT TO SCALE)

APPROVED BY:

Developed by: Sukul Kanuar — CITY ENGINEER
Developed by: Hiang Nguyen — CITY TRAFFIC ENGINEER
Developed by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV-27-2023 | DWG NO: 02752-02

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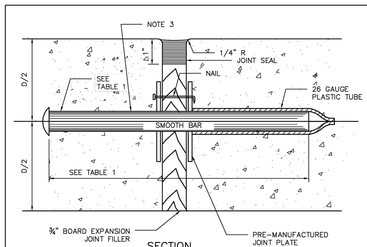
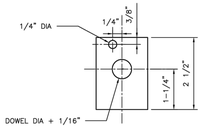


SECTION

DOWEL TYPE EXPANSION JOINT

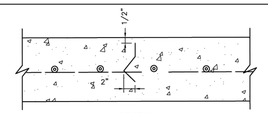
PLAN VIEW

JOINT PLATE



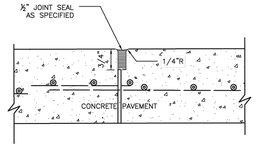
ELEVATION VIEW

JOINT PLATE



SECTION

DEFORMED METAL STRIP



SECTION

CONSTRUCTION JOINT SEAL

TABLE 1

PAVEMENT THICKNESS (IN)	DOWEL SIZES AND SPACINGS		
	DIAMETER (IN)	LENGTH (IN)	SPACING (IN)
6	3/4	18	12
7	1	18	12
8	1	18	12
9	1 1/4	18	12
10	1 1/4	18	12
11	1 1/4	18	12
12	1 1/4	18	12

NOTES:

1. STEEL TO MEET ASTM STANDARD SPECIFICATIONS FOR CONCRETE REINFORCING BARS. UNITS TO BE SPACED 12" CENTER ON CENTER.
2. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS.
3. CENTER DOWEL HORIZONTALLY ON JOINT.
4. CENTER DOWEL VERTICALLY IN CONCRETE BASE. EXTEND THICKENED CONCRETE AS NEEDED TO MAINTAIN 3" MIN COVER.
5. CITY OF HOUSTON APPROVED PRODUCTS MAY BE USED AS JOINT PLATE ALTERNATIVE.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

PAVEMENT EXPANSION AND CONSTRUCTION JOINT DETAILS

(SCALE: NOT TO SCALE)

APPROVED BY:

Developed by: Sukul Kanuar — CITY ENGINEER
Developed by: Hiang Nguyen — CITY TRAFFIC ENGINEER
Developed by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV-27-2023 | DWG NO: 02752-01

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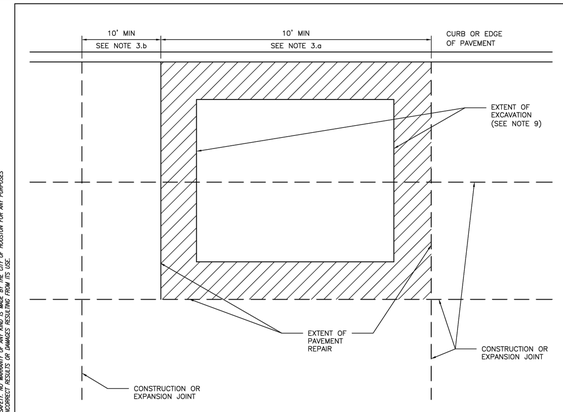

NOTES:

1. EXTENT OF PAVEMENT REPAIR SHALL BE PERPENDICULAR AND PARALLEL TO TRAVEL WAY.
2. WIDTH:
   REPLACE PANEL WIDTH TO NEAREST CONSTRUCTION OR EXPANSION JOINT BEYOND EDGE OF EXCAVATION.
3. LENGTH:
   a. MINIMUM LENGTH OF PAVEMENT REPAIR ALONG TRAVEL WAY IS 10' FROM THE NEAREST JOINT.
   b. IF EXTENT OF PAVEMENT REPAIR IS LESS THAN 10' FROM EXISTING CONSTRUCTION OR EXPANSION JOINT, EXTEND PAVEMENT REPAIR TO EXISTING JOINT.
4. SAW CUT AND EXPOSE 15" OF REINFORCING STEEL AROUND EDGE OF PANEL REPLACEMENT. PROVIDE HORIZONTAL DOWELS (PER SPECIFICATION SECTION 02951-PAVEMENT REPAIR AND RESTORATION) IF REINFORCING IS BROKEN OFF OR DOES NOT EXIST.
5. REPLACE CURB WHEN ADJACENT LANE IS REPLACED.
6. MAINTAIN EXPANSION JOINTS AT EXISTING LOCATIONS UNLESS OTHERWISE DIRECTED BY CITY ENGINEER.
7. SPECIALTY PAVEMENTS (IE: BRICK PAVERS) TO BE REPLACED WITH MATCHING PAVEMENT IN ALL CASES.
8. REPLACE PAVEMENT MARKINGS IN ACCORDANCE WITH CITY OF HOUSTON STANDARD SPECIFICATIONS 02764-RAISED PAVEMENT MARKERS AND 02767-THERMOPLASTIC PAVEMENT MARKINGS.
9. EXTENT OF EXCAVATION INCLUDES 18" OVERCUT AS SHOWN ON STANDARD DETAIL 02951-04 PAVEMENT REPAIR DETAIL FOR STREET CUTS (FLEX-BASE PAVEMENT & CONCRETE PAVEMENT).

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

STREET CUT FOR CONCRETE PAVEMENT REPLACEMENT/RESTORATION AGE OF PAVEMENT > 5YRS

(SCALE: NOT TO SCALE)

APPROVED BY:

Developed by: Sukul Kanuar — CITY ENGINEER
Developed by: Hiang Nguyen — CITY TRAFFIC ENGINEER
Developed by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV-27-2023 | DWG NO: 02951-02

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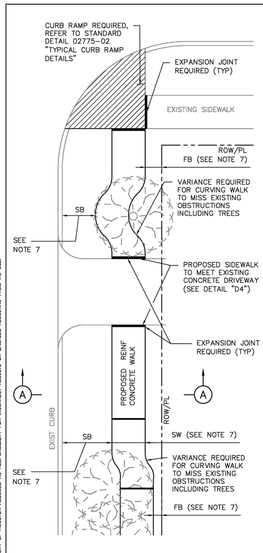
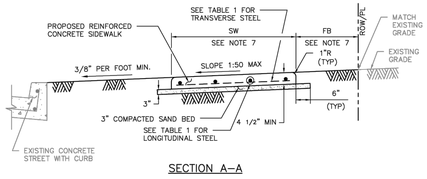
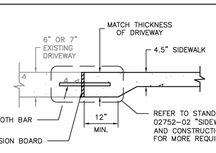


PLAN VIEW



SECTION A-A



DETAIL D4

DRIVEWAY/SIDEWALK HEADER

TABLE 1

REINFORCING STEEL INFORMATION
FOR 4 ½ " THICK SIDEWALKS
EXPANSION JOINT SPACING = 40 FT
f_c' = 3,500 PSI AND f_y = 60,000 PSI
REFER TO CONTRACT DRAWINGS FOR SIDEWALKS WIDER THAN 6 FEET.

SIDEWALK THICKNESS (IN)	SIDEWALK WIDTH (FT)	LONGITUDINAL STEEL			TRANSVERSE STEEL #3 BARS SPACING (IN)
		#3 BARS			
		NO. OF BARS	SPACING (IN)	END BAR SPACING (IN)	
4.5	5	3	27	3	48
4.5	6	4	22	3	48

NOTES:

1. 6X6 – W2.9XW2.9 WELDED WIRE FABRIC MAY BE USED IN LIEU OF THE REINFORCING STEEL GIVEN IN TABLE 1.
2. REINFORCED CONCRETE SIDEWALKS THRU DRIVEWAYS OPENINGS SHALL BE EITHER 6" THICK OR 7" THICK AS SPECIFIED ON 6" STABILIZED SUBGRADE. FOR THE REINFORCING STEEL REQUIREMENTS, SEE CITY OF HOUSTON STANDARD DETAILS 02754-01A, 02754-01B, 02754-03, AND 02754-04.
3. MAXIMUM SPACING FOR EXPANSION JOINTS SHALL BE 40 FEET.
4. CONTRACTOR SHALL CONSTRUCT SIDEWALK IN A MANNER NOT TO BLOCK THE NATURAL DRAINAGE FROM ADJACENT PROPERTY.
5. ALL RAMPS AND SIDEWALKS/WALKWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH HOUSTON PUBLIC WORKS STANDARDS, TEXAS ACCESSIBILITY STANDARDS (TAS) AND AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. IF THERE IS A CONFLICT IN THE REQUIREMENTS, THE STRICTEST REQUIREMENTS SHALL GOVERN.
6. CURB RAMPS THAT ARE STEEPER THAN A 1:12 MAX SLOPE WILL NOT BE ACCEPTED BY THE CITY OF HOUSTON UNLESS NOTED OTHERWISE.
7. REFER TO CONTRACT DRAWINGS FOR SIDEWALK (SW), FRONTAGE BUFFER (FB), AND SAFETY BUFFER (SB) WIDTHS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

TYPICAL SIDEWALK LAYOUT AND DETAILS FOR STREETS WITH CURBS

(SCALE: NOT TO SCALE)

APPROVED BY:

Developed by: Sukul Kanuar — CITY ENGINEER
Developed by: Hiang Nguyen — CITY TRAFFIC ENGINEER
Developed by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV-27-2023 | DWG NO: 02775-01

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR | HOUSTON, TX 77042 | 713.428.2400
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS — JOHN W. LACY — 90202 — LICENSED PROFESSIONAL ENGINEER — 10/19/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL

CIVIL DETAILS
SHEET 8 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R - 000267 - 0172 - 4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
C-000-508	SHEET NO. 22 OF 226

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Civil Details\Sheets\CIVIL DETAILS SHEET 8 OF 9.dwg

DISCLAIMER:
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TABLE OF VARIABLE DIMENSIONS (5) AND QUANTITIES FOR ONE HEADWALL

Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3

DATE:
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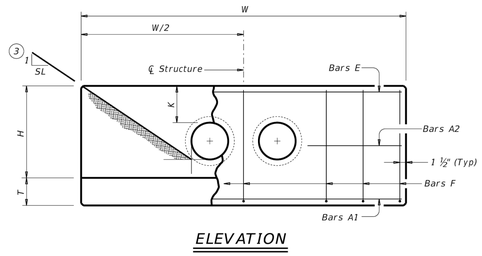
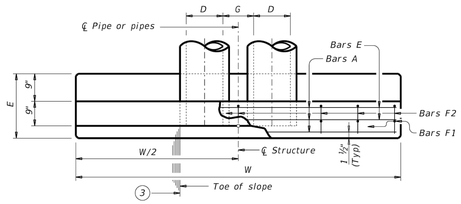
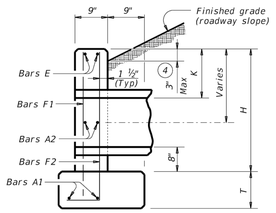


ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF (6) REINFORCING STEEL

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

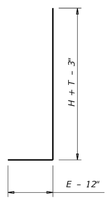
(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).



BARS F2

Texas Department of Transportation | Bridge Division Standard

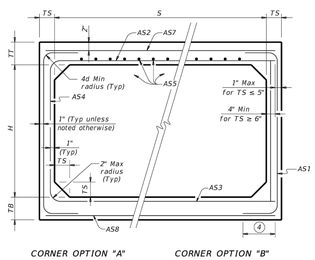
CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: CD-CH-PW0-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

CITY OF HOUSTON HOUSTON PUBLIC WORKS STORM CONSTRUCTION NOTES

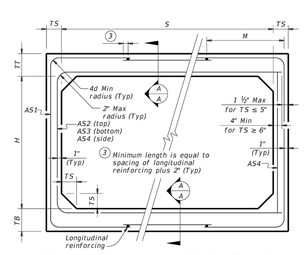
1. STORM SEWER SHALL BE REINFORCED CONCRETE PIPE (C-76, CLASS III), AND SHALL BE INSTALLED, BEDDED, AND BACK FILLED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 2317-02, 02317-3, 02317-05, 02317-06, AND 02317-07 (JULY 2019) AS APPLICABLE UNLESS OTHERWISW SHOWN ON THE DRAWINGS.
2. ALL STORM SEWER CONSTRUCTED IN SIDELOT EASMENT SHALL BE R.C.P (C-76, CLASSIII) AND SHALL BE EMBEDDED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 02317-02, 02317-03, 02317-05, 02317-06, AND 02317-07 AS APPLICABLE.
3. ALL SEWER UNDER PROPOSED OR FUTURE PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE BACKFILLED WITH 1-1/2 SACK CEMENT/C.Y. STABLIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE. THE REMAINING DEPTH OF TRENCH SHALL BE BACKFILLED WITH SUITABLE EARTH MATERIAL.
4. ALL TRENCH BACKFILL SHALL BE IN 8" LIFTS, WITH TESTS TAKEN AT 100 FOOT INTERVALS IN EACH LIFT, AND MECHNICALLY COMPACTED TO A DENSITY OF NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMACTION TEST (ASTM D-698/AASHTO T99).
5. CIRCULAR AND ELLIPTICAL REINFORCED CONCRETE PIPE SHALL BE INSTALLED USING RUBBER GASKET JOINT CONFORMING TO ASTM C443 AND ASTM C877 RESPECTIVELY.
6. ALL STORM SEWER PIPES AND INLET LEADS SHALL BE 24" AND LARGER R.C.P. (C-76, CLASSIII).
7. ALL PRPOSED PIPE STUB-OUTS FROM MANHOLES AND INLET LEADS ARE TO BE PLUGGED WITH 8" BRICK WALLS UNLESS OTHERWISE NOTED.
8. MINIMUM HORIZONTAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 48-INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES. MINIMUM VERTICAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 24-INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES.
9. ADJUST MANHOLE COVERS TO GRADE CONFORMING TO REQUIREMENTS OF SECTION 02086-ADJUSTING MANHOLES, INLETS, AND VALAVE BOXES TO GRADE.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ANY BACK SLOPE DRAINAGE SYSTEM DISTURBED AS A RESULT OF THIS WORK.
11. ALL DITCHES SHALL BE GRADED TO PROPOSED ELEVATIONS TO INSURE PROPER DRAINAGE. ALL OUTFALLS SHALL BE PROPERLY BACKFILLED AND COMPACTED. ALL DISTURBED AREA SHALL BE REGRADED, SEEDED, AND FERTILIZED.
12. ALL DRIVEWAYS WILL BE LOCATED TO AVOID EXISTING CURB INLET STRUCTURES.



CORNER OPTION "A" CORNER OPTION "B"

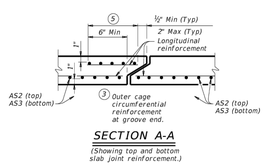
FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



CORNER OPTION "A" CORNER OPTION "B"

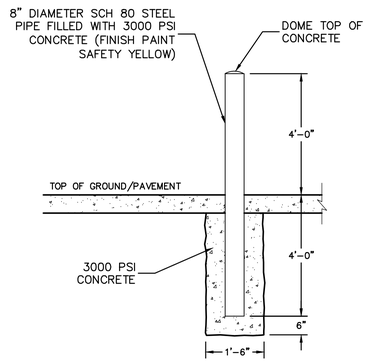
FILL HEIGHT 2 FT AND GREATER



SECTION A-A
(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:
Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.
See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.
In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."



PIPE BOLLARD DETAIL
NTS

PAPE–DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
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(713) 961–1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

CIVIL
CIVIL DETAILS
SHEET 9 OF 9

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R - 000267 - 0172 - 4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 23 OF 226	

C–000–509

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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 THEIR 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.
6. ALL PROJECT SCOPE SHOWN ON STRUCTURAL SHEETS AS DESIGNATED BY SHEET NUMBERING S-XXX-XXX SHALL BE GOVERNED BY THE FOLLOWING SPECIFICATION SECTIONS: 03301.1, 03600, 03920, 03930, 05500, 05520, 05530, 05550, AND 05590.

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, CONDITION CW.
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.
3. ALL ALUMINUM SHALL BE POWDER COATED DARK GREEN.

MASONRY

1. CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C90. THE TOTAL MASONRY ASSEMBLAGE SHALL HAVE A COMPRESSIVE STRENGTH EQUAL TO 2500 PSI AT 28 DAYS.
2. MASONRY MORTAR SHALL CONFORM TO ASTM C270, TYPE S.
3. ALL BOND BEAMS AND ANY BLOCK CELLS CONTAINING REINFORCING STEEL, ANCHORS, OR OTHER EMBEDMENTS SHALL BE FILLED WITH GROUT MEETING THE REQUIREMENTS OF ASTM C476. WALLS SHALL BE FULLY GROUTED WHEN INDICATED ON THE DRAWINGS.

STRUCTURAL STEEL

1. ROLLED WIDE FLANGE SHAPES, CHANNELS, AND ANGLES SHALL HAVE A MINIMUM YIELD STRENGTH OF 50 KSI; PLATES AND BARS SHALL HAVE A MINIMUM YIELD STRENGTH OF 50 KSI; STRUCTURAL PIPES SHALL HAVE A MINIMUM YIELD STRENGTH OF 35 KSI; ROUND AND RECTANGULAR HOLLOW STRUCTURAL SECTIONS SHALL HAVE A MINIMUM YIELD STRENGTH 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. HOT-DIP GALVANIZED GRATING SHALL BE POWDER COATED DARK GREEN.
6. 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.
7. 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.

   SLAB FOUNDATIONS..... 1700 PSF
   FROST DEPTH..... 0'-6"
   COEFFICIENT AGAINST SLIDING (ULTIMATE)..... 0.30

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 016113 - EQUIPMENT AND NON-STRUCTURAL COMPONENTS.
   SECTION 055900 - METAL STAIRS.
   SECTION 055200 - METAL RAILINGS.
   SECTION 055500 - EQUIPMENT ANCHORAGE.
   SECTION 134550 - PRE-FABRICATED CONCRETE STRUCTURES
   SECTION 151400 - PIPE SUPPORTS

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FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

STANDARD STRUCTURAL NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
S-000-501	SHEET NO. 24 OF 226

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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

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LEGENDS AND ABBREVIATIONS

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S-000-502

SHERWOOD OAKS ELECTRICAL EQUIPMENT SHELTER

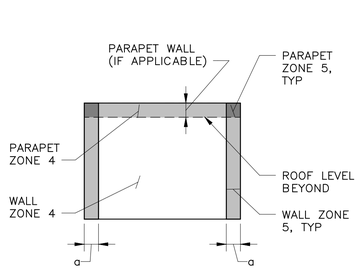
INTERNAL PRESSURE COEFFICIENT	±0.55
DIMENSION "a" FOR WALLS	6.00 FT
DIMENSION "h" FOR ROOF	12.00
ROOF TYPE	1

COMPONENT AND CLADDING WIND PRESSURES, PSF

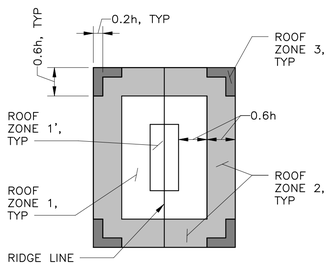
EFFECTIVE WIND AREA (SQR FT) →		<=2	4	10	20	50	100	200	500	1000+
ROOF NEG PRESSURE, ZONE 1		SEE NOTE 6 BELOW								
ROOF NEG PRESSURE, ZONE 1'										
ROOF NEG PRESSURE, ZONE 2										
ROOF NEG PRESSURE, ZONE 3										
ROOF POS PRESSURE, ZONES 1, 1'										
ROOF POS PRESSURE, ZONES 2, 3										
ROOF OVERHANG PRESSURE ZONES 1, 1'										
ROOF OVERHANG PRESSURE ZONE 2										
ROOF OVERHANG PRESSURE ZONE 3										
WALL ZONE 4	(+)									
	(−)									
WALL ZONE 5	(+)									
	(−)									
PARAPET WALL ZONE 4										
PARAPET WALL ZONE 5										

NOTES:

1. POSITIVE PRESSURES ACT TOWARDS THE SURFACE. NEGATIVE PRESSURES ACT AWAY FROM THE SURFACE.
2. LINEARLY INTERPOLATE PRESSURES FOR EFFECTIVE WIND AREAS BETWEEN THOSE SCHEDULED OR USE PRESSURES FOR THE SMALLER EFFECTIVE WIND AREA.
3. ALL ROOF OVERHANG PRESSURES ACT UPWARD.
4. SOFFITS BELOW ROOF OVERHANGS ARE DESIGNED FOR THE PRESSURE ON THE WALL BELOW THE SOFFIT.
5. PARAPET PRESSURES ARE THE TOTAL OF THE WINDWARD AND LEEWARD PARAPET FACE VALUES.
6. THE ELECTRICAL EQUIPMENT SHELTER AT SHERWOOD OAKS IS A DELEGATED DESIGN AND VALUES IN THE CHART ABOVE ARE TO BE DETERMINED BY THE SUPPLIER.



WALL ELEVATION



ROOF PLAN
TYPE 1 ROOF
(FLAT OR GABLE ≤7°)

BASIC LOADING CRITERIA

THE APPLICABLE BUILDING CODE IS THE 2021 INTERNATIONAL BUILDING CODE (IBC) WITH CITY OF HOUSTON AMENDMENTS.

1. DEAD LOAD ..... CALCULATED
2. LIVE LOADS:
   - OPERATING AND PROCESS FLOORS..... 150 PSF
   - STAIRS, SERVICE PLATFORMS & LANDINGS..... 150 PSF
   - ELECTRICAL AND CONTROL ROOM FLOORS..... 250 PSF
   - CHEMICAL STORAGE ROOMS..... 250 PSF
   - STORAGE..... 250 PSF
   - ALL FLOORS NOT INDICATED..... 100 PSF
   - ROOF..... 20 PSF(UNREDUCED)
   - LIFT STATION TOP SLABS..... 300 PSF OR EQUIPMENT LOADS + 50 PSF
3. LATERAL EARTH PRESSURE (EQUIVALENT FLUID PRESSURE)
   - NON-SATURATED..... N/A
   - SATURATED..... N/A
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..... 64 PSF/FT
7. SNOW LOAD (ENVELOPED, ALL SITES):
   - GROUND SNOW LOAD (P_g)..... 9 PSF
   - SNOW EXPOSURE FACTOR (C_e)..... 0.9
8. SEISMIC LOAD (ENVELOPED, ALL SITES):
   - MAPPED MCE SHORT PERIOD SPECTRAL RESPONSE ACCELERATION (S_S)..... 0.083g
   - MAPPED MCE ONE SECOND PERIOD SPECTRAL RESPONSE ACCELERATION (S_1)..... 0.045g
   - DESIGN SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS (S_{DS})..... 0.073g
   - DESIGN SPECTRAL RESPONSE ACCELERATION AT ONE SECOND PERIOD (S_{D1})..... 0.066g
   - SITE CLASS..... D
   - SEISMIC DESIGN CATEGORY..... A
9. WIND LOAD:
   - BASIC (ULTIMATE) DESIGN WIND SPEED..... 143 MPH (WEST COURT)
141 MPH (GREEN DOLPHIN)
137 MPH (MUD #175-1)
136 MPH (SHERWOOD OAKS)
   - ALLOWABLE STRESS (NOMINAL) DESIGN WIND SPEED..... 111 MPH (WEST COURT)
109 MPH (GREEN DOLPHIN)
106 MPH (MUD #175-1)
105 MPH (SHERWOOD OAKS)
   - GROUND ELEVATION FACTOR (K_e)..... 1.0
   - EXPOSURE..... C
10. RAIN INTENSITY (ENVELOPED, ALL SITES): (15 MINUTE)..... 11.8 INCHES/HR
(60 MINUTE)..... 5.76 INCHES/HR
11. FLOOD DESIGN DATA:
    - DESIGN FLOOD ELEVATION..... EL 27.00 (WEST COURT)
EL 30.00 (GREEN DOLPHIN)
EL 78.50 (MUD #175-1)
EL 91.00 (SHERWOOD OAKS)

SNOW AND SEISMIC LOADING CRITERIA FOR BUILDINGS	SHERWOOD OAKS ELECTRICAL EQUIPMENT SHELTER
RISK CATEGORY	III
FLAT-ROOF SNOW LOAD (P_f), PSF	*
SNOW DRIFT SURCHARGE LOAD (P_d), PSF	*
SNOW DRIFT WIDTH (W), FEET	*
SNOW IMPORTANCE FACTOR (I_S)	1.1
SNOW LOAD SLOPE FACTOR (C_S)	*
THERMAL FACTOR (C_t)	*
SEISMIC IMPORTANCE FACTOR	1.25
SEISMIC DESIGN CATEGORY	A
BASIC SEISMIC FORCE RESISTING SYSTEM	*
STRENGTH DESIGN BASE SHEAR, KIPS	*
SEISMIC RESPONSE COEFFICIENT (C_S)	*
RESPONSE MODIFICATION FACTOR (R)	*
FLOOD DESIGN CLASS PER ASCE 24	III
ELEVATION AT THE TOP OF LOWEST FLOOR	*
ELEVATION LIMIT OF DRY FLOODPROOFING	*
ELEVATION AT BOTTOM OF LOWEST HORIZONTAL STRUCTURAL MEMBER	98.00'

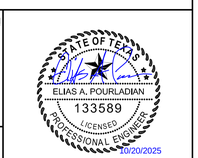
* THE ELECTRICAL EQUIPMENT SHELTER AT SHERWOOD OAKS IS A DELEGATED DESIGN AND VALUES IN THE CHART ABOVE ARE TO BE DETERMINED BY THE SUPPLIER.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182



CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

STRUCTURAL LOADING CRITERIA

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 26 OF 226	

S-000-503

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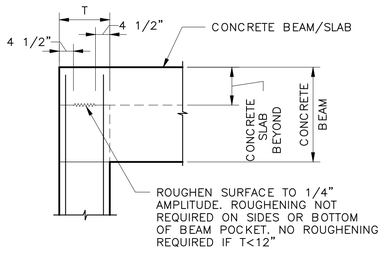
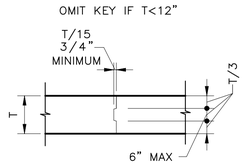
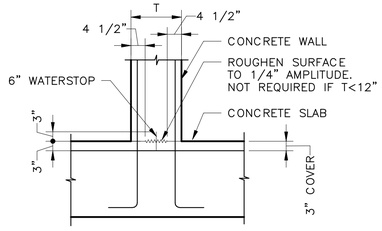


TOP OF WALL TO BEAM/SLAB

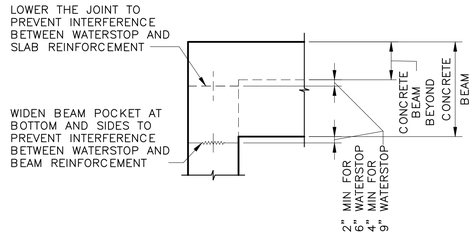


SLAB TO SLAB

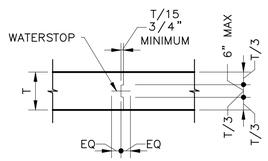


FOR T < 18"

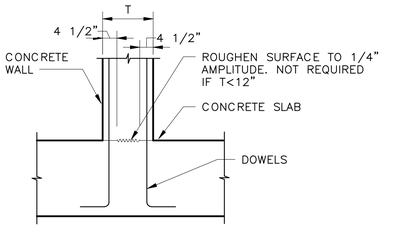
SLAB TO BOTTOM OF WALL



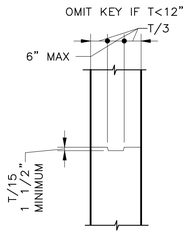
TOP OF WALL TO BEAM/SLAB



SLAB TO SLAB (T>=12")

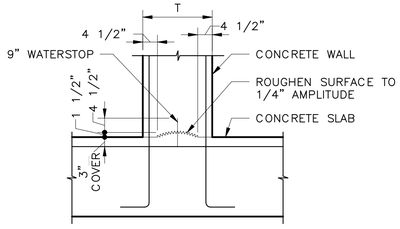


SLAB TO BOTTOM OF WALL



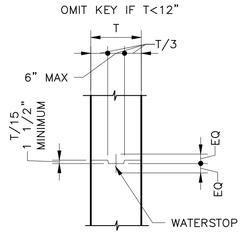
WALL TO WALL

JOINTS WITHOUT WATERSTOPS

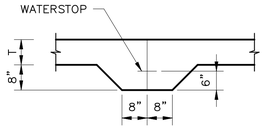


FOR T >= 18"

SLAB TO BOTTOM OF WALL



WALL TO WALL



SLAB TO SLAB (T<12")

JOINTS WITH WATERSTOPS

NOTES:

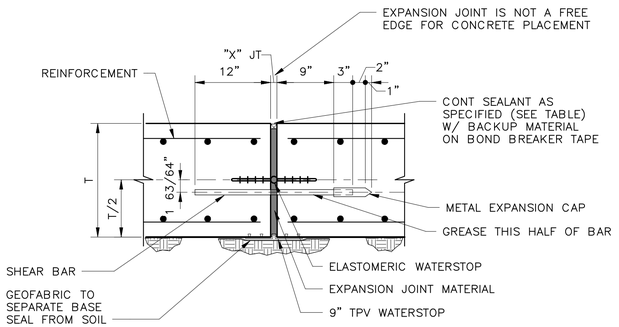
1. DETAILS ON THIS DRAWING APPLY TO ALL DRAWINGS UNLESS NOTED OTHERWISE.
2. WORK THIS DRAWING WITH THE STANDARD CONCRETE REINFORCEMENT DETAILS.
3. AT WALL JOINTS AND AT WALL BASE JOINTS, SECURE ALL ELASTOMERIC WATERSTOPS IN THE CORRECT POSITION USING HOG RINGS OR GROMMETS SPACED AT 12 INCHES ALONG THE 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.

NOTES:

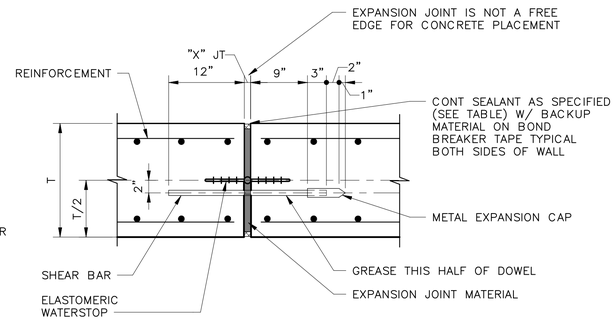
1. REINFORCEMENT STEEL IS CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS.
2. "CSJ W/ WS" – CONSTRUCTION JOINT WITH WATERSTOP.
3. "CSJ" – CONSTRUCTION JOINT WITHOUT WATERSTOP.
4. UNLESS NOTED OTHERWISE, WATERSTOPS MAY BE STEEL OR PVC.
5. WATERSTOP SIZE SHALL BE 6" FOR WALLS AND SLABS LESS THAN 18" THICKNESS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

A TYPICAL CONSTRUCTION JOINT DETAILS

NO SCALE



SLAB EXPANSION JOINT – TYPE A



WALL EXPANSION JOINT – TYPE A

SEALANT TYPE	EJ SPACING	EJ SIZE "X"	SEALANT DEPTH
POLYURETHANE OR POLYSULFIDE	<100 FT	3/4"	3/8"
	101 FT – 150 FT	1"	1/2"

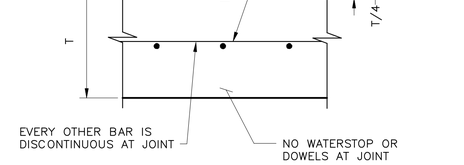
SEALANT TYPE	EJ SPACING	EJ SIZE "X"	SEALANT DEPTH
POLYURETHANE OR POLYSULFIDE	<100 FT	3/4"	3/8"
	101 FT – 150 FT	1"	1/2"

NOTES:

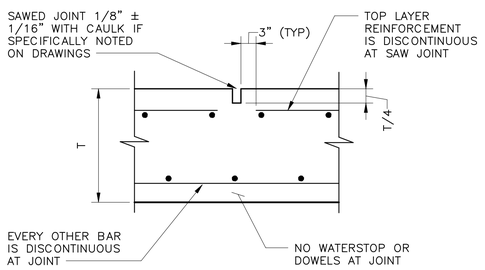
1. PROVIDE 3/4" DIAMETER SHEAR BARS @ 1'-6" CENTERS ACROSS JOINT UNLESS NOTED OTHERWISE.
2. REINFORCING STEEL SHALL NOT BE EXTENDED ACROSS JOINT UNLESS NOTED OTHERWISE. SHEAR BARS SHALL BE SMOOTH FREE FROM RUST OR SCALE, AND GREASED TO PREVENT BOND (ONE HALF BAR ONLY).
3. WATERSTOP SIZE SHALL BE 6" FOR WALLS AND SLABS LESS THAN 18" IN THICKNESS, AND SHALL BE 9" FOR WALLS AND SLABS THICKER THAN 18".
4. "EJ W/ WS" – EXPANSION JOINT WITH ELASTOMERIC WATERSTOP
   "EJ" – EXPANSION JOINT WITHOUT WATERSTOP

B TYPICAL EXPANSION JOINT DETAILS

NO SCALE



SINGLY REINFORCED SLABS



DOUBLY REINFORCED SLABS

NOTES:

1. TYPICAL CONTROL JOINT NOTES NOT APPLICABLE FOR SAWED CONTRACTION JOINT.
2. "SJ" SAWED JOINT WITH NO WATERSTOP.
3. JOINT FORMED WITH TOOL OR INSERT STRIP MAY BE SUBSTITUTED FOR SAWED TYPE ONLY WITH PRIOR ACCEPTANCE BY THE ENGINEER.
4. SAWED CONTRACTION JOINTS TO BE USED AS INDICATED ON DRAWINGS.

C SAWED CONTRACTION JOINT – SLAB ON GRADE

NO SCALE

BLACK & VEATCH

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STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

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SHEET NO. 27 OF 226	

S-000-504

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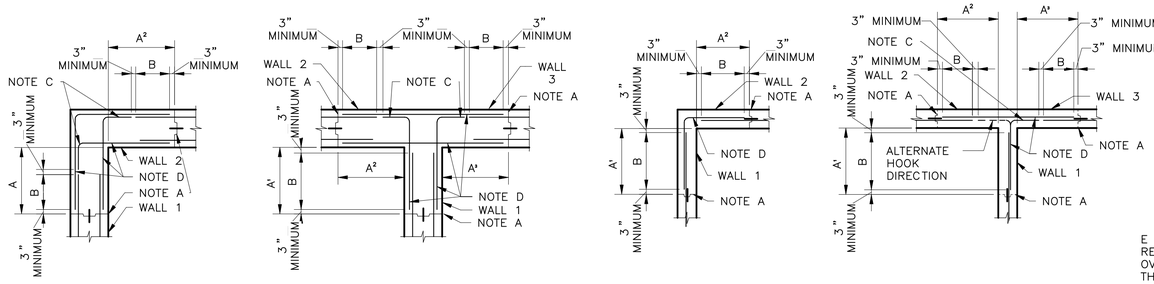


A = VERTICAL CONSTRUCTION JOINT NEAREST TO WALL CORNER.

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

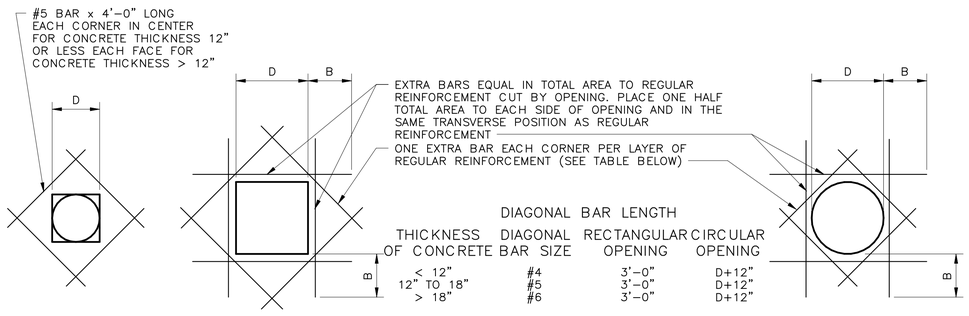
D = TYPICAL CORNER REINFORCEMENT. SIZE SHALL MATCH LARGEST ADJACENT WALL HORIZONTAL REINFORCEMENT; SPACING SHALL MATCH MINIMUM ADJACENT WALL HORIZONTAL REINFORCEMENT SPACING.

MAIN REINFORCEMENT FOR ALL STRUCTURES

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

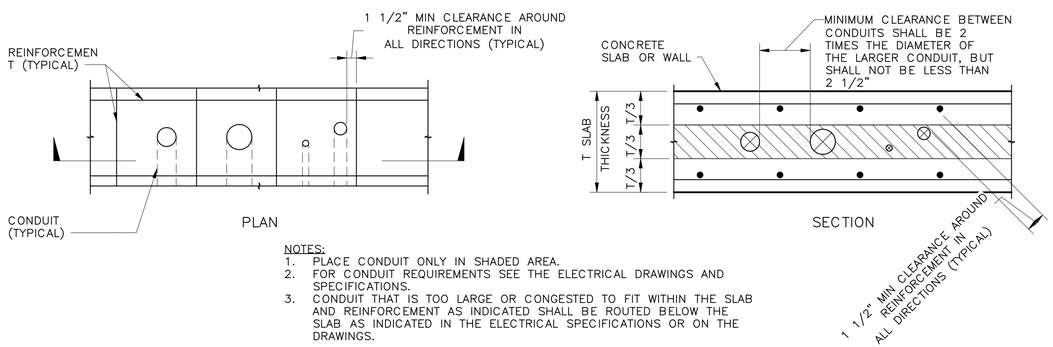
NO SCALE



TYPICAL REQUIRED UNLESS ADDITIONAL REINFORCEMENT SPECIFICALLY INDICATED AT OPENINGS ON DRAWINGS

C TYPICAL EXTRA REINFORCEMENT AT OPENINGS 12" TO < = 54"

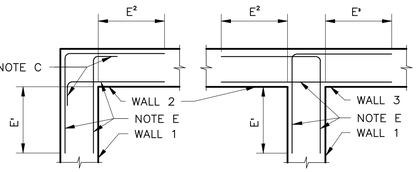
NO SCALE



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

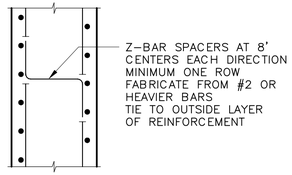


E = WHERE SPECIFICALLY NOTED ON THE DRAWINGS, ADDITIONAL CORNER REINFORCEMENT SHALL BE PLACED IN BOTH FACES OF THE INDICATED CORNER OVER THE FULL HEIGHT. ADDITIONAL CORNER REINFORCEMENT SHALL BE OF THE SAME SIZE AND SPACING AS THE MAIN CORNER REINFORCEMENT. PLACE ADDITIONAL REINFORCEMENT ALTERNATELY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

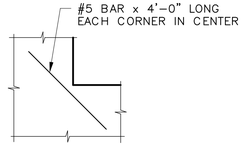
CONTRACTORS OPTION: E BAR TAILS MAY BE SPLICED USING LAPPED SPLICE LENGTHS FOR TOP BARS. SPLICES SHALL NOT BE LOCATED IN THE CORNER AREA COMMON TO BOTH WALLS AND SHALL CLEAR HOOK ENDS BY 3" MINIMUM.

ADDITIONAL REINFORCEMENT WHERE SPECIFICALLY NOTED ON THE DRAWINGS



D SPACERS FOR WALL REINFORCEMENT

NO SCALE

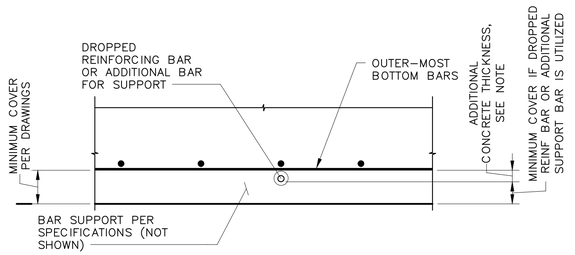


NOTE:
TYPICAL REQUIRED UNLESS ADDITIONAL REINFORCEMENT SPECIFICALLY INDICATED AT OPENINGS ON DRAWINGS

E TYPICAL EXTRA REINFORCEMENT AT ISOLATED RE-ENTRANT CORNERS

NO SCALE

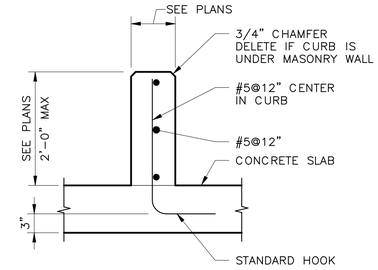
NOTES:
1. DETAILS ON THIS DRAWING APPLY TO ALL DRAWINGS UNLESS OTHERWISE NOTED.
2. WORK THIS DRAWING WITH THE STANDARD CONCRETE JOINT DETAILS.



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.

B REINFORCING SUPPORT DETAIL

NO SCALE



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

F TYPICAL CONCRETE CURB 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.

BLACK & VEATCH

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HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

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AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

S-000-505

SHEET NO. 28 OF 226

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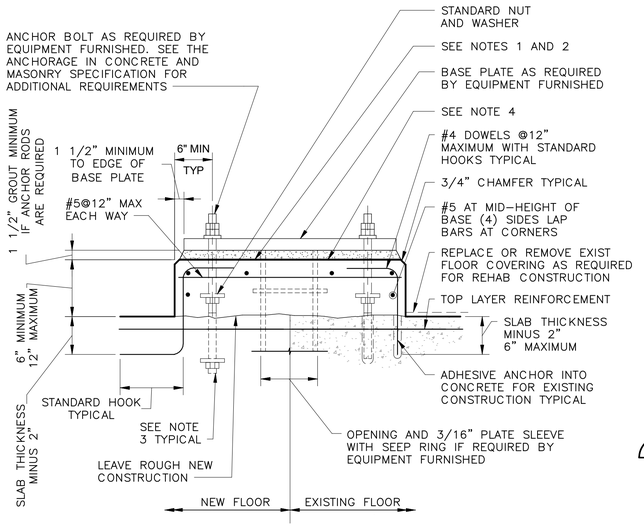
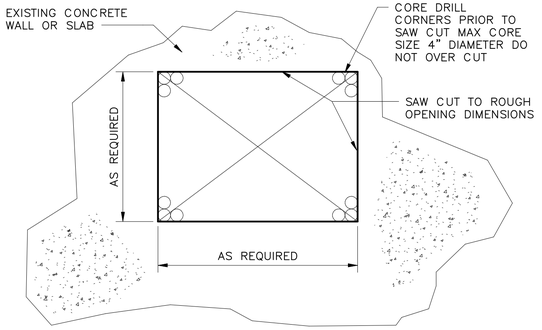


NOTES:

1. EQUIPMENT MANUFACTURER TO INDICATE REQUIRED FLATNESS WHERE NO GROUT IS SPECIFIED. TOLERANCES SHALL BE IN CONFORMANCE WITH ACI PRC-117 GUIDE FOR TOLERANCE COMPATIBILITY IN CONCRETE CONSTRUCTION.
2. CONTRACTOR AND SUPPLIER SHALL COORDINATE FINAL LOCATION AND SIZE OF PADS WITH EQUIPMENT FURNISHED. COORDINATE ANCHOR BOLT REQUIREMENTS FOR REQUIRED EMBEDMENT DEPTHS AND CONCRETE EDGE DISTANCES.
3. WHERE THE DESIGN ANCHOR BOLT EMBEDMENT IS GREATER THAN THE CONCRETE EQUIPMENT BASE THICKNESS, THEN THE REQUIRED DEPTH OF EMBEDMENT SHALL BE MEASURED FROM THE TOP OF STRUCTURAL SLAB AND NOT THE TOP OF THE EQUIPMENT BASE.
4. EQUIPMENT BASE SHALL USE STRUCTURAL CONCRETE AS INDICATED IN THE CAST-IN-PLACE CONCRETE SPECIFICATION.

A EQUIPMENT BASE DETAIL

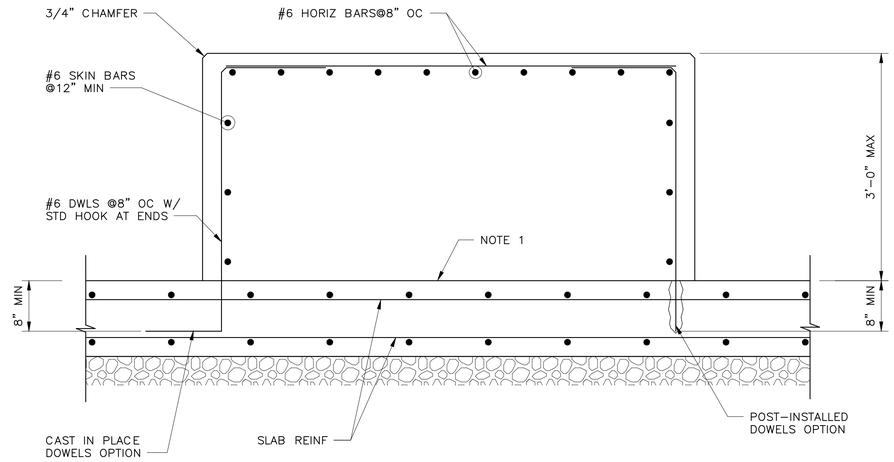
NO SCALE



NOTE:
SIZES AND LOCATIONS OF ALL OPENINGS MUST BE APPROVED BY ENGINEER PRIOR TO BEGINNING CORING OR CUTTING OPERATIONS.

B PROCEDURE FOR CUTTING OR ENLARGING OPENINGS IN EXISTING CONCRETE SLABS OR WALLS

NO SCALE



NOTES:

1. ROUGHEN SURFACE OF CONCRETE TO AMPLITUDE OF 1/4 INCH.
2. CONTRACTOR AND SUPPLIER SHALL COORDINATE FINAL LOCATION AND SIZE OF PADS WITH EQUIPMENT FURNISHED. COORDINATE ANCHOR BOLT REQUIREMENTS FOR REQUIRED EMBEDMENT DEPTHS AND CONCRETE EDGE DISTANCES.
3. WHERE THE DESIGN ANCHOR BOLT EMBEDMENT IS GREATER THAN THE CONCRETE EQUIPMENT BASE THICKNESS, THEN THE REQUIRED DEPTH OF EMBEDMENT SHALL BE MEASURED FROM THE TOP OF STRUCTURAL SLAB AND NOT THE TOP OF THE EQUIPMENT BASE.
4. EQUIPMENT BASE SHALL USE STRUCTURAL CONCRETE AS INDICATED IN THE CAST-IN-PLACE CONCRETE SPECIFICATION.

C ODOR CONTROL EQUIPMENT BASE DETAIL

NO SCALE

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

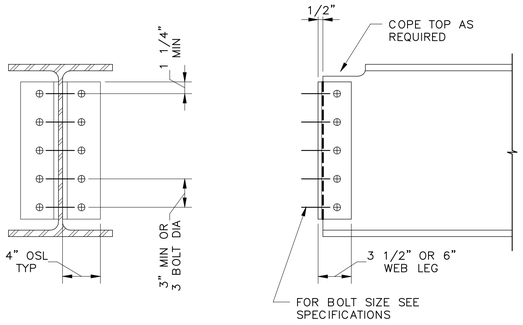
STRUCTURAL

MISCELLANEOUS CONCRETE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 29 OF 226	

S-000-506

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-000-GENERAL-BV.rvt



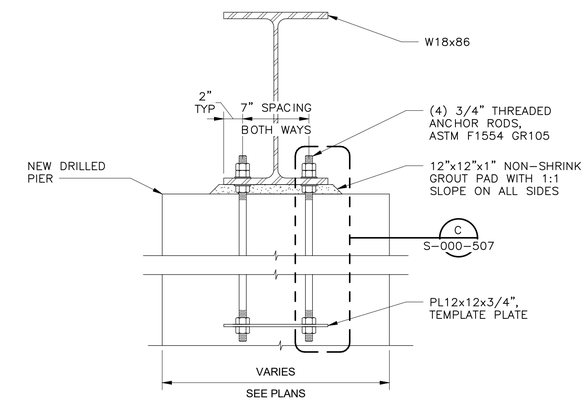
SHOP BOLTED – FIELD BOLTED			
BEAM SIZE (ALL WEIGHTS)	NO OF BOLTS		ANGLE SIZE
	OSL	IN WEB	
W18, M18, S18, C18, MC18	8	4	2L'S 4x3 1/2x1/4
W12 & W14, M12 & M14, S12, C12, MC12 & MC13	6	3	2L'S 4x3 1/2x3/8
W8 & W10, M8 & M10, S8 & S10 C8, C9 & C10, MC8, MC9 & MC10	4	2	2L'S 4x3 1/2x3/8

NOTE: FABRICATOR SHALL PROVIDE ADDITIONAL CLIPS, SEATS, BOLTS, ETC AS REQUIRED TO COMPLY WITH OSHA SAFETY STANDARDS FOR STEEL ERECTION.

OSL = OUTSTANDING LEG

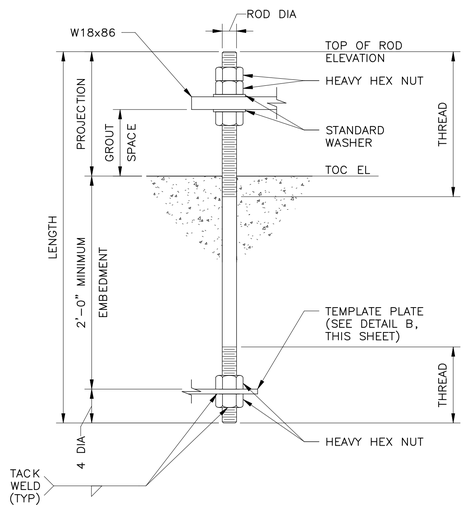
A STANDARD STEEL FRAMING CONNECTION DETAILS

NO SCALE



B TYPICAL BEAM TO DRILLED PIER ANCHORAGE DETAIL

NO SCALE



C ANCHOR ROD DETAIL

S-000-507 NO SCALE

NOTE: REFER TO NOTES ON SHEET S-000-510 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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HOUSTON PUBLIC WORKS

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STRUCTURAL

STANDARD STEEL FRAMING CONNECTION DETAILS

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SHEET NO. 30 OF 226	

S-000-507

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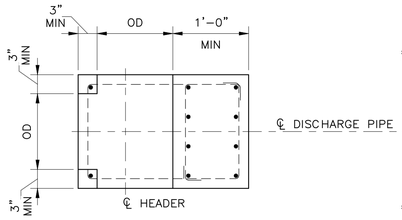
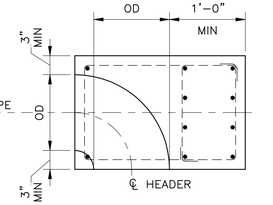
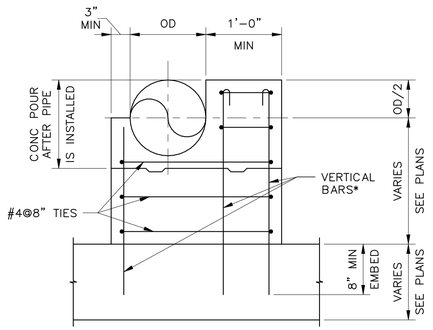


PLAN THRUST BLOCK @ TEE



PLAN THRUST BLOCK @ ELBOW



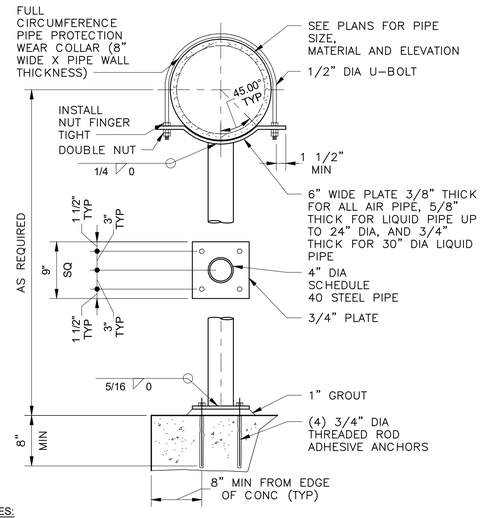
ELEVATION

*VERTICAL BARS

PIPE DIA	NO. BARS VERT BARS
4" – 8"	3 – 2#5
10" – 12"	3 – 3#5
14" – 16"	3 – 4#5
18" – 20"	3 – 4#5

A TYPICAL THRUST BLOCK DETAIL

NO SCALE



NOTES:

1. ALL STEEL MATERIALS SHALL BE HOT-DIP GALVANIZED FOR EXTERIOR LOCATIONS. VENT HOLES FOR GALVANIZING SHALL BE THE MINIMUM SIZE NECESSARY. HOLES SHALL BE LOCATED IN THE BOTTOM BASE PL AND ALSO LOCATED IN THE TOP OF THE PIPE, ADJACENT TO THE CURVED PLATE. FOR LIQUID PIPE SIZES UP TO 30".
2. ALL ODOR CONTROL PIPE SUPPORTS SHALL BE CONSTRUCTED OF 316 STAINLESS STEEL.

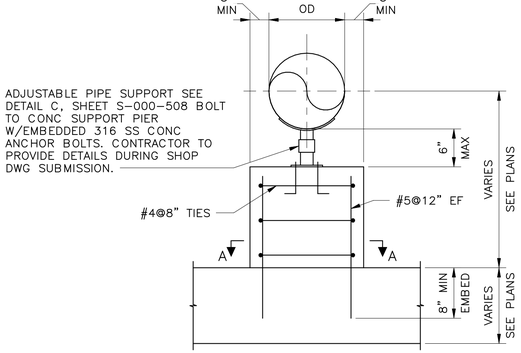
D ODOR CONTROL PIPE SUPPORT

NO SCALE

ODOR CONTROL SUPPORT PIPE SCHEDULE								
MARK	COLUMN SIZE	BASE PLATE SIZE			ANCHOR BOLTS			
		T	L	W	DIA	EMBED	E	TYPE
PS-1	HSS 6x6x3/8	3/4"	1'-0"	1'-0"	3/4"	6"	2"	CAST-IN-PLACE THREADED ROD
PS-2	HSS 6x6x3/8	3/4"	1'-0"	1'-0"	3/4"	8"	2"	POST-INSTALLED ADHESIVE ANCHOR (NOTE 6)

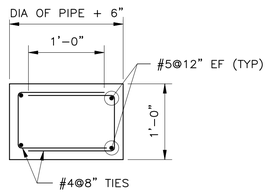
NOTES:

1. ALL ODOR CONTROL PIPE SUPPORTS SHALL BE HOT-DIP GALVANIZED STEEL MATERIAL TYPICAL, UNO IN DETAILS. BOLTS SHALL BE HOT-DIP GALVANIZED UNO.
2. POLYURETHANE SADDLES BY PIPING TECHNOLOGY AND PRODUCTS, INC., OR EQUAL.
3. SEE MECHANICAL PLANS FOR PIPE SIZES AND ELEVATIONS, TYP.
4. SEE MECHANICAL PLANS FOR PIPE SUPPORT LOCATIONS.
5. FIELD VERIFY EXISTING STRUCTURE. COORDINATE EXISTING STRUCTURE W/PIPE SUPPORT.
6. A MINIMUM EDGE DISTANCE OF 8" FROM ANCHOR TO NEAREST EDGE OF CONCRETE SHALL BE PROVIDED. CONTRACTOR TO FIELD VERIFY.

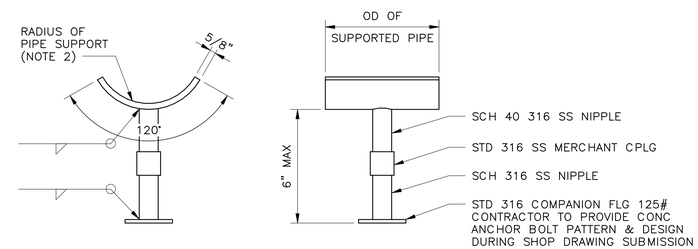


B TYPICAL CONC PIPE SUPPORT PIER DETAIL

NO SCALE



SECTION A-A

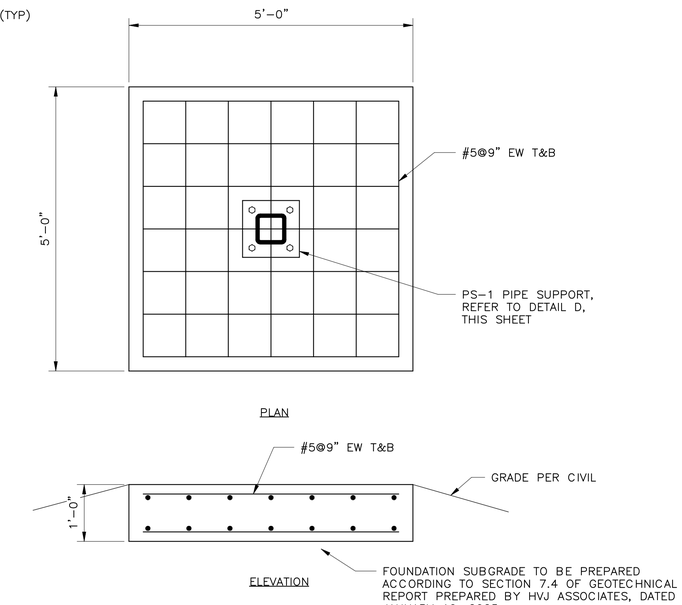


NOTES:

1. ADJUSTABLE PIPE SUPPORT ASSEMBLY TO BE 316SS.
2. PROVIDE MEANS OF PREVENTING DISSIMILAR METAL CONTACT.

C TYPICAL ADJUSTABLE PIPE SUPPORT

NO SCALE



E ODOR CONTROL PIPE SUPPORT FOUNDATION

NO SCALE

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

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LIFT STATIONS RENEWAL AND REHABILITATION

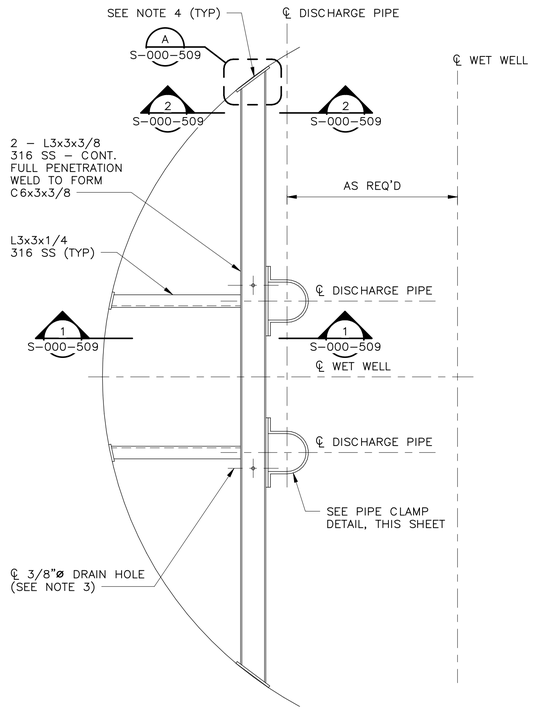
STRUCTURAL

STANDARD PIPE SUPPORT DETAILS (SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 31 OF 226	

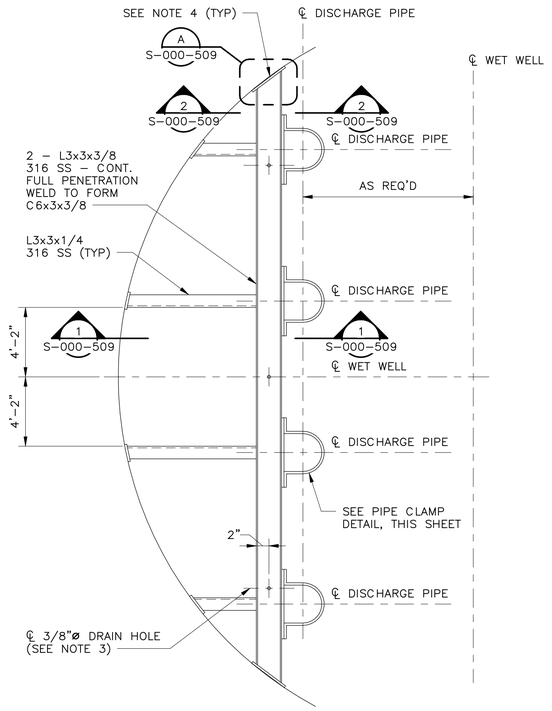
S-000-508

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-000-GENERAL-BV.rvt



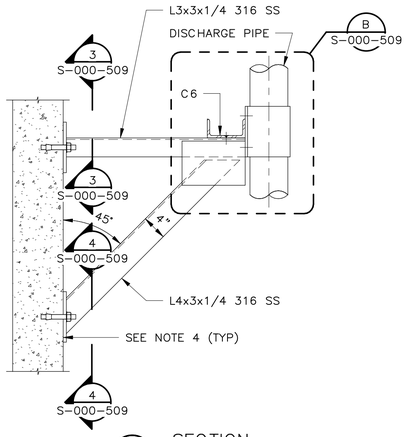
0 TYP DISCHARGE PIPING SUPPORT PLAN FOR 2 PUMPS

NO SCALE



00 TYP DISCHARGE PIPING SUPPORT PLAN FOR 4 PUMPS

NO SCALE

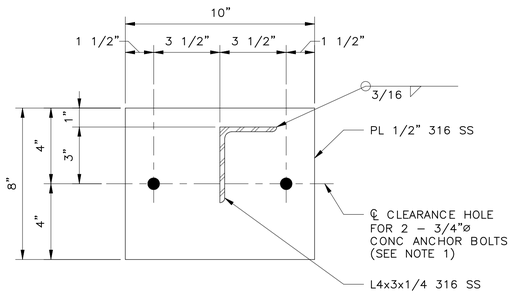


1 SECTION

S-000-509 NO SCALE

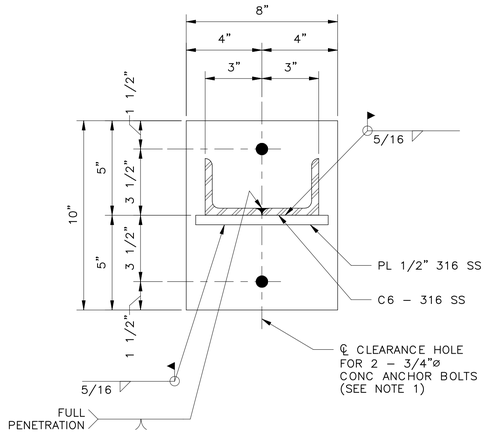
NOTES:

1. CONCRETE ANCHOR BOLTS SHALL HAVE MINIMUM EMBEDMENT AND SHALL BE TYPE 316 STAINLESS STEEL, PER SPECIFICATIONS.
2. SEE PLANS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
3. DRILL 3/8"ø HOLES, 1" OFF C TO C6 AT MIDSPAN BETWEEN LATERAL PIPE SUPPORTS TO ALLOW FOR DRAINAGE. 3 HOLES PER CHANNEL WHERE 2 LATERAL SUPPORTS REQUIRED; 2 HOLES PER CHANNEL WHERE 1 LATERAL SUPPORT REQUIRED.
4. SET 1/4" NEOPRINE GASKET ON WALL SURFACE IN SIKA 1A (OR EQUAL) SEALANT.



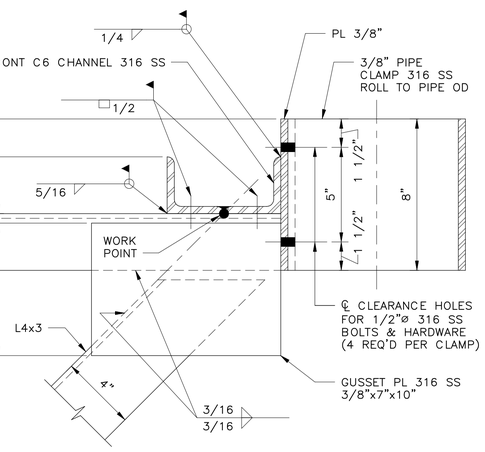
4 SECTION

S-000-509 NO SCALE



2 SECTION

S-000-509 NO SCALE

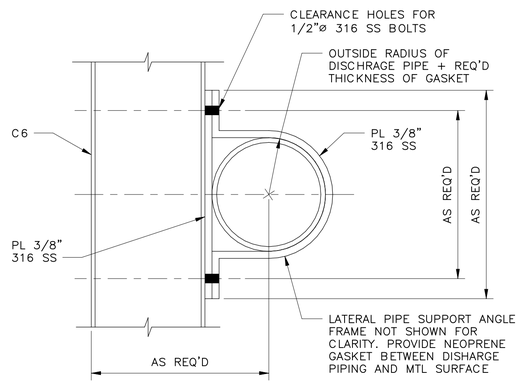


A DETAIL

S-000-509 NO SCALE

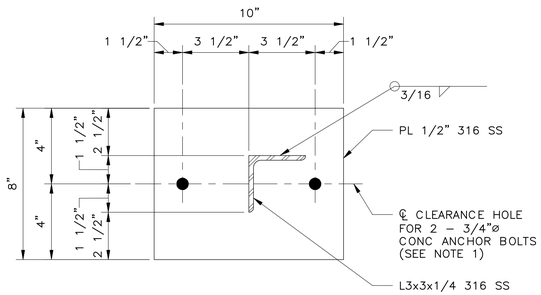
B DETAIL

S-000-509 NO SCALE



C PIPE CLAMP DETAIL

NO SCALE



3 SECTION

S-000-509 NO SCALE

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

STANDARD PIPE SUPPORT DETAILS (SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 32 OF 226	

S-000-509

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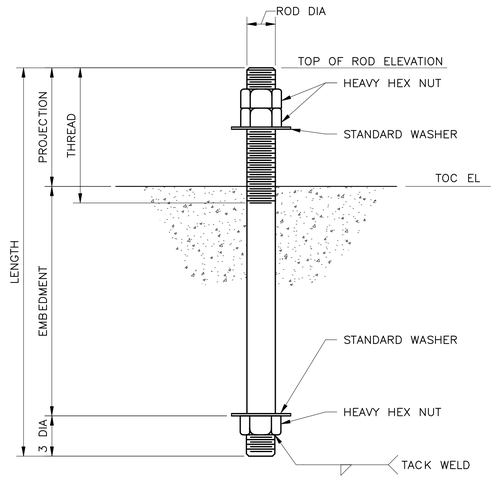
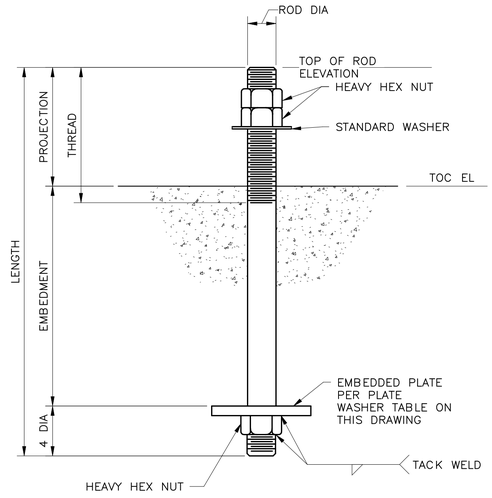


A ANCHOR ROD DETAIL
NO SCALE



B ANCHOR ROD DETAIL
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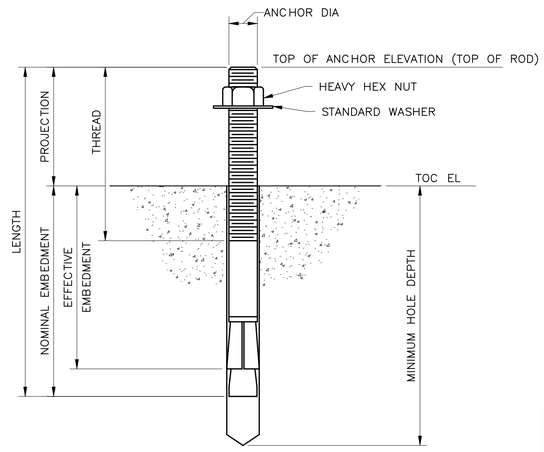
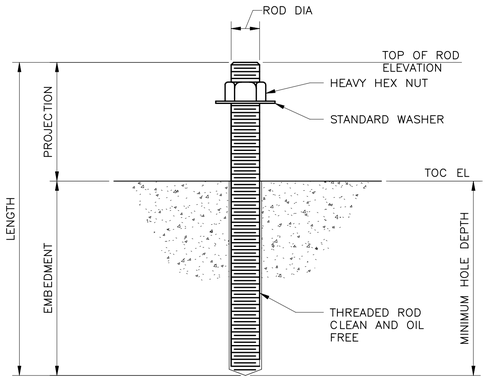


C EXPANSION ANCHOR DETAIL
NO SCALE



D ADHESIVE ANCHOR DETAIL
NO SCALE

NOTES:

1. DETAILS ON THIS DRAWING APPLY TO ALL DRAWINGS UNLESS NOTED OTHERWISE.
2. PROVIDE ANCHOR AS INDICATED ON DRAWINGS.
3. WHERE NO SPECIFIC MANUFACTURE IS INDICATED ON THE DRAWINGS FOR A CERTAIN TYPE OF ANCHOR, CONTRACTOR TO USE ONE OF THE ANCHOR'S SPECIFIED IN SPECIFICATION 055500 – ANCHORAGE IN CONCRETE AND MASONRY.
4. ANCHORS SHOWN ON THIS SHEET ARE FOR GENERAL INFORMATION. NOT ALL ANCHORS SHOWN ON THIS SHEET MAY BE USED FOR THIS PROJECT.
5. ANCHOR RODS SHALL BE ASTM F1554 GRADE 36, WITH NUTS CONFORMING TO ASTM A563 GRADE A HEAVY HEXAGON, UNLESS NOTED OTHERWISE.
6. ANCHOR RODS, NUTS, STD WASHERS AND EMBED PLATE WASHERS, METAL SLEEVES AND EMBEDMENTS SHALL BE HOT–DIPPED GALVANIZED AFTER FABRICATION, UNLESS NOTED OTHERWISE.
7. CONFIRM ANCHOR ROD LAYOUTS AND PROJECTIONS USING EQUIPMENT SHOP DRAWINGS AND STRUCTURAL STEEL SHOP DRAWINGS AS APPLICABLE.

PLATE WASHER TABLE

ANCHOR ROD DIAMETER (IN)	PLATE WASHER OUTSIDE DIAMETER (IN)	PLATE WASHER INSIDE DIAMETER (IN)	PLATE WASHER THICKNESS FOR GRADE 36 ANCHOR RODS (IN)	PLATE WASHER THICKNESS FOR GRADE 55 ANCHOR RODS (IN)	PLATE WASHER THICKNESS FOR GRADE 105 ANCHOR RODS (IN)
3/4	2	13/16	1/4	1/2	3/4
7/8	2 1/2	15/16	3/8	1/2	7/8
1	3	1 1/16	3/8	5/8	1
1 1/8	3	1 3/16	3/8	5/8	1 1/4
1 1/4	3 1/2	1 5/16	1/2	3/4	1 1/4
1 3/8	3/ 1/2	1 7/16	1/2	3/4	1 1/2
1 1/2	4	1 9/16	1/2	7/8	1 1/2
1 3/4	4 1/2	1 13/16	5/8	1	1 3/4
2	5	2 1/16	3/4	1 1/4	2

NOTES:
1. AT CONTRACTOR'S OPTION, OUTSIDE OF PLATE WASHER CAN EITHER BE CIRCULAR OR SQUARE.
2. PLATE WASHERS SHALL BE ASTM A36 MATERIAL.

BLACK & VEATCH

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SHEET NO. 33 OF 226	

S–000–510

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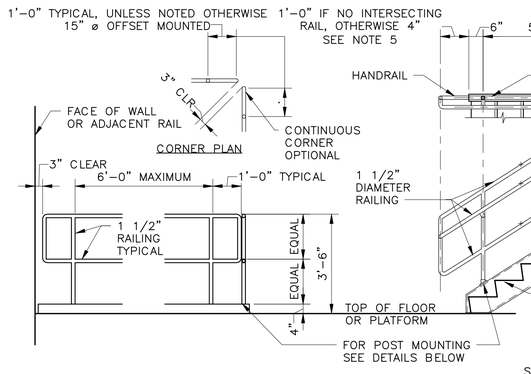
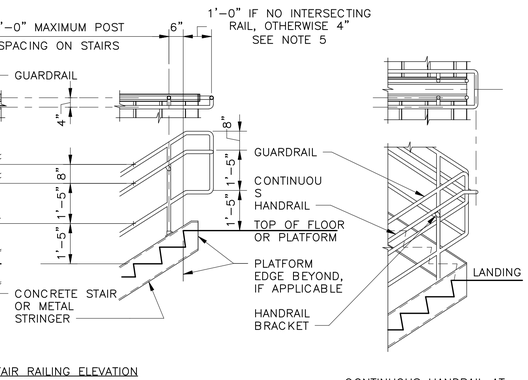
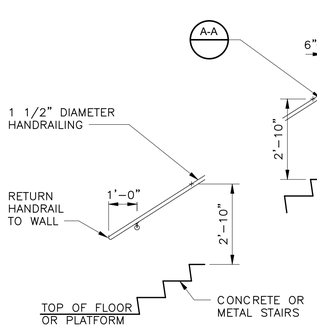
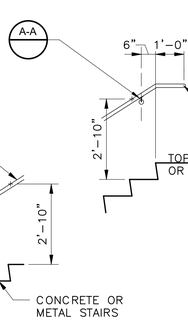
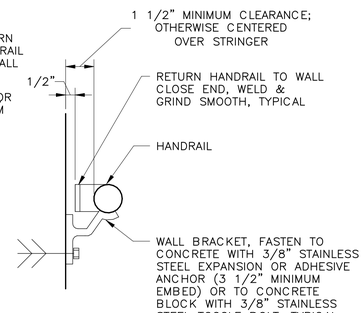
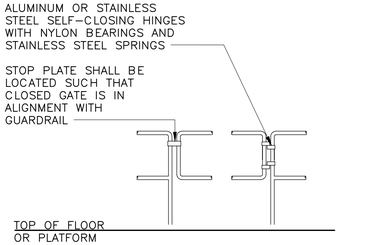












GATE CONFIGURATION TO MATCH ADJACENT RAILING OR AS PROVIDED BY SELF-CLOSING SAFETY GATE MANUFACTURER IN SAME MATERIAL AS GUARDRAIL SWING GATE INWARD WITH HINGES LOCATED TO PROVIDE LEAST OBSTRUCTION TO ACCESS

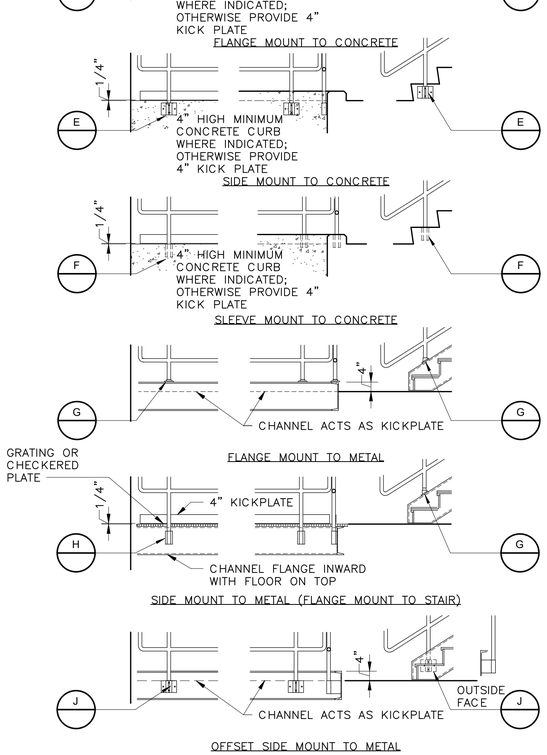
A TWO RAIL GUARDRAIL
3/8" = 1'-0"

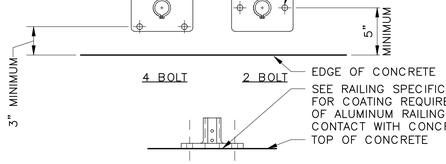
B WALL MOUNTED HANDRAIL
3/8" = 1'-0"

C SELF-CLOSING SWING GATE
NO SCALE

NOTES:

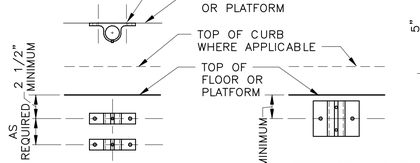
1. RAILING MATERIAL AND FABRICATION SHALL BE AS INDICATED ON THE DESIGN DRAWINGS AND IN THE PROJECTSPECIFICATIONS FOR HANDRAILING AND GUARDRAILING.
2. ALL RAILING AND MOUNTINGS SHALL BE DESIGNED AND FABRICATED IN COMPLIANCE WITH THE MOST STRINGENT REQUIREMENTS OF THE RAILING SPECIFICATIONS, THE APPLICABLE LOCAL BUILDING CODE AND ALL PERTINENT OSHA AND LOCAL SAFETY REGULATIONS.
3. GUARDRAIL AND HANDRAIL SHALL BE DESIGNED AND FABRICATED IN CONFIGURATIONS REQUIRED TO FIT THE LOCATIONS INDICATED ON THE DESIGN DRAWINGS. CONTRACTOR SHALL VERIFY FINAL DIMENSIONS BEFORE FABRICATION.
4. GUARDRAIL MAY BE REPLACED WITH WALL MOUNTED HANDRAIL AT STAIR EDGES AND STRINGERS LOCATED ADJACENT TO WALLS. IF THE OUTSIDE EDGE OF THE STAIR STRINGER IS MORE THAN 3" FROM THE WALL FACE, GUARDRAIL SHALL BE USED.
5. THE INBOARD HANDRAILING AT SWITCHBACK STAIR LANDINGS MUST BE CONTINUOUS FROM ONE STAIR RUN TO THE NEXT. ADJUST INDICATED DIMENSION AS REQUIRED TO ALIGN AND CONNECT RAILINGS OVER THE LANDING EDGE.
6. THE GUARDRAIL AND HANDRAIL CONFIGURATIONS ON THIS SHEET WILL NOT SATISFY ADA REQUIREMENTS FOR HANDICAPPED ACCESSIBILITY. AT LOCATIONS ON THE DESIGN DRAWINGS WHERE CONFORMANCE WITH ADA REQUIREMENTS IS SPECIFICALLY NOTED, THE RAILING SUPPLIER SHALL MODIFY THE CONFIGURATIONS TO COMPLY WITH THE MOST STRINGENT REQUIREMENTS OF ANSI 117.1 UNIFORM FEDERAL ACCESSIBILITY STANDARDS AND THE ACCESSIBILITY STANDARDS OF THE AMERICANS WITH DISABILITIES ACT (ADA).
7. AT LOCATIONS SPECIFICALLY INDICATED AS REMOVABLE RAILING, GUARDRAILING AND MOUNTING DETAILS SHALL BE MODIFIED AS FOLLOWS:
   * RAILING SHALL BE DETAILED IN SHORT LENGTHS THAT WEIGH NO MORE THAN 50 LBS. EACH PIECE SHALL INCLUDE AT LEAST 2, BUT NOT MORE THAN 3 POSTS. RAIL ENDS SHALL BE TERMINATED SIMILAR TO THE END TERMINATION DETAILS THIS SHEET.
   * MOUNTING DETAILS SHALL BE MODIFIED TO PERMIT RAILING PIECES TO BE REMOVED AND REINSTALLED WITHOUT USE OF TOOLS.





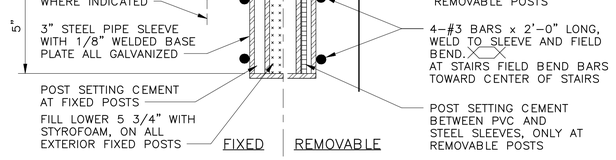
NOTE: USE SIDE-MOUNTED DETAILS UNLESS NOT FEASIBLE TO INSTALL.

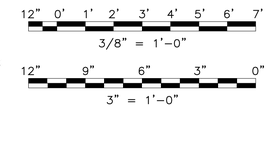
D BASE FLANGE MOUNT
NO SCALE



NOTE: USE SIDE-MOUNTED DETAILS UNLESS NOT FEASIBLE TO INSTALL.

E SIDE MOUNT
NO SCALE





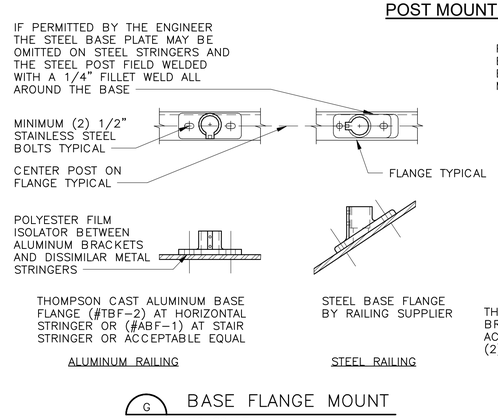
NOTES:

1. FIXED AND REMOVABLE DETAILS SIMILAR EXCEPT AS NOTED.
2. THE REMOVABLE SLEEVE MOUNT DETAIL SHALL NOT BE USED IN WET LOCATIONS SUBJECT TO FREEZING. SUBSTITUTE A REMOVABLE BASE FLANGE OR SIDE MOUNT DETAIL.

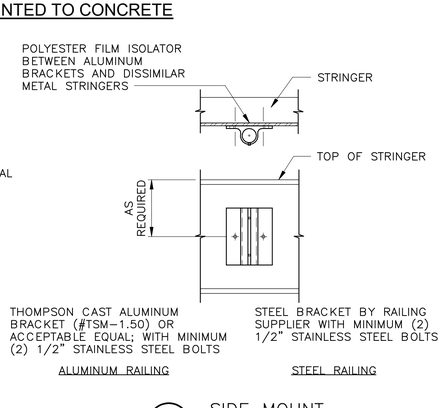
F SLEEVE MOUNT
3" = 1'-0"

POST MOUNTED TO CONCRETE

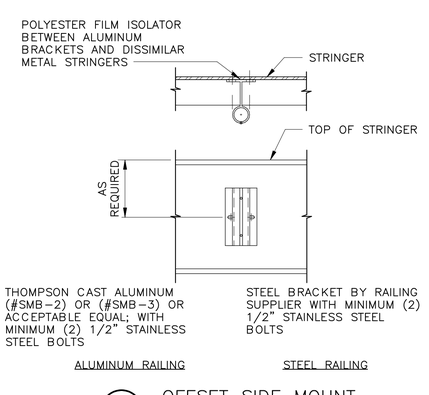
POST MOUNTED TO METAL



G BASE FLANGE MOUNT
NO SCALE



H SIDE MOUNT
NO SCALE



J OFFSET SIDE MOUNT
NO SCALE

S-000-511

BLACK & VEATCH

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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

GUARDRAIL & HANDRAILING DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 34 OF 226	

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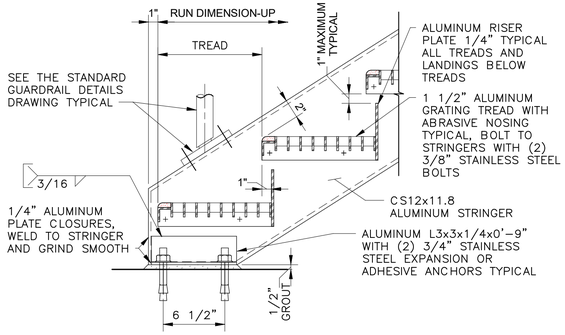
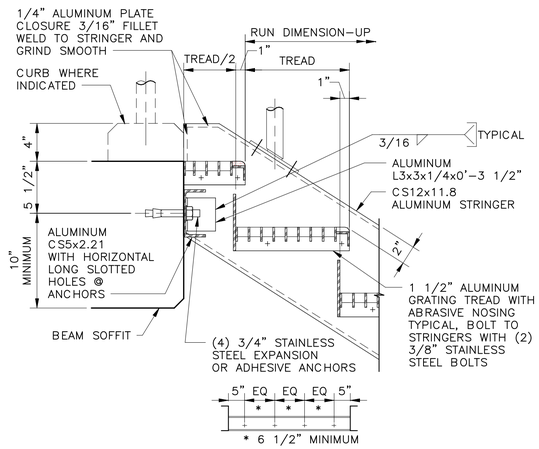
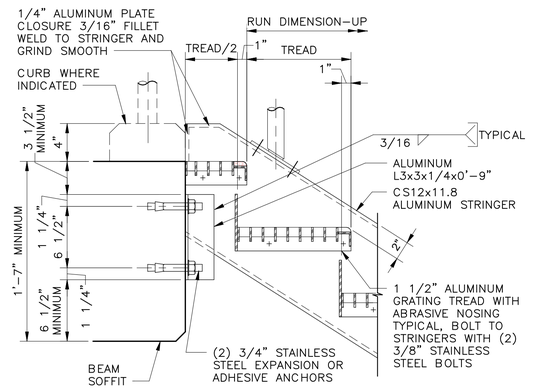


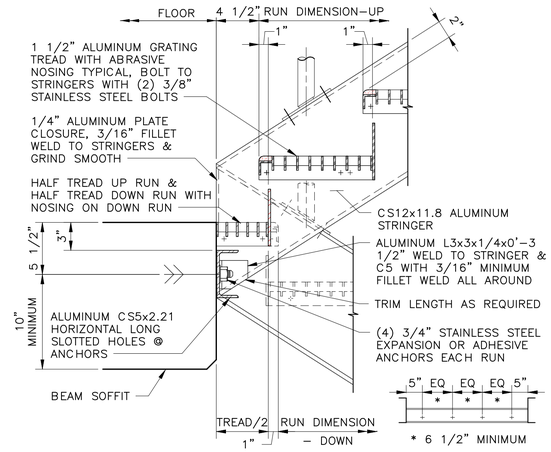
A DETAIL
1 1/2" = 1'-0"



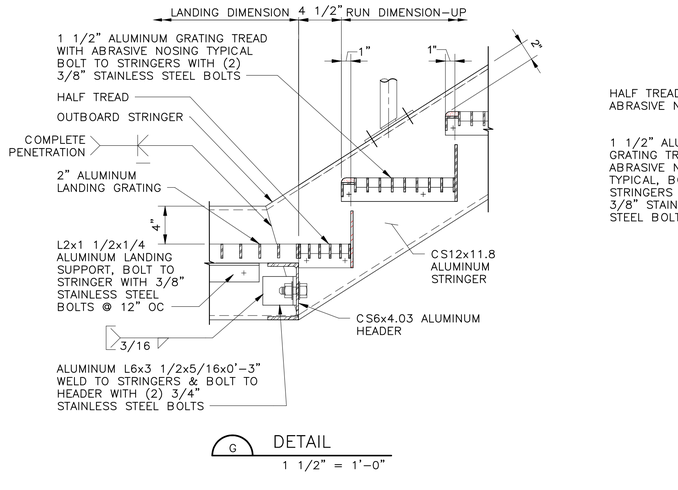
B DETAIL
1 1/2" = 1'-0"



BB ALTERNATE DETAIL
1 1/2" = 1'-0"

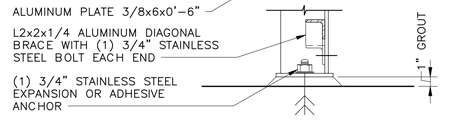


C DETAIL
1 1/2" = 1'-0"



D DETAIL
1 1/2" = 1'-0"

E DETAIL
1 1/2" = 1'-0"

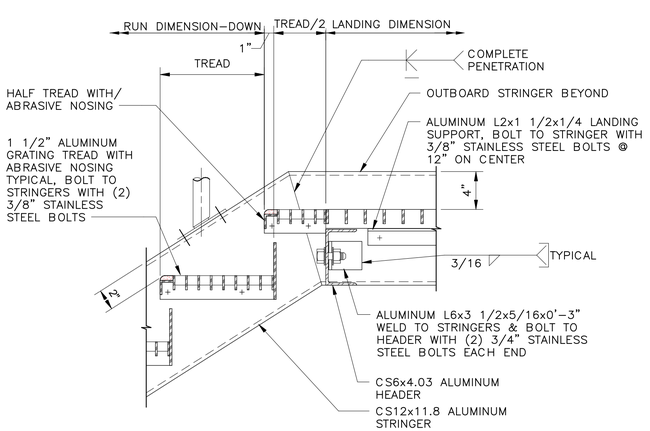


F DETAIL
1 1/2" = 1'-0"

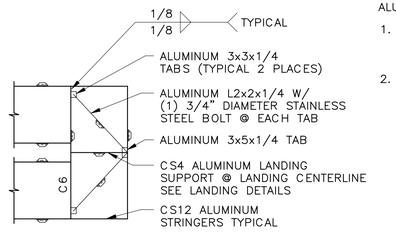
STAIR DESIGN NOTES:

1. STAIRS SHALL BE DESIGNED BY THE SUPPLIER IN GENERAL ACCORDANCE WITH DETAILS INDICATED ON THESE DESIGN DRAWINGS. THE DESIGN SHALL COMPLY WITH ALL APPLICABLE PROVISIONS OF THE LOCAL BUILDING CODE, ANSI A117.1 AND OSHA.
2. THE SHOP DRAWINGS SHALL BE SEALED BY AN ENGINEER REGISTERED IN THE STATE OF THE PROJECT. IF REQUESTED, SEALED CALCULATIONS SHALL BE SUBMITTED FOR REVIEW.
3. THE COMPLETED FABRICATIONS SHALL SUPPORT THE LOADS AND DEFLECTION CRITERIA INDICATED IN THE STRUCTURAL METALS SPECIFICATION.
4. THE STAIR DESIGN AND DETAILS SHALL BE COORDINATED WITH THE HANDRAILING AND GUARDRAILING SUPPLIED. STAIR MEMBERS SHALL BE ADEQUATE TO ACCEPT LOADS FROM THE RAIL POSTS BASED UPON THE CRITERIA INDICATED IN THE RAILING SPECIFICATIONS.
5. CONNECTIONS TO THE SUPPORTING STRUCTURE SHALL BE ADEQUATE TO TRANSFER ALL LOADINGS, AND SHALL BE DESIGNED IN ACCORDANCE WITH ALL APPLICABLE PROVISIONS OF THE AISC MANUAL AND ACI 318. THE NUMBER AND TYPE OF CONNECTIONS SHALL COMPLY AT A MINIMUM, WITH THESE DESIGN DRAWINGS. ALL NECESSARY BRACKETS, BOLTS, AND ANCHORS SHALL BE PROVIDED.
6. STAIR RISER HEIGHTS SHALL NOT BE LESS THAN 4 INCHES OR GREATER THAN 11 INCHES. THE MINIMUM TREAD DEPTH IS 11 INCHES. STAIR TREADS AND RISERS SHALL BE OF UNIFORM SIZE AND SHAPE. THE TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTH SHALL NOT EXCEED 3/8 INCH IN A STAIR WAY FLIGHT.

G DETAIL
1 1/2" = 1'-0"



H DETAIL
1 1/2" = 1'-0"



TYPICAL LANDING BRACING
1 1/2" = 1'-0"

ALUMINUM GRATING STAIR NOTES:

1. ALL ALUMINUM SHAPES SHALL BE ALUMINUM ASSOCIATION STANDARD STRUCTURAL SHAPES.
2. DESIGNATION LEGEND FOR ALUMINUM SHAPES: CS 12 x 11.8
   CHANNEL
   DEPTH
   MEMBER WEIGHT LB/FT
   L 5 x 5 x 3/8
   ANGLE
   LEG LENGTH
   LEG LENGTH
   LEG THICKNESS
3. WELDS NOT DIMENSIONED ON THE DRAWINGS SHALL BE SIZED TO DEVELOP THE FULL STRENGTH OF THE LEAST STRENGTH COMPONENT OF THE CONNECTION.

12" 9" 6" 3" 0" 1'
1 1/2" = 1'-0"

BLACK & VEATCH

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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

TYPICAL STAIR DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
S-000-512	SHEET NO. 35 OF 226

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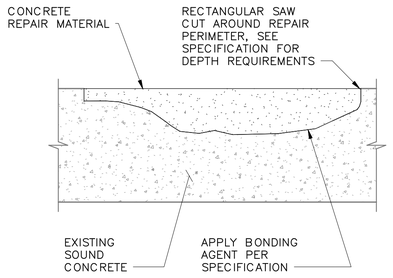
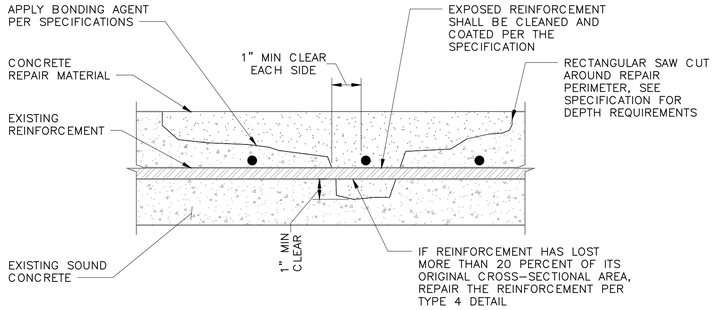


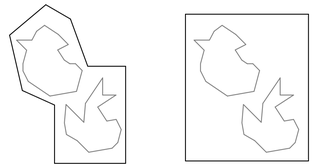
TYPE 1 – NO EXPOSED REINFORCEMENT



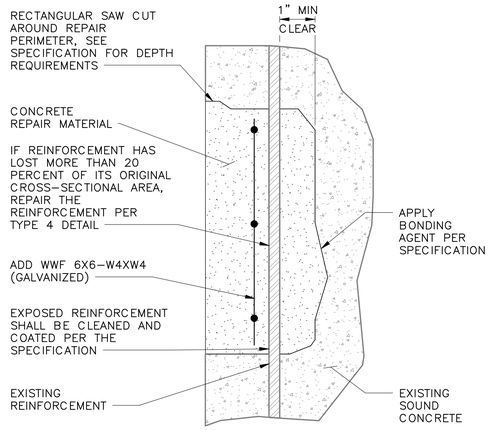
TYPE 2 – MINOR EXPOSED REINFORCEMENT

GENERAL REPAIR NOTES

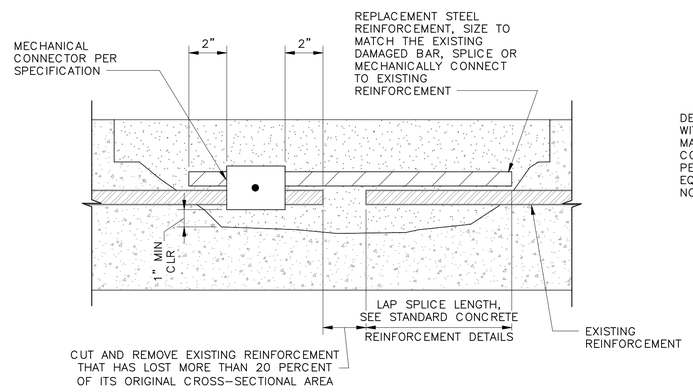
1. REPAIR PRODUCTS SHALL BE AS INDICATED IN THE PROJECT SPECIFICATIONS.
2. REPAIR ACTIVITIES SUCH AS CLEANING, SURFACE PREPARATION, PRODUCT APPLICATION, AND CURING SHALL BE AS INDICATED IN THE PROJECT SPECIFICATIONS.
3. THE CONCRETE SURFACE REPAIR DETAILS ARE APPLICABLE TO EXISTING CONCRETE THAT IS DAMAGED. 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.



1 FIGURE
NO SCALE



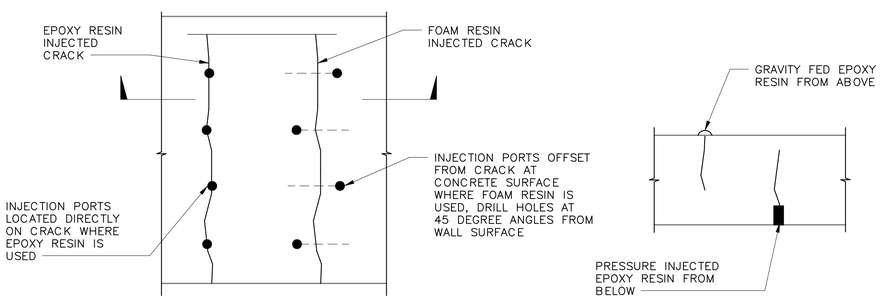
TYPE 3 – MAJOR EXPOSED REINFORCEMENT



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

A CONCRETE SURFACE REPAIR
NO SCALE

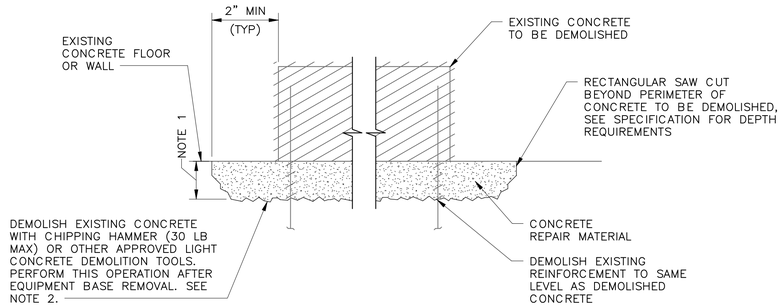


WALL ELEVATION

SLAB SECTION

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

C CONCRETE CRACK REPAIR
NO SCALE



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
NO SCALE

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.

D TYPICAL MISCELLANEOUS REPAIR NOTES
NO SCALE

BLACK & VEATCH

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STRUCTURAL

TYPICAL CONCRETE CRACK AND SURFACE REPAIR DETAILS & NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 36 OF 226	

S–000–513

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SCHEDULE OF SPECIAL INSPECTIONS

SYSTEM OR MATERIAL	INSPECTION				REMARKS	INSPECTION AGENT NO.
	BUILDING CODE REFERENCE	OTHER REFERENCE	FREQUENCY			
			CONTINUOUS	PERIODIC		
SOILS						
VERIFY MATERIAL BELOW FOUNDATION IS ADEQUATE TO ACHIEVE DESIGN BEARING CAPACITY, FREE OF LOOSE, DELETERIOUS OR FOREIGN MATERIAL.	1705.6			X (FOUNDATION EXCAVATION COMPLETE)	SEE EXCAVATION AND FILL FOR STRUCTURES AND SPECIFICATION SECTION.	
VERIFY EXCAVATIONS FOR STRUCTURES ARE EXTENDED TO PROPER DEPTH, PROPER SIZE AND MATERIAL.	1705.6			X (FOUNDATION EXCAVATION COMPLETE)		
PRIOR TO PLACEMENT OF CONTROLLED FILL, INSPECT SUBGRADE AND VERIFY SITE IS PROPERLY PREPARED.	1705.6			X (PRIOR TO PLACEMENT OF FILL)	SEE EXCAVATION AND FILL FOR STRUCTURES AND SPECIFICATION SECTION.	
PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIAL TO VERIFY COMPLIANCE WITH SPECIFICATIONS.	1705.6			X (DURING PLACEMENT OF FILL)	SEE EXCAVATION AND FILL FOR STRUCTURES AND SPECIFICATION SECTION.	
VERIFY MATERIALS, DENSITIES, AND LIFT THICKNESS DURING PLACEMENT AND COMPACTION OF CONTROLLED FILL FOR FOUNDATIONS. NOTE THE EXCEPTION OF ARTICLE 1705.6.	1705.6		X		SEE EXCAVATION AND FILL FOR STRUCTURES AND SPECIFICATION SECTION.	
CAST-IN-PLACE DEEP FOUNDATION ELEMENTS (AUGER CAST PILES AND DRILLED SHAFTS)						
MATERIAL VERIFICATION	1705.8		X			
DRILLING OPERATIONS AND MAINTAIN RECORDS FOR EACH PILE OR SHAFT.	1705.8		X			
INSTALLATION: LOCATION, PLUMBNESS, DIAMETERS, BELL DIAMETER, LENGTHS, EMBEDMENT INTO BEDROCK, ADEQUATE END BEARING STRATA CAPACITY, RECORD OF CONCRETE OR GROUT VOLUMES.	1705.8		X		REFER TO TABLE FOR ADDITIONAL MATERIAL-SPECIFIC REQUIREMENTS. SEE BELOW.	
STRUCTURAL LOAD-BEARING MEMBERS FABRICATED IN A SHOP						
CONFIRM THE "FABRICATOR'S CERTIFICATE OF COMPLIANCE" HAS BEEN RECEIVED AND ACCEPTED BY RDPRC AND AHJ FOR THE FABRICATED ITEMS.	1704.2.5.1 1704.5 1705.11		X		AT END OF FABRICATION, AND PRIOR TO INSTALLATION OF THE SHOP FABRICATED ITEMS IN THE WORK.	
CONCRETE (INSPECTIONS NOT REQUIRED FOR NONSTRUCTURAL CONCRETE SLABS SUPPORTED DIRECTLY ON THE GROUND)						
REINFORCING STEEL AND PRESTRESSING TENDON CONDITION (FREE OF OIL, DIRT AND LOOSE RUST AND THAT PROPERLY COATED AND/OR SHEATHED) AND PLACEMENT. VERIFY SIZE, SPACING, BAR CLEARANCES, COVER, AND ADEQUATE SUPPORT TO PREVENT DISPLACEMENT DURING CONCRETE PLACEMENT. VERIFY DOWELS FOR WORK ABOVE ARE PROPERLY ALIGNED AND SPACED TO MATCH OTHER WORK.	1705.3	ACI 318 (CH 20) ACI 318 (25.2-25.3) ACI 318 (26.6.1-26.6.3)	X (PRIOR TO CLOSING OF FORMS OR DELIVERY OF CONCRETE, FOR EACH PLACEMENT)			
CAST-IN-PLACE ANCHOR BOLTS PRIOR TO AND DURING PLACEMENT OF CONCRETE.	1705.3	ACI 318 (26.7.2)	X		ALL BOLTS VISUALLY INSPECTED TO VERIFY ANCHOR DIAMETER, LOCATION, AND EMBEDMENT LENGTH.	
VERIFY USE OF APPROVE MIX DESIGN(S).	1705.3	ACI 318 (26.4.3-26.4.4)		X	RDPRC TO APPROVE CONTRACTOR'S PROPOSED MIX DESIGN PRIOR TO CONSTRUCTION. INSPECTOR TO VERIFY FROM CONCRETE DELIVERY TICKET THAT THE APPROPRIATE MIX HAS BEEN PROVIDED PRIOR TO PLACEMENT.	
FORMWORK SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED, CONSTRUCTION JOINTS PROPERLY PREPARED.	1705.3	ACI 318 (26.11.1.2(b))		X (PRIOR TO DELIVERY OF CONCRETE FOR EACH PLACEMENT)		
PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	1705.3	ASTM C31 ASTM C172 ACI 318 (26.12)		X	SAMPLING AND TESTING FREQUENCY SHALL BE AS INDICATED IN THE CAST-IN-PLACE CONCRETE SPECIFICATION.	
CONCRETE PLACEMENT.	1705.3	ACI 318(26.5.2)	X		VERIFY THAT WATER ADDED AT THE SITE DOES NOT EXCEED THAT ALLOWED BY THE MIX DESIGN. VERIFY CONVEYING, DEPOSITING, AND CONSOLIDATION OF CONCRETE. OBSERVE PLACEMENT PROCEDURES FOR EVIDENCE OF SEGREGATION, POSSIBLE COLD JOINTS, DISPLACEMENT OF REINFORCING OR FORMS, AND PROPER SUPPORT OF EMBEDDED ITEMS, ANCHOR BOLTS, ETC.	

SCHEDULE OF SPECIAL INSPECTIONS

SYSTEM OR MATERIAL	INSPECTION				REMARKS	INSPECTION AGENT NO.
	BUILDING CODE REFERENCE	OTHER REFERENCE	FREQUENCY			
			CONTINUOUS	PERIODIC		
CONCRETE (INSPECTIONS NOT REQUIRED FOR NONSTRUCTURAL CONCRETE SLABS SUPPORTED DIRECTLY ON THE GROUND) CONTINUED						
CONCRETE CURING - MAINTAIN TEMPERATURE AND TECHNIQUES	1705.3	ACI 318 (26.5.3-26.5.5)		X (DURING HOT, COLD, AND WINDY CONDITIONS)	FOR WET-CURING, CHECK AT THE BEGINNING OF EACH DAY DURING 7 DAY CURING PERIOD.	
STRUCTURAL STEEL						
MAIN STRUCTURAL STEEL ELEMENTS: REVIEW MATERIAL TEST REPORTS.	1705.2.1	AISC 360 (A3.1) AISC 360 (N5.2)		X	3 PIECES FROM EACH LOT; VERIFY AT FABRICATOR'S SHOP PRIOR TO CUTTING.	
ANCHOR RODS AND THREADED RODS: REVIEW MATERIAL TEST REPORTS.	1705.2.1	AISC 360 (A3.4) AISC 360 (N5.2)		X	EACH LOT.	
GALVANIZED STEEL MEMBERS: INSPECT EXPOSED CUT SURFACES OF GALVANIZED MAIN MEMBERS AND RECTANGULAR HSS FOR CRACKS AFTER GALVANIZING.	1705.2.1				EACH MAIN MEMBER AND HSS SHAPE. INSPECT AT JOBSITE.	
VERIFY THE FOLLOWING PRIOR TO WELDING:						
WELDING CONSUMABLES: REVIEW MANUFACTURER'S CERTIFICATIONS.	1705.2.1	AISC 360 (A3.5) AISC 360 (N5.2) AISC 360 (N5.4)		X	3 RODS FROM EACH LOT: VERIFIED AT FABRICATOR'S SHOP AND AT JOBSITE.	
WELDING FILLER METALS AND FLUXES: REVIEW MANUFACTURER'S PRODUCT DATA SHEETS OR CATALOG DATA.	1705.2.1	AISC 360 (N5.2)		X	EACH LOT. REVIEW PRODUCTS, LIMITATIONS OF USE, RECOMMENDED OR TYPICAL WELDING PARAMETERS, AND STORAGE AND EXPOSURE REQUIREMENTS, INCLUDING BAKING, IF APPLICABLE.	
WELDING PROCEDURES SPECIFICATIONS (WPS'S): REVIEW PROCEDURES.	1705.2.1	AISC 360 (N5.2) AISC 360 (N5.4)		X	FOR EACH WELDED JOINT OR MEMBER.	
WELDING PROCEDURES NOT PREQUALIFIED PER AWS D1.1 OR D1.3: REVIEW PROCEDURE QUALIFICATIONS RECORDS (PQR'S).	1705.2.1	AISC 360 (N5.7)		X		
WELDING PERSONNEL QUALIFICATIONS RECORDS (WPQR'S) AND CONTINUITY RECORDS: REVIEW WELDER QUALIFICATIONS.	1705.2.1	AISC 360 (N5.2) AISC 360 (N5.4)		X	PERFORM FOR EACH WELDER.	
WELDER IDENTIFICATION SYSTEM: REVIEW SYSTEM OF MARKING JOINTS FOR PURPOSE OF IDENTIFYING WELDERS.	1705.2.1	AISC 360 (N5.4)		X		
FIT UP OF GROOVE WELDS: OBSERVE JOINT PREPARATIONS, DIMENSIONS, CLEANLINESS, TACKING, AND BACKING.	1705.2.1	AISC 360 (N5.4)		X		

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FB NO. P-6182

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PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
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LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

SCHEDULE OF SPECIAL INSPECTIONS (SHEET 1 OF 3)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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S-000-514

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SCHEDULE OF SPECIAL INSPECTIONS

SYSTEM OR MATERIAL	INSPECTION: BUILDING CODE REFERENCE	INSPECTION: OTHER REFERENCE	INSPECTION: FREQUENCY: CONTINUOUS	INSPECTION: FREQUENCY: PERIODIC	REMARKS	INSPECTION AGENT NO.
VERIFY THE FOLLOWING PRIOR TO WELDING:						
FIT UP OF CJP GROOVE WELDS OF HSS T–, Y–, AND K–JOINTS WITHOUT BACKING: OBSERVE JOINT PREPARATIONS, DIMENSIONS, CLEANLINESS, AND TACKING.	1705.2.1	AISC 360 (N5.4)		X		
ACCESS HOLES: CONFIGURATION AND FINISH.	1705.2.1	AISC 360 (N5.4)		X		
FIT UP OF FILLET WELDS: OBSERVE DIMENSIONS, CLEANLINESS, AND TACKING.	1705.2.1	AISC 360 (N5.4)		X		
VERIFY THE FOLLOWING DURING WELDING:						
WELDING CONSUMABLES: PACKING AND APPROPRIATE EXPOSURE CONTROL.	1705.2.1	AISC 360 (N5.4)		X		
NO WELDING OVER CRACKED TACK WELDS.	1705.2.1	AISC 360 (N5.4)		X		
ENVIRONMENTAL CONDITIONS: WIND SPEED, PRECIPITATION, AND AMBIENT TEMPERATURE LIMITS ARE OBSERVED.	1705.2.1	AISC 360 (N5.4)		X		
WELDING PROCEDURE SPECIFICATIONS SPECIFICATIONS (WPS'S): SETTINGS ON WELDING EQUIPMENT, TRAVEL SPEED, SELECTED WELDING MATERIALS, SHIELDING GAS TYPE/FLOW RATE, PREHEAT APPLIED, INTERPASS TEMPERATURE MAINTAINED (MIN/MAX), PROPER POSITION.	1705.2.1	AISC 360 (N5.4)		X		
WELDING TECHNIQUES: INTERPASS AND FINAL CLEANING, EACH PASS IS WITHIN PROFILE LIMITATIONS, EACH PASS MEETS QUALITY REQUIREMENTS.	1705.2.1	AISC 360 (N5.4)		X		
HEADED STUD ANCHORS: PLACEMENT AND INSTALLATION OF ANCHORS.	1705.2.1	AISC 360 (N5.4)		X	OBSERVE ONCE DAILY FOR EACH WELDER AND VISUALLY INSPECT ALL ANCHORS AT THE COMPLETION OF THEIR WELDING.	
VERIFY THE FOLLOWING AFTER WELDING:						
WELDS CLEANED	1705.2.1	AISC 360 (N5.4)		X		
WELD SIZE, LENGTH AND LOCATION.	1705.2.1	AISC 360 (N5.4)	X			
WELDS MEET VISUAL INSPECTION CRITERIA (CRACK PROHIBITION, WELD/BASE METAL FUSION, CRATER, CROSS SECTION, WELD PROFILES, WELD SIZE, UNDERCUT, POROSITY)	1705.2.1	AISC 360 (N5.4)	X			
ARC STRIKES	1705.2.1	AISC 360 (N5.4)	X			
K–AREA	1705.2.1	AISC 360 (N5.4)	X		WHEN WELDING DOUBLER, CONTINUITY, OR STIFFENER PLATES IN THE K–AREA OF A WEB, VISUALLY INSPECT THE WEB K–AREA FOR CRACKS WITHIN 3 INCHES OF THE WELD.	
WELD ACCESS HOLES IN ROLLED HEAVY SHAPES AND BUILT–UP HEAVY SHAPES.	1705.2.1	AISC 360 (N5.4)	X		VISUALLY INSPECT THE WELD ACCESS HOLES FOR CRACKS AFTER WELDING.	
BACKING REMOVED AND WELD TABS REMOVED.	1705.2.1	AISC 360 (N5.4)	X			
REPAIR ACTIVITIES	1705.2.1	AISC 360 (N5.4)	X			
DOCUMENT ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER.	1705.2.1	AISC 360 (N5.4)	X			
NO PROHIBITED WELDS HAVE BEEN ADDED WITHOUT APPROVAL OF EOR.	1705.2.1	AISC 360 (N5.4)		X		
VERIFY THE FOLLOWING PRIOR TO BOLTING:						
FASTENERS: REVIEW MANUFACTURER'S CERTIFICATIONS.	1705.2.1	AISC 360 (A3.3) AISC 360 (N5.2) AISC 360 (N5.6)		X (3 BOLTS FROM EACH LOT)	VERIFIED AT JOBSITE.	
FASTENERS: REVIEW MARKINGS PER ASTM REQUIREMENTS.	1705.2.1	AISC 360 (N5.6)		X		
CORRECT FASTENERS SELECTED FOR JOINT DETAIL (GRADE, TYPE, BOLT, LENGTH).	1705.2.1	AISC 360 (N5.6)		X		
CORRECT BOLTING PROCEDURE SELECTED FOR JOINT DETAIL.	1705.2.1	AISC 360 (N5.6)		X		
CONNECTING ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION (FOR SLIP–CRITICAL JOINTS) AND HOLE PREPARATION.	1705.2.1	AISC 360 (N5.6) RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH–STRENGTH BOLTS (SECTION 9.3)		X		
PRE–INSTALLATION VERIFICATION TESTING BY INSTALLING PERSONNEL.	1705.2.1	AISC 360 (N5.6) RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH–STRENGTH BOLTS (SECTION 9.3)		X	REQUIRED FOR ALL PRETENSIONED AND SLIP–CRITICAL JOINTS.	
PROTECTED STORAGE FOR BOLTS, NUTS, WASHERS, OTHER FASTENER COMPONENTS	1705.2.1	AISC 360 (N5.6)		X		

SCHEDULE OF SPECIAL INSPECTIONS

SYSTEM OR MATERIAL	INSPECTION: BUILDING CODE REFERENCE	INSPECTION: OTHER REFERENCE	INSPECTION: FREQUENCY: CONTINUOUS	INSPECTION: FREQUENCY: PERIODIC	REMARKS	INSPECTION AGENT NO.
VERIFY THE FOLLOWING DURING BOLTING:						
FASTENER ASSEMBLIES PLACED IN ALL HOLES AND WASHERS AND NUTS POSITIONED AS REQUIRED.	1705.2.1	AISC 360 (N5.6)		X		
FASTENER COMPONENT NOT TURNED BY THE WRENCH IS PREVENTED FROM ROTATING.	1705.2.1	AISC 360 (N5.6)		X		
VERIFY THE FOLLOWING AFTER BOLTING:						
SNUG–TIGHT JOINTS.	1705.2.1	AISC 360 (N5.6) RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH–STRENGTH BOLTS (SECTION 9.1)		X	ALL CONNECTIONS VISUALLY INSPECTED TO CONFIRM THAT PILES OF THE CONNECTED ELEMENTS ARE IN FIRM CONTACT AND WASHERS HAVE BEEN USED. NUTS SHALL NOT BE TURNABLE WITHOUT A WRENCH.	
AFTER BOLTING, DOCUMENT ACCEPTANCE OR REJECTION OF BOLTED CONNECTIONS.	1705.2.1	AISC 360 (N5.6)		X		
VERIFICATION OF STEEL FRAME BRACES, STIFFENERS, MEMBER LOCATIONS AND JOINT DETAILS.	1705.2.1	AISC 360 (N5.6)		X	AT 50% COMPLETE AND 100% COMPLETE FOR EACH STRUCTURE.	
POST–INSTALLED ANCHORS – ADHESIVE ANCHORS IN TO CONCRETE						
ADHESIVE ANCHORS INSTALLED IN OVERHEAD, UPWARDLY INCLINED, OR HORIZONTAL POSITIONS: VERIFY ANCHOR TYPE, SIZE, DIMENSIONS, LOCATION, SPACING, EDGE DISTANCE, EMBEDMENT DEPTH, TIGHTENING TORQUE, HOLE DIMENSIONS, HOLE CLEANING PROCEDURE, CONCRETE COMPRESSIVE STRENGTH, CONCRETE THICKNESS, ADHESIVE EXPIRATION DATE, AND ADHERENCE TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.	1705.3 1703.4.2 1705.1.1	MANUFACTURER'S RESEARCH REPORT	X			
ADHESIVE ANCHORS INSTALLED IN OTHER POSITIONS: VERIFY ANCHOR TYPE, SIZE, DIMENSIONS, LOCATION, SPACING, EDGE DISTANCE, EMBEDMENT DEPTH, TIGHTENING TORQUE, HOLE DIMENSIONS, HOLE CLEANING PROCEDURE, CONCRETE, COMPRESSIVE STRENGTH, CONCRETE THICKNESS, ADHESIVE IDENTIFICATION, ADHESIVE EXPIRATION DATE, AND ADHERENCE TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.	1705.3 1703.4.2 1705.1.1	MANUFACTURER'S RESEARCH REPORT		X	INSPECTION REQUIRED AT START OF JOB FOR EACH TYPE AND SIZE OF ADHESIVE ANCHOR BY CONSTRUCTION PERSONNEL ON SITE. SUBSEQUENT INSTALLATIONS OF THE SAME ANCHOR TYPE AND SIZE BY THE SAME PERSONNEL SHALL BE INSPECTED PERIODICALLY, UNLESS CONTINUOUS INSPECTIONS ARE MANDATED BY THE MANUFACTURER'S RESEARCH REPORT. ANY CHANGE IN THE ANCHOR PRODUCT BEING INSTALLED OR THE PERSONNEL PERFORMING THE INSTALLATION SHALL REQUIRE ANOTHER INITIAL INSPECTION.	

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FB NO. P–6182

STATE OF TEXAS
ELIAS A. POURLADIAN
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LIFT STATIONS RENEWAL AND REHABILITATION

STRUCTURAL

SCHEDULE OF SPECIAL INSPECTIONS (SHEET 2 OF 3)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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NASIR FAZLJOO, P.E.	
SHEET NO. 38 OF 226	

S–000–515

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SCHEDULE OF SPECIAL INSPECTIONS

SYSTEM OR MATERIAL	INSPECTION: BUILDING CODE REFERENCE	INSPECTION: OTHER REFERENCE	FREQUENCY: CONTINUOUS	FREQUENCY: PERIODIC	REMARKS	INSPECTION AGENT NO.
ALUMINUM						
MATERIAL VERIFICATION OF STRUCTURAL ALUMINUM: CERTIFIED MILL TEST REPORTS	1705.1.1			X (EACH MILL ORDER)		
MATERIAL VERIFICATION OF BOLTS: MANUFACTURER'S CERTIFIED TEST REPORTS.	1705.1.1			X (EACH LOT)		
MATERIAL VERIFICATION OF WELD FILLER METALS	1705.1.1	AWS D1.2 (SECTION 5)		X (3 RODS FROM EACH LOT)	CHECKED AT FABRICATOR'S SHOP AND AT JOBSITE.	
VERIFY USE OF PROPER WPS'S.	1705.1.1	AWS D1.2 (SECTION 5)		X (PRIOR TO START OF WORK)	OBTAIN COPY OF WELDING PROCEDURE SPECIFICATIONS.	
VERIFY WELDER QUALIFICATIONS.	1705.1.1	AWS D1.2 (SECTION 5)		X (PRIOR TO START OF EACH WELDER'S WORK)	OBTAIN COPY OF QUALIFICATION RECORDS.	
COMPLETE AND PARTIAL PENETRATION GROOVE WELDS.	1705.1.1	AWS D1.2 (SECTION 5)	X			
MULTIPASS FILLET WELDS.	1705.1.1	AWS D1.2 (SECTION 5)	X			
SINGLE PASS FILLET WELDS.	1705.1.1	AWS D1.2 (SECTION 5)		X (OBSERVE ONCE DAILY FOR EACH WELDER AND VISUALLY INSPECT ALL WELDS AT THE COMPLETION OF EACH WELD)		
PRE-ENGINEERED STRUCTURES						
FABRICATION AND ERECTION	1705.1.1				REFER TO TABLE FOR FABRICATOR, WELDING, AND HIGH STRENGTH BOLTING SPECIAL INSPECTION REQUIREMENTS.	

SYSTEM OR MATERIAL	TESTING: BUILDING CODE REFERENCE	TESTING: OTHER REFERENCE	FREQUENCY	REMARKS	INSPECTION AGENT NO.
GEOTECHNICAL					
CLASSIFICATION OF CONTROLLED FILL MATERIAL	1705.6	ASTM D2488	ONE PER STRATUM OF ON-SITE EXCAVATED MATERIAL. ONE PER COMMON SUPPLY OF OFF-SITE MATERIAL.	SEE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION SECTION.	
FOUNDATION SUBGRADE, IN-PLACE DENSITY	1705.6	ASTM D2922 ASTMD1556 OR ASTM D2167 (10% OF TESTS TO BE ASTM D1556 OR ASTM D2167)	ONE TEST PER 1,000 SY, OR AS REQUIRED IN THE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION. MIN ONE PER FOUNDATION FOR FOUNDATIONS OVER 10 SY	SEE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION SECTION.	
CONTROLLED FILL BENEATH FOUNDATIONS, IN-PLACE DENSITY.	1705.6	ASTM D2922 ASTMD1556 OR ASTM D2167 (10% OF TESTS TO BE ASTM D1556 OR ASTM D2167)	ONE TEST PER 200 SY, OR AS REQUIRED IN THE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION. MIN ONE PER FOUNDATION FOR FOUNDATIONS OVER 10 SY	SEE EXCAVATION AND FILL FOR STRUCTURES SPECIFICATION SECTION.	
CONCRETE					
CONCRETE STRENGTH	1705.3	ASTM C31 ASTM C39 ASTM C172	SEE CONCRETE SPECIFICATION.	SEE CONCRETE SPECIFICATION FOR QUANTITY OF CYLINDERS.	
CONCRETE SLUMP, AIR CONTENT, TEMPERATURE, UNIT WEIGHT, WATER SOLUBLE CHLORIDE ION, SHRINKAGE.	1705.3	ASTM C31 ASTM C138 ASTM C143 ASTM C157 ASTM C172 ASTM C231 ASTM C1064 ASTM C1218	SEE CONCRETE SPECIFICATION.		
STEEL					
PENETRANT (PT), MAGNETIC PARTICLE (MT), RADIOGRAPHIC (RT) AND ULTRASONIC (UT) TESTING OF WELDS.	1705.2	PT-AWS D1.1 (6.10 & 6.14.5) MT-AWS D1.1 (6.10 & 6.14.4) RT-AWS D1.1 (6.12 & 6.14.1) UT-AWS D1.1 (6.13 & 6.14.3)			
ALUMINUM					
LIQUID PENETRANT (PT) AND RADIOGRAPHIC (RT) TESTING OF WELDS.		PT-AWS D1.2 (5.7.5) RT-AWS D1.2 (5.10 & 5.15)			

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STRUCTURAL

SCHEDULE OF SPECIAL INSPECTIONS (SHEET 3 OF 3)

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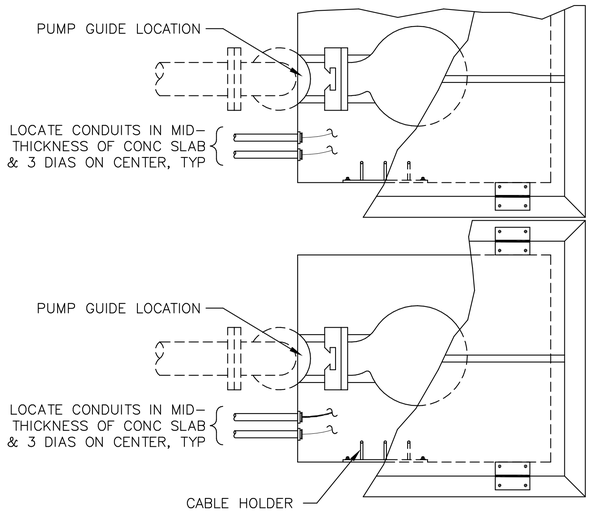
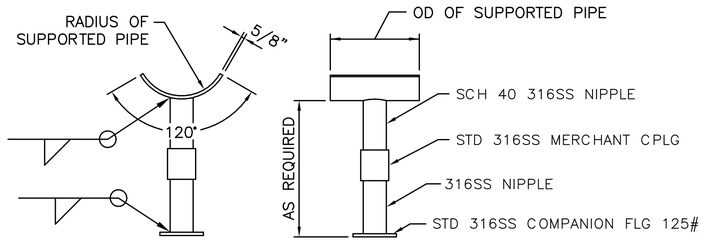
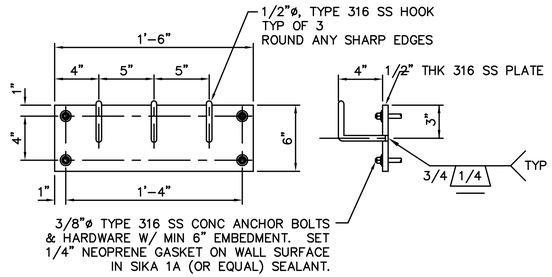




TYP ADJUSTABLE PIPE SUPPORT

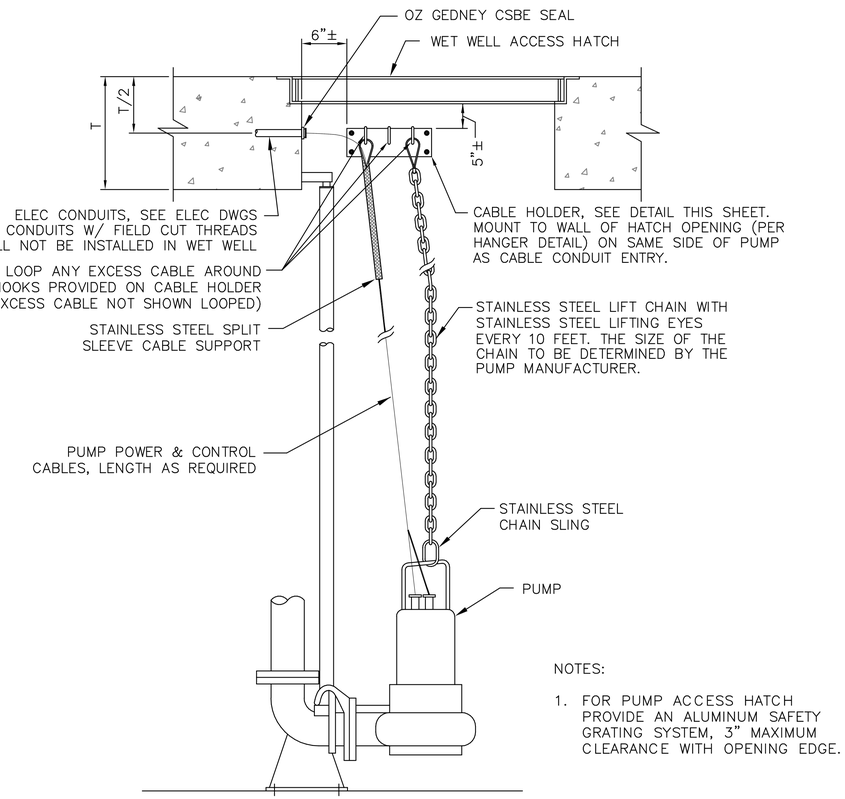
NOTES:
1 ADJUSTABLE PIPE SUPPORT ASSEMBLY TO BE 316SS.
2. PROVIDE MEANS OF PREVENTING DISSIMILAR METAL CONTACT.

DETAIL 2 Z0C02



TYPICAL CABLE HOLDER ASSY

DETAIL 14 Z0C02

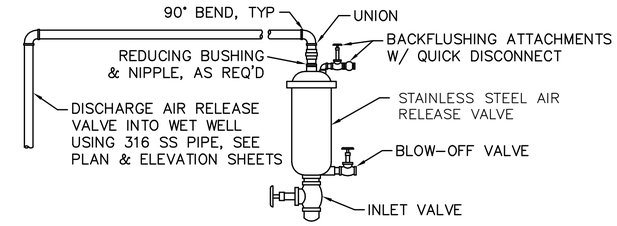


NOTES:

1. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.

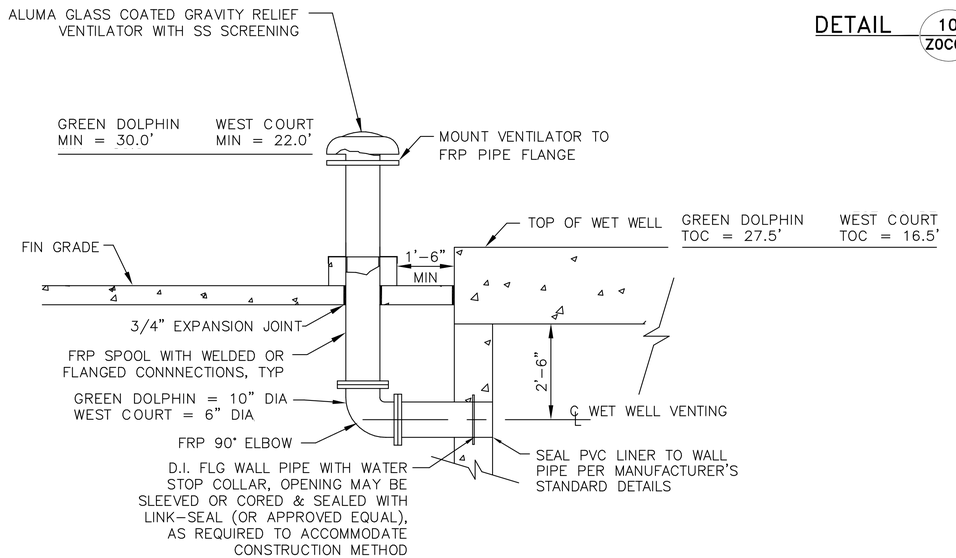
TYP PUMP LIFTING & CABLING DETAIL

DETAIL 3 Z0C02



TYPICAL AIR RELEASE VALVE ASSY

DETAIL 10 Z0C02



WET WELL VENTING INSTALLATION

DETAIL 1A Z0C07

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PROCESS MECHANICAL

MECHANICAL DETAILS
SHEET 1 OF 4

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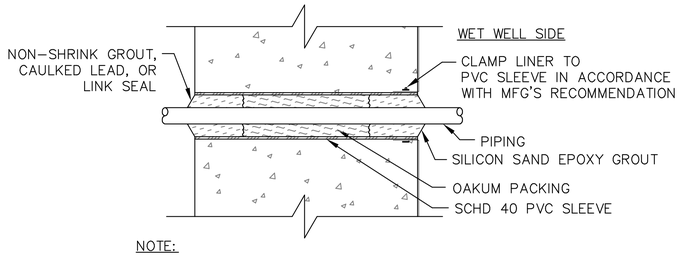
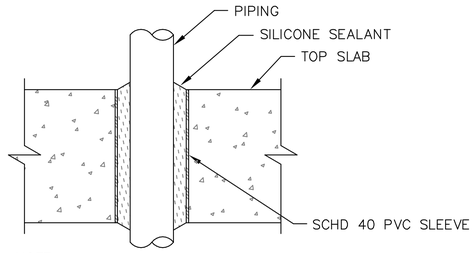


NOTE:
SLEEVED WET WELL PENETRATION IS NOT TO BE USED FOR CONDUIT INSTALLATION. SEE ELECTRICAL DETAIL SHEETS FOR CONDUIT PENETRATIONS.

SLEEVED WET WELL PENETRATION FOR PIPING 4"ø & SMALLER

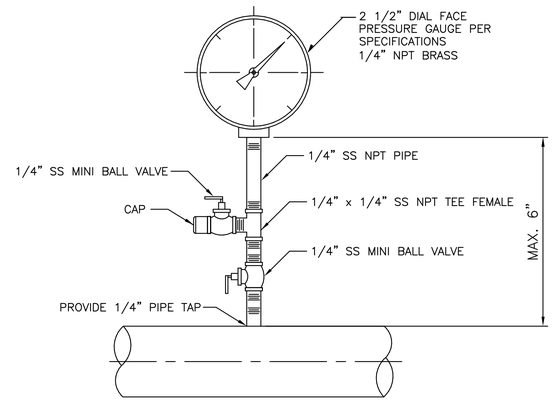
DETAIL 6 Z0C03



NOTE:
SLEEVED SLAB PENETRATION IS NOT TO BE USED FOR WET WELL PENETRATIONS.

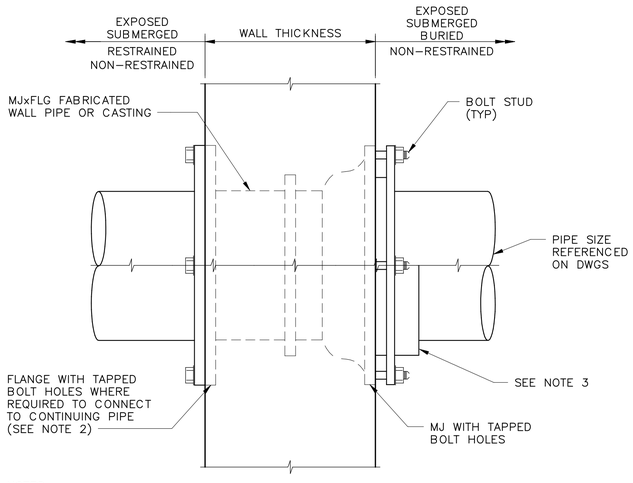
SLEEVED SLAB PENETRATION

DETAIL 7 Z0C03



1. ALL FITTINGS SHALL BE STAINLESS STEEL (316).

1 PRESSURE GAUGE DETAIL
NO SCALE



NOTES :

1. WALL PIPE SHALL BE ORIENTED SO THAT THE BOLT HOLES STRADDLE THE TOP CENTERLINE.
2. WHERE PIPE IS REQUIRED ON ONE SIDE ONLY, PROVIDE MJxPE WALL PIPE.
3. FOR STEEL PIPE APPLICATIONS BUILD UP END OF STEEL PIPE TO FIT MJ WALL PIPE.
4. FOR BURIED PIPING, CONTRACTOR SHALL PROVIDE AN ADDITIONAL FIELD JOINT AS CLOSE AS PRACTICAL TO FACE OF WALL, BUT NO MORE THAN 5 FEET.
5. 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.

2 FLANGED – MECHANICAL JOINT WALL PIPE
NO SCALE

BLACK & VEATCH

BLACK & VEATCH CORPORATION
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SURVEYED BY:
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FB NO. P-6182

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LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
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LIFT STATIONS RENEWAL AND REHABILITATION

PROCESS MECHANICAL

MECHANICAL DETAILS
SHEET 2 OF 4

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M-000-502

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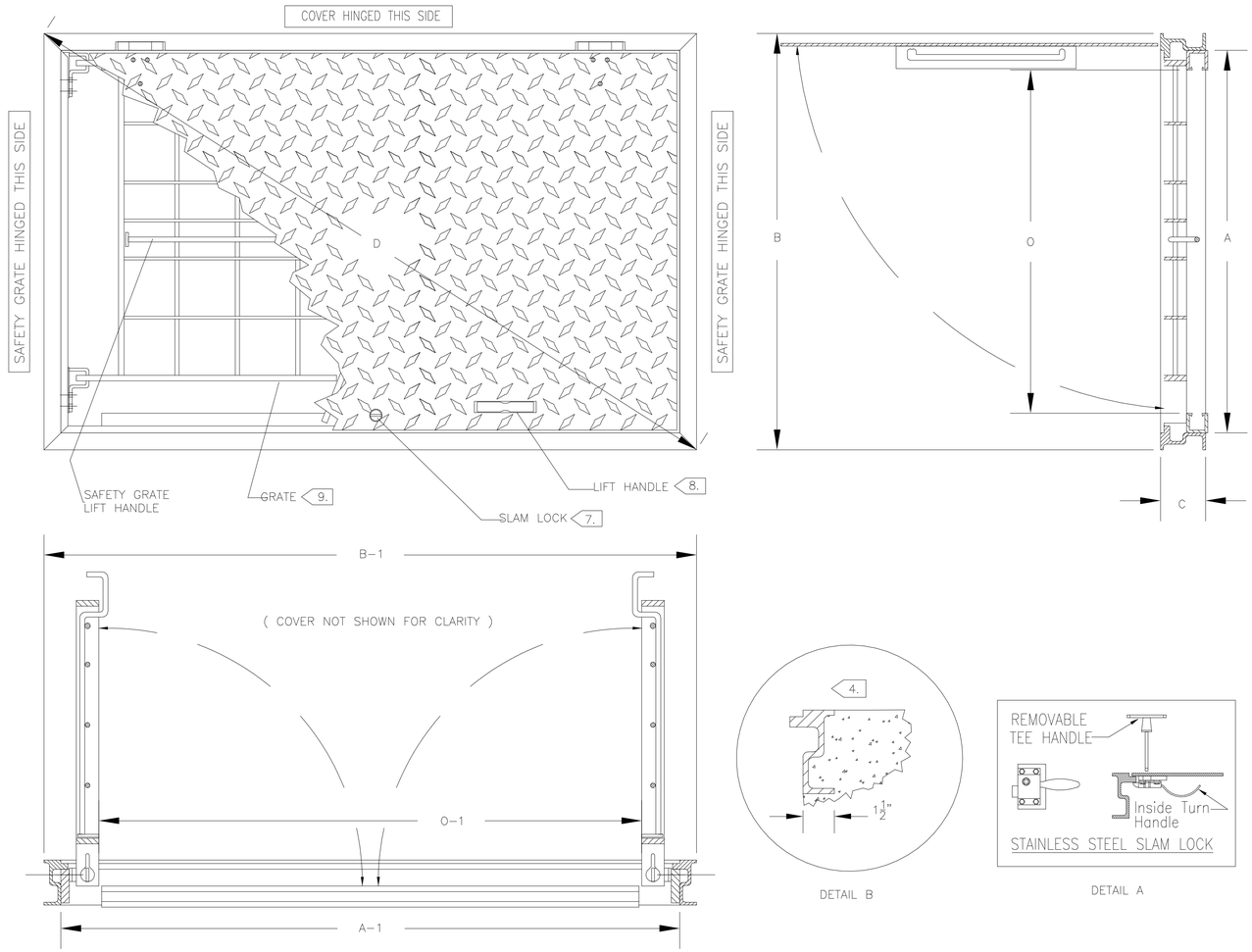


PATTERN NO.	DIMENSIONS IN INCHES		UNOBSTRUCTED CLEAR OPENING	HEIGHT	DIAGONAL
ALUMINUM	A x A1	B x B1	O x O1	C	D
FLED-AOSH	PER MANUFACTURER	PER MANUFACTURER	MATCH EXISTING	PER MANUFACTURER	PER MANUFACTURER

1.) MATERIAL SHALL BE 6061-T6 ALUMINUM FOR BARS, ANGLES, AND EXTRUSIONS. 1/4" DIAMOND PLATE SHALL BE 5086 ALUMINUM. EXTERIOR OF FRAME WHICH COMES IN CONTACT WITH CONCRETE SHALL HAVE ONE COAT FOREST GREEN PAINT.

2.) UNIT DESIGNED PEDESTRIAN RATED FOR A MINIMUM LIVE LOAD OF 300 LBS./SQ.FT.

3.) DOOR SHALL BE EQUIPPED WITH A HOLD OPEN ARM. DOOR SHALL LOCK OPEN IN THE 90 DEGREE POSITION. HOLD OPEN ARM SHALL BE FASTENED TO THE FRAME WITH A 1/2" GRADE 316 STAINLESS STEEL BOLT.

4.) ANGLE FRAME SHALL BE OF EXTRUDED ALUMINUM, WITH A CONTINUOUS 1-1/2" ANCHOR FLANGE.

5.) COVER HINGES SHALL BE OF HEAVY DUTY DESIGN. MATERIAL SHALL BE GRADE 316 STAINLESS STEEL. EACH HINGE SHALL HAVE A GRADE 316 STAINLESS STEEL, 3/8" DIAMETER HINGE PIN. HINGE SHALL BE FASTENED TO ANGLE AND DIAMOND PLATE WITH GRADE 316 STAINLESS STEEL BOLTS AND NY-LOCK NUTS.

6.) ALL HARDWARE SHALL BE STAINLESS STEEL.

7.) EACH HATCH SHALL BE SUPPLIED WITH A GRADE 316 STAINLESS STEEL SLAM LOCK, WITH KEY WAY PROTECTED BY A THREADED PLUG. PLUG SHALL BE FLUSH WITH THE TOP OF THE 1/4" DIAMOND PLATE. SLAM LOCK SHALL BE FASTENED WITH FOUR GRADE 316 STAINLESS STEEL BOLTS AND WASHERS.

8.) EACH HATCH SHALL BE EQUIPPED WITH AN ALUMINUM LIFT HANDLE. THE LIFT HANDLE SHALL BE FLUSH WITH THE TOP OF THE 1/4" DIAMOND PLATE.

9.) UNITS SHALL BE SUPPLIED WITH A HINGED SAFETY GRATES (SAFETY YELLOW) TO PROVIDE PROTECTION AGAINST FALL THROUGH AND TO CONTROL ACCESS TO THE CONFINED SPACE. (SEE SAFETY GRATE SPECIFICATIONS ON SEPARATE PAGE.)

10.) HATCH COVERS SHALL BE PAINTED FOREST GREEN TO DEMARCATE AND PREVENT VANDALISM.

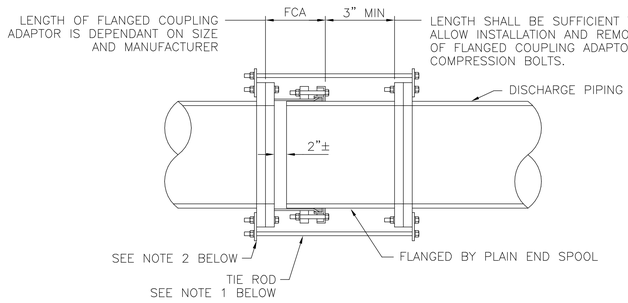
11.) FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARNACE WITH OPENING EDGE.

12.) HATCH SHALL BE CONSTRUCTED THAT IS FLOOD PROOF.

13.) PROTECTIVE COATING SHALL BE APPLIED TO THE ACCESS HATCH INTERIOR AND EXTERIOR SURFACES IN ITS ENTIRETY. REFER TO SPECIFICATION 09901.

LIFT STATION WET WELL AND SPLITTER BOX HATCHES

SOURCE: ITT/FLYGT

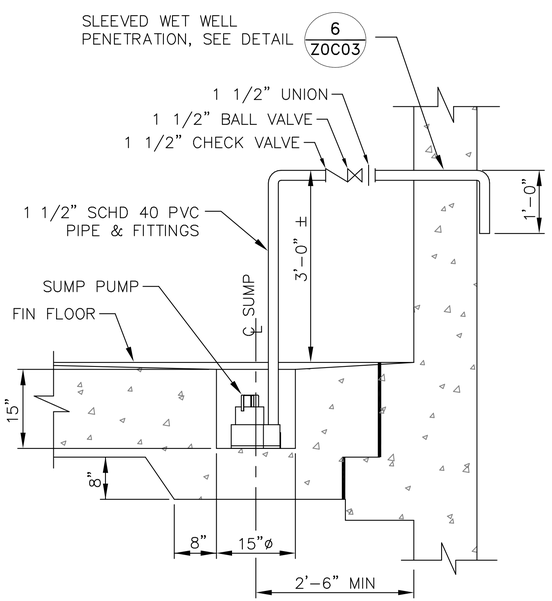


NOTES:

1. PROVIDE A NUMBER OF TIE RODS EQUAL TO 1/2 THE NUMBER OF FLANGE BOLTS. EVENLY SPACE INSTALLATION OF TIE RODS. DIAMETER OF TIE RODS TO BE EQUAL TO THE DIAMETER OF FLANGE BOLTS. LENGTH OF TIE RODS TO BE DETERMINED BY CONTRACTOR BASED ON SIZE AND MANUFACTURER OF FLANGED COUPLING ADAPTOR AND FINAL LENGTH OF SPOOL PIECE.
2. PROVIDE 316 SS TAB FOR ATTACHMENT OF TIE RODS. SIZE TO BE DETERMINED BY CONTRACTOR.
3. CONTRACTOR TO SUBMIT DETAILS DURING SHOP DRAWING SUBMISSION.
4. ALL HARDWARE SHALL BE 316 STAINLESS STEEL. TIE RODS SHOULD BE THREADED.
5. THIS RESTRAINT DOES NOT REPLACE THRUST BLOCKS TO BE PROVIDED AT OTHER LOCATIONS.

TYP FLANGED COUPLING ADAPTOR RESTRAINT DETAIL

DETAIL 14 Z0C07



TYPICAL SUMP PUMP INSTALLATION

DETAIL 5 Z0C03

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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LIFT STATIONS RENEWAL AND REHABILITATION

PROCESS MECHANICAL

MECHANICAL DETAILS SHEET 3 OF 4

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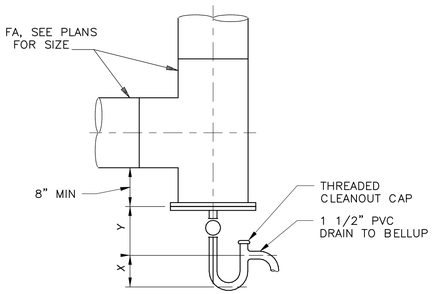


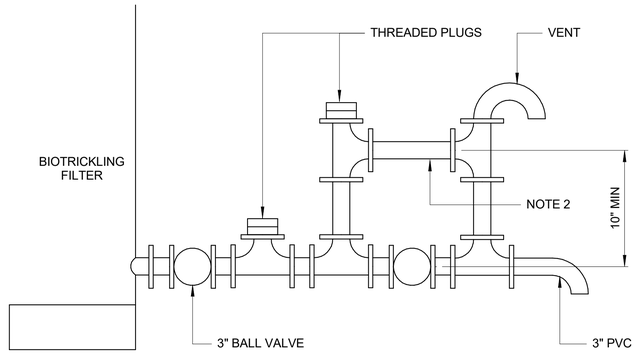
ELEVATION

NOTES:

1. TRAPS ON THE SUCTION SIDE OF FANS SHALL HAVE MINIMUM DIMENSIONS OF 10" FOR "Y" AND 8" FOR "X".
2. DRAIN CONNECTION TO FAN SCROLL IS TO BE TRAPPED AND DRAIN SIMILAR.

1 CONDENSATE DRAIN

NO SCALE

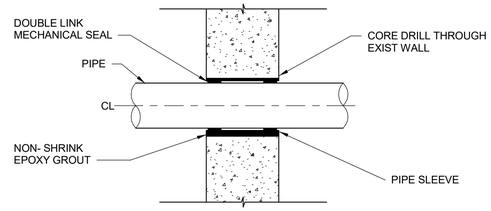


NOTES:

1. TYPICAL DRAIN/OVERFLOW ARRANGEMENT SHOWN. ACTUAL ARRANGEMENT MAY VARY DEPENDING ON FINAL ODOR CONTROL SYSTEM SUPPLIER REQUIREMENTS. CONTRACTOR TO COORDINATE.
2. MINIMUM 6" BELOW INVERT OF AIR INLET CONNECTION.

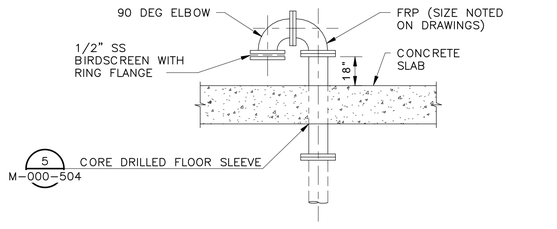
2 HORIZONTAL BIOTRICKLING FILTER DRAIN/OVERFLOW

NO SCALE



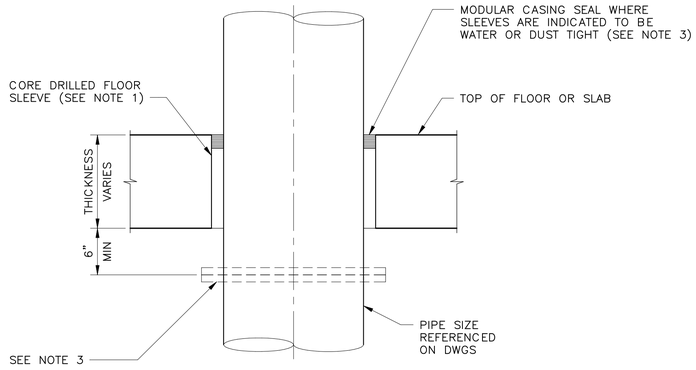
3 EXISTING CONCRETE CORE DRILL PIPE PENETRATION DETAIL

NO SCALE



4 GOOSENECK AIR VENT DETAIL EXISTING CONCRETE

NO SCALE



NOTES:

1. CORE DRILL SMOOTH FLOOR OPENING AND COORDINATE DIAMETER WITH MODULAR CASING SEAL MANUFACTURER, MAXIMUM CORE DIAMETER 12".
2. FIRESAFING TO BE PROVIDED AT ALL RATED LOCATIONS INDICATED ON THE DRAWINGS AND INSTALLED PER ACCEPTED UL RATED SYSTEMS.
3. TO MINIMIZE SLEEVE SIZE PROVIDE A SCREW-ON FLANGE OR GROOVED COUPLING ON ONE SIDE OF OPENING.

5 CORE DRILLED FLOOR SLEEVE

12" = 1'-0"

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10/20/2025

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LIFT STATIONS RENEWAL AND REHABILITATION

PROCESS MECHANICAL

MECHANICAL DETAILS
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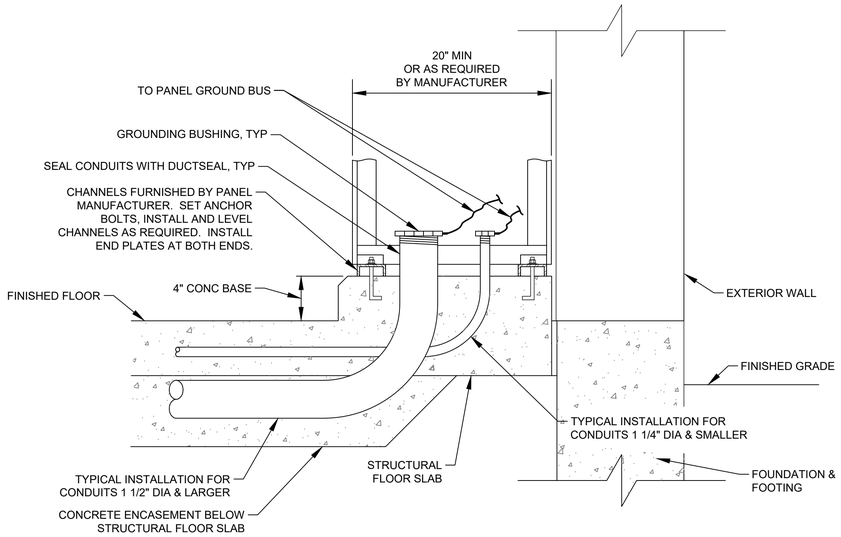
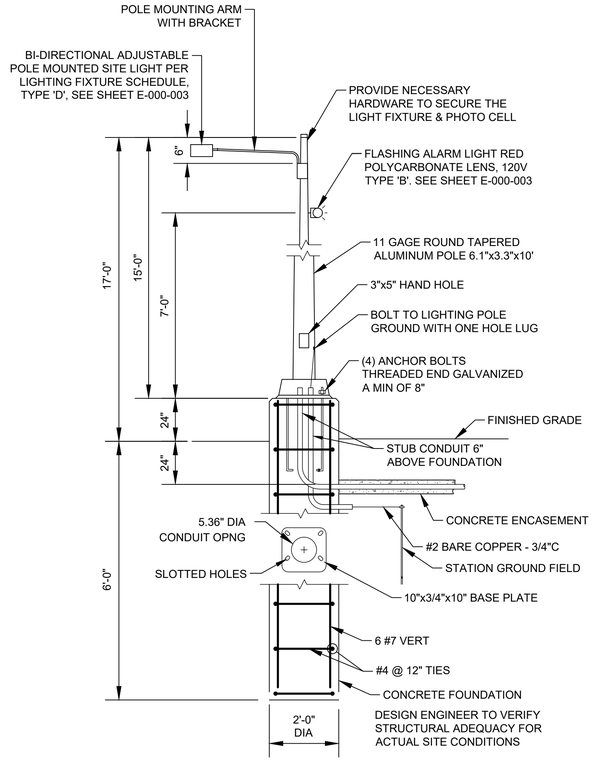


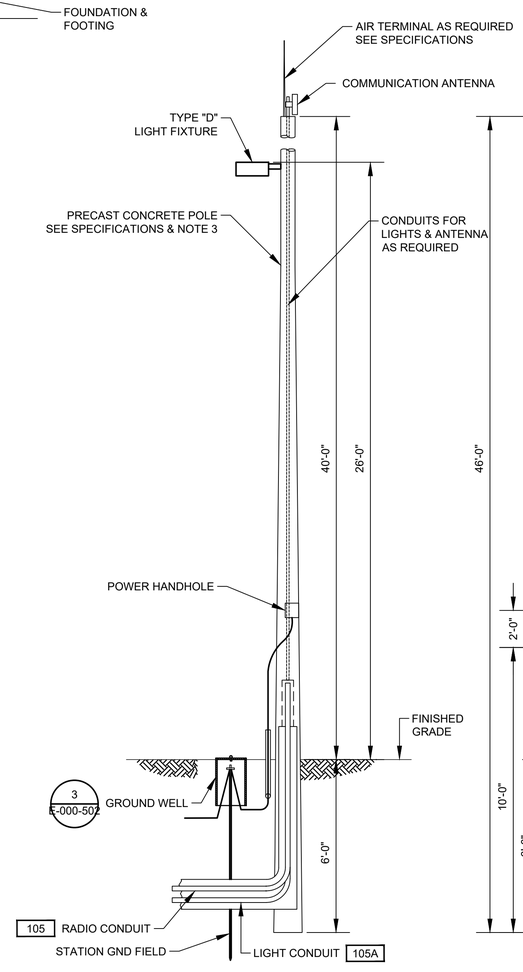
TYPICAL MCC & CONTROL PANEL INSTALLATION & CONDUIT ENTRY

DETAIL 14
NTS -



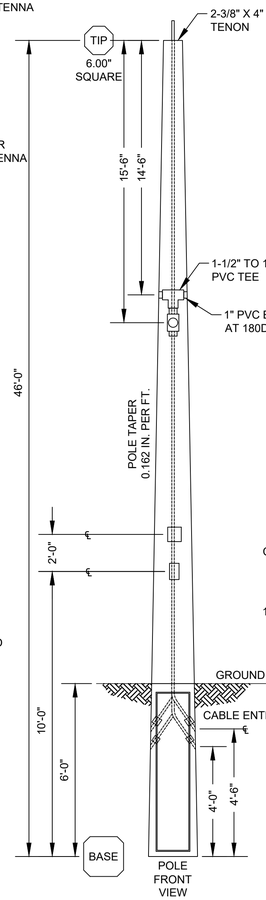
TYPICAL YARD LIGHT

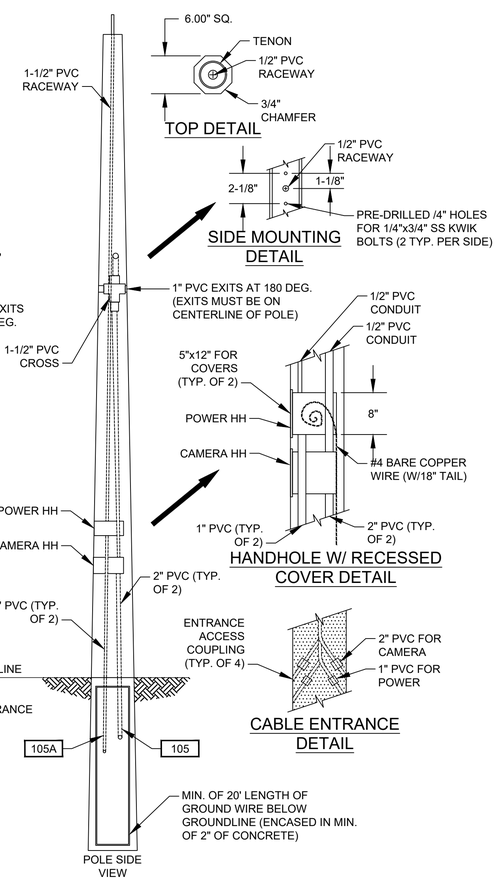
DETAIL 13
NTS -



COMMUNICATION POLE MOUNTING DETAIL

DETAIL 15
NTS -





NOTES:

1. ON GROUND WIRE TERMINATION'S, ALL PAINTED OR COATED METAL SURFACES SHALL BE REMOVED AND CLEANED TO BARE METAL. TO OBTAIN A SOUND GROUND CONNECTION. ONCE INSTALLED APPLY PROTECTIVE COATING ON BARE METAL AREAS PER MANUFACTURER REQUIREMENTS.
2. PRECAST CONCRETE POLE TO MOUNT THE RADIO RECEIVER.
3. 1" CONDUIT TO EXTEND TO THE TOP OF POLE FOR ETHERNET CABLE FOR RADIO.

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ELECTRICAL
GENERAL
ELECTRICAL YARD LIGHT/COMM. POLE DETAILS

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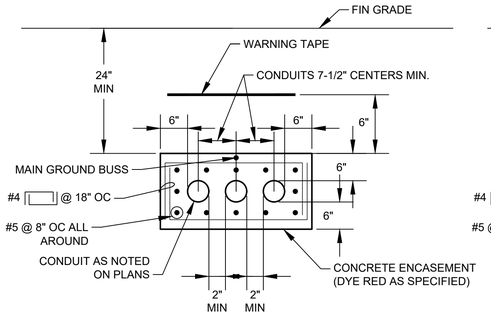
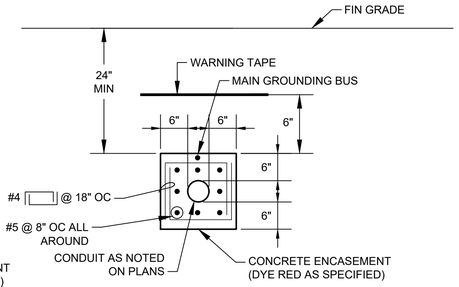


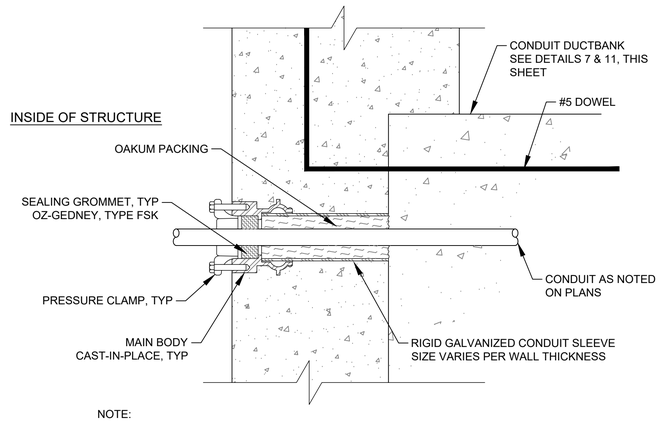
TYP MULTI-CONDUIT DUCTBANK SECTION

NOTE: TIE MAIN GROUNDING BUS TO REBAR AT A MAXIMUM INTERVAL OF EVERY 20 FEET.

DETAIL 1 / NTS



TYP SINGLE-CONDUIT DUCTBANK SECTION

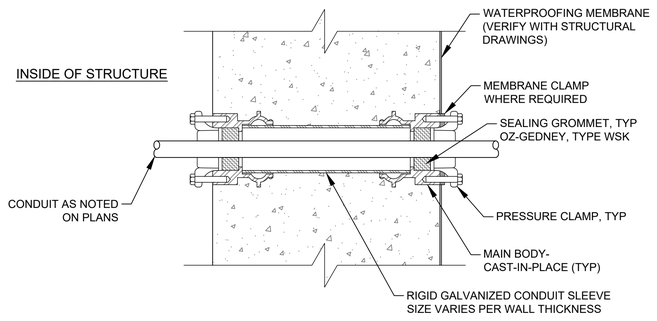


NOTE:

WALL SEAL SHOWN IS TYPICAL FOR EACH CONDUIT IN DUCTBANK.

SINGLE ENDED TYPE

FOR USE WHERE CONDUIT OUTSIDE THE STRUCTURE IS ENCASED IN CONCRETE

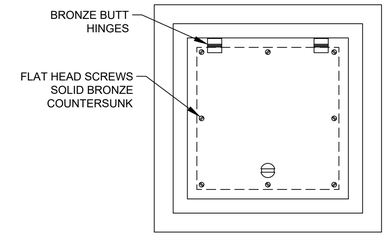


DOUBLE ENDED TYPE WITH MEMBRANE

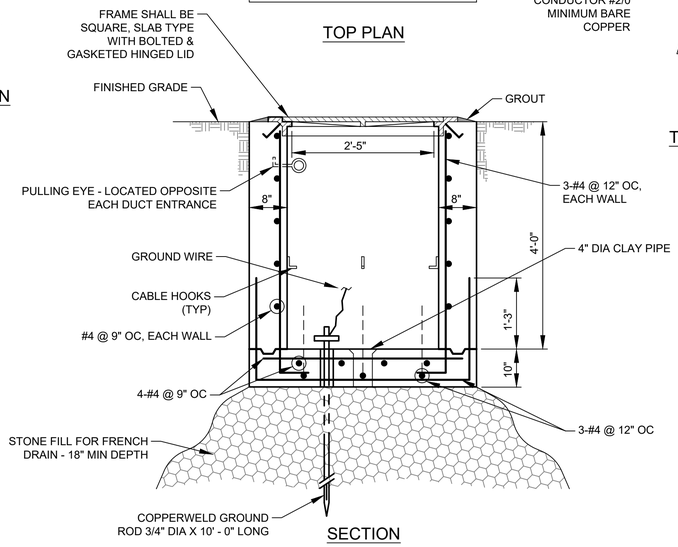
FOR USE WHERE CONDUIT OUTSIDE THE STRUCTURE IS ENCASED IN CONCRETE

TYPICAL CONDUIT SEALS

DETAIL 4 / NTS



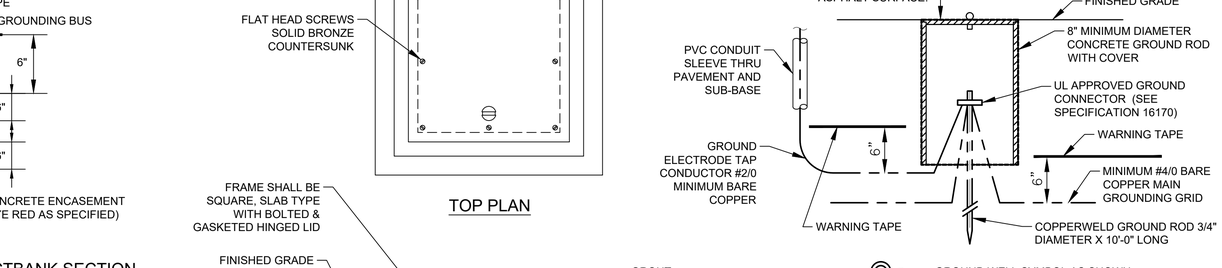
TOP PLAN



SECTION

TYPICAL ELECTRICAL HANDHOLE CONSTRUCTION

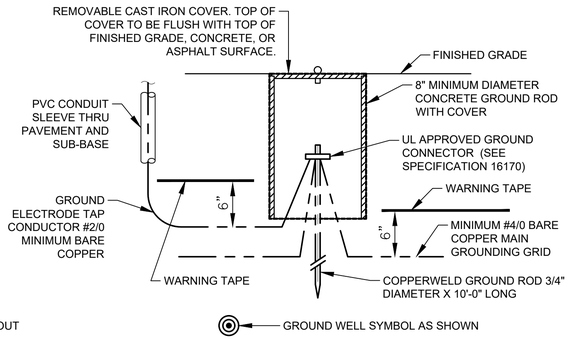
DETAIL 2 / NTS



PLAN

TYPICAL DUCTBANK ENTRANCE AT STRUCTURE WALL

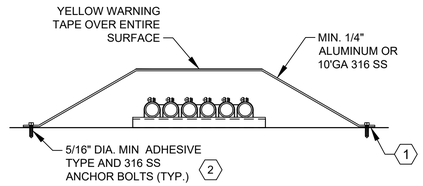
DETAIL 5 / NTS



TYPICAL GROUND ROD AND WELL INSTALLATION

DETAIL 3 / NTS

GROUND CONNECTOR SCHEDULE	
WIRE SIZE	BURNDY
#2 AWG	GAR 6426
#2/0 AWG	GAR 6426
#4/0 AWG	GAR 6429
500 kcmil	GAR 6434



CONDUIT COVER

DETAIL 6 / NOT TO SCALE

NOTES BY SYMBOL "#":

1. PROVIDE 1/8" NEOPRENE GASKET WHERE ALUMINUM IS SELECTED. DO NOT ALLOW ALUMINUM TO COME INTO DIRECT CONTACT WITH CONCRETE.
2. PROVIDE THE CORRECT SIZE ANCHOR BOLTS BASED ON LOAD.

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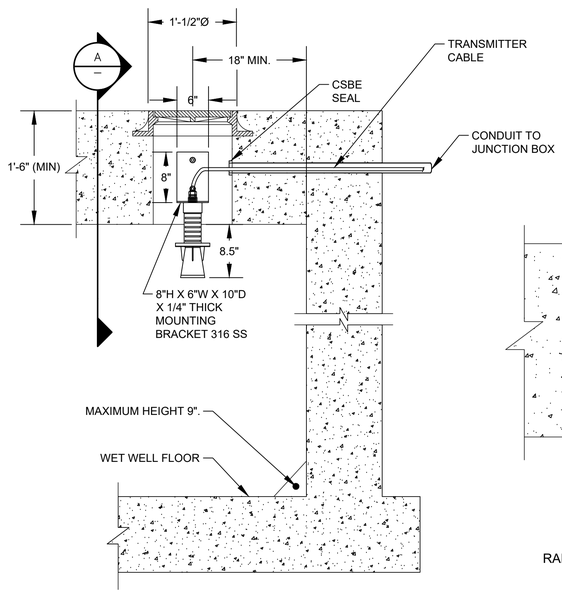
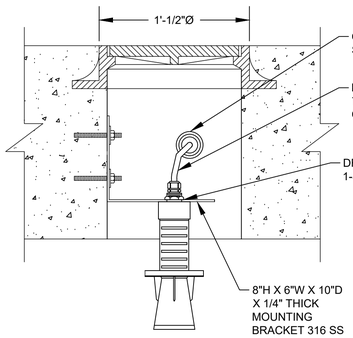


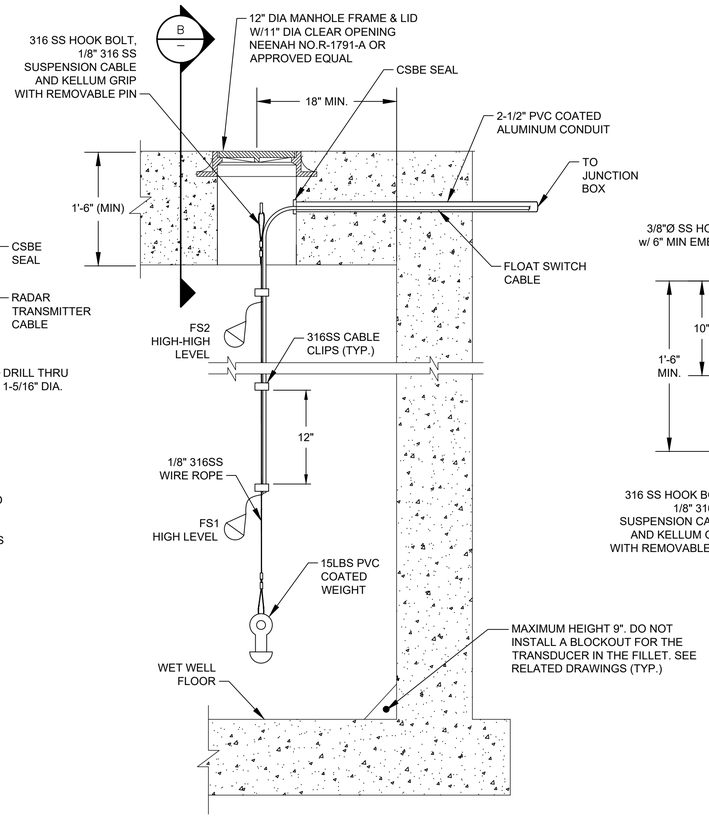
RADAR LEVEL TRANSMITTER MOUNTING
(TYP. LT-1, LT-2)

DETAIL 1
NTS
(SEE NOTE 1, 2, 4 & 5)



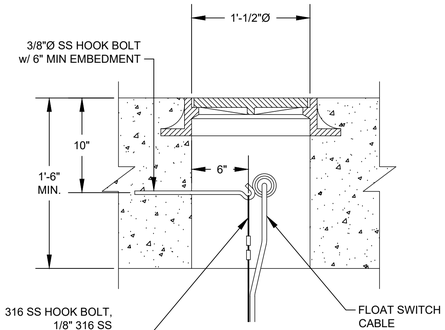
RADAR LEVEL TRANSMITTER MOUNTING
TYP. LT-1 & LT-2

SECTION 2
NTS
(SEE NOTE 1, 2, 4 & 5)



FLOAT SWITCH MOUNTING

DETAIL 3
NTS
(SEE NOTES 3, 4 & 5)

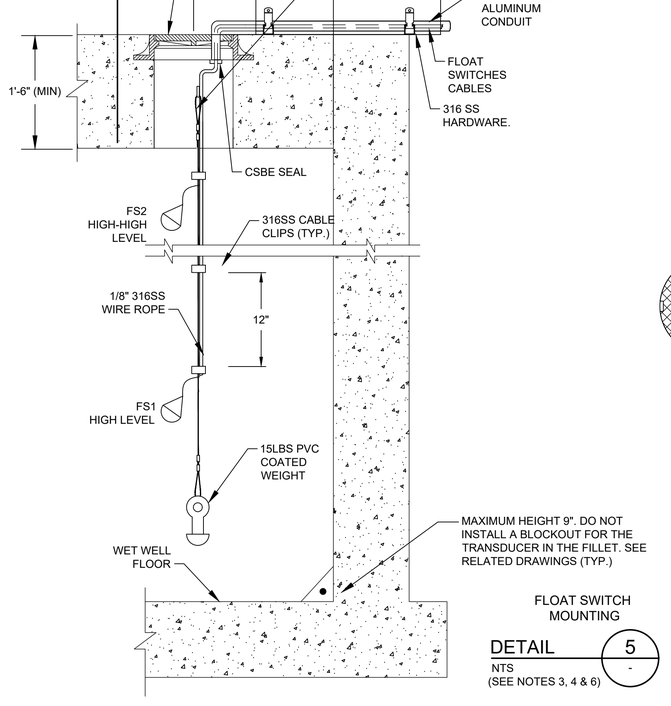


4
FLOAT SWITCH MOUNTING

SECTION 4
NTS
(SEE NOTES 3, 4 & 5)

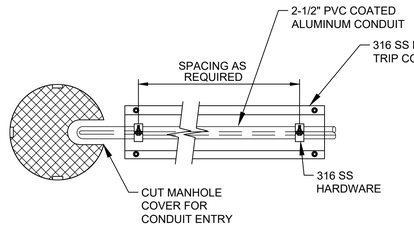
NOTES:

1. NEW RADAR LEVEL TRANSMITTERS FOR LT-1, LT-2.
2. NEW MANHOLES FOR RADAR LEVEL TRANSMITTERS LT-1, LT-2.
3. NEW MANHOLE FOR FLOAT SWITCHES.
4. PAINT MANHOLE LIDS AND HATCHES HUNTER GREEN.
5. NEW MANHOLE INSTALLATION.
6. RETROFIT MANHOLE INSTALLATION.
7. INSIDE WET WELL IS CLASSIFIED AS CLASS I, DIVISION 1. OUTSIDE WET WELL WITHIN 5 FEET OF WET WELL OPENINGS ARE CLASSIFIED AS CLASS I, DIVISION 2.



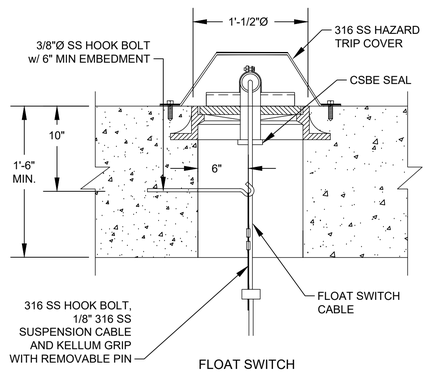
FLOAT SWITCH MOUNTING

DETAIL 5
NTS
(SEE NOTES 3, 4 & 6)



FLOAT SWITCH MOUNTING
TOP VIEW

DETAIL 6
NTS
(SEE NOTES 3, 4 & 6)



FLOAT SWITCH
MOUNTING

SECTION 7
NTS
(SEE NOTES 3, 4 & 6)

GAI
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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

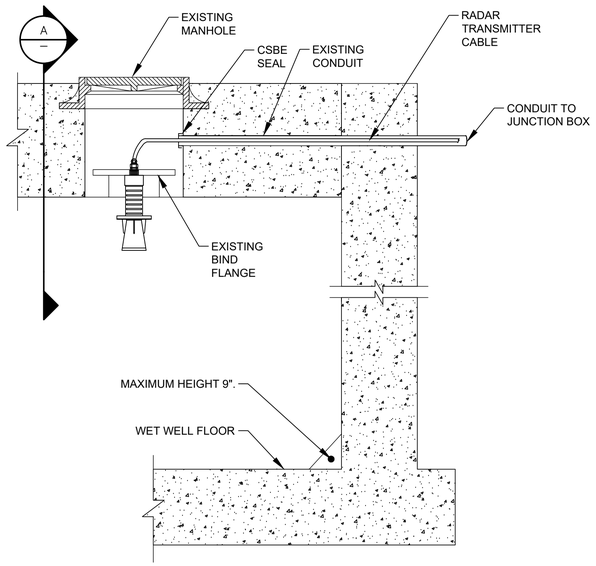
ELECTRICAL

RADAR LEVEL TRANSMITTER GAUGING SYSTEM INSTALLATION & DETAILS SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 46 OF 226	

E-000-503

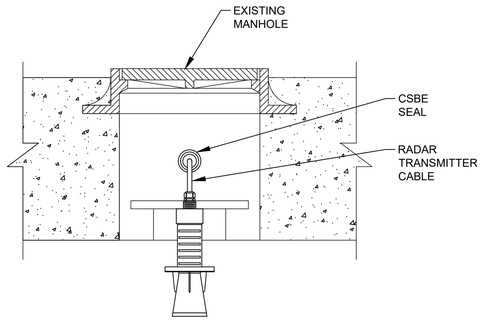
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\1Working\GENERAL E-000-503.dwg



RADAR LEVEL TRANSMITTER MOUNTING
(TYP. LT-1, LT-2)

DETAIL 8
NTS

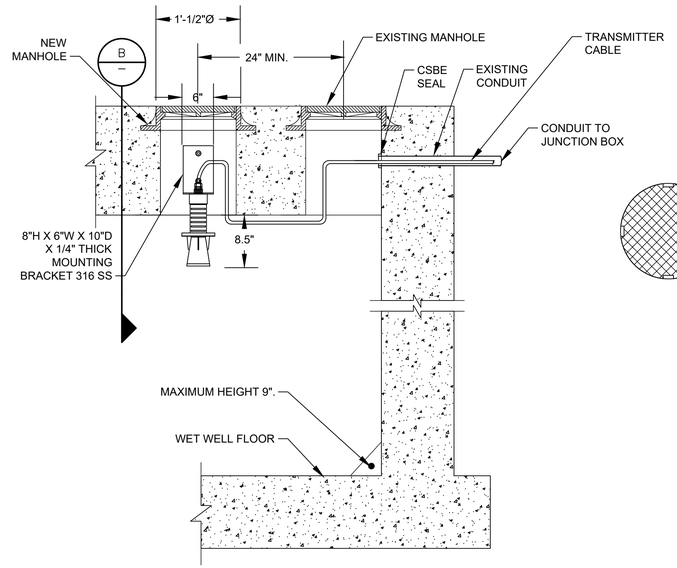
(SEE NOTES 1, 2, 4, 6 & 7)



RADAR LEVEL TRANSMITTER MOUNTING
TYP. LT-1 & LT-2

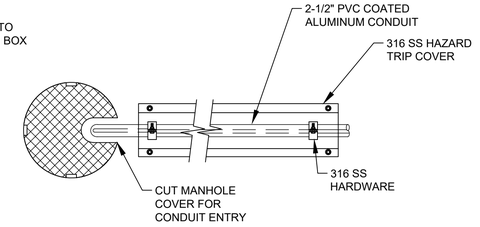
SECTION 9
NTS

(SEE NOTES 1, 2, 4, 6 & 7)



RADAR LEVEL TRANSMITTER MOUNTING
(TYP. LT-1, LT-2)

DETAIL 10
NTS



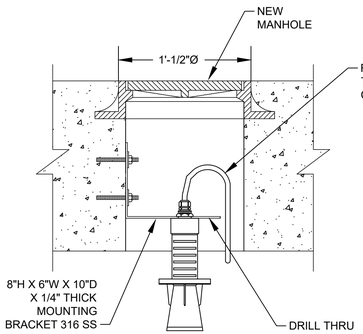
FLOAT SWITCH MOUNTING
TOP VIEW

DETAIL 14
NTS

(SEE NOTES 1, 4, 5 & 6)

NOTES:

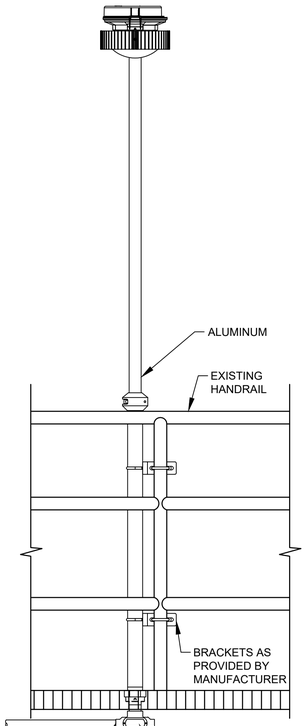
1. NEW RADAR LEVEL TRANSMITTERS FOR LT-1, LT-2.
2. EXISTING AIRCELL MANHOLES FOR RADAR LEVEL TRANSMITTERS LT-1, LT-2.
3. EXISTING SUBMERSIBLE TRANSDUCER MANHOLES FOR RADAR LEVEL TRANSMITTERS LT-1, LT-2.
4. PAINT MANHOLE LIDS AND HATCHES HUNTER GREEN.
5. NEW MANHOLE INSTALLATION.
6. RETROFIT MANHOLE INSTALLATION.
7. DEMOLISH ALL EQUIPMENT ASSOCIATED WITH AIRCELL INSIDE THE WETWELL.
8. DEMOLISH ALL EQUIPMENT ASSOCIATED WITH SUBMERSIBLE LEVEL TRANSDUCER INSIDE THE WETWELL.
9. INSIDE WET WELL IS CLASSIFIED AS CLASS I, DIVISION 1. OUTSIDE WET WELL WITHIN 5 FEET OF WET WELL OPENINGS ARE CLASSIFIED AS CLASS I, DIVISION 2.
10. POLE HEIGHT SHALL BE LIMITED TO A MAXIMUM OF 108" OR AS RECOMMENDED BY THE MANUFACTURER.
11. CONTRACTOR SHALL SUBMIT FOR ENGINEERS REVIEW ANCHORAGE OF ALL LIGHT POLES TO CONCRETE SLABS SIGNED AND SEALED BY A REGISTERED ENGINEER IN THE STATE OF TEXAS. THE CALCULATIONS SHALL CONFORM TO THE CONTRACT DRAWINGS , SPECIFICATIONS AND ACI 318 APPENDIX D.

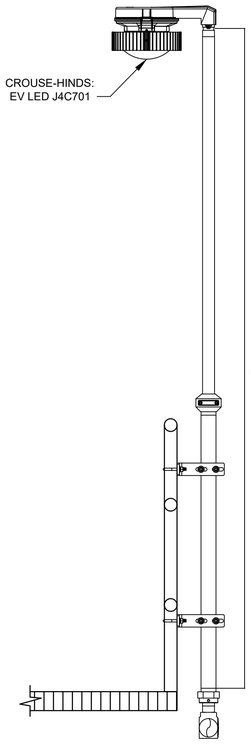


RADAR LEVEL TRANSMITTER MOUNTING
TYP. LT-1 & LT-2

SECTION 12
NTS

(SEE NOTES 1, 3, 4, 5, 6 & 8)



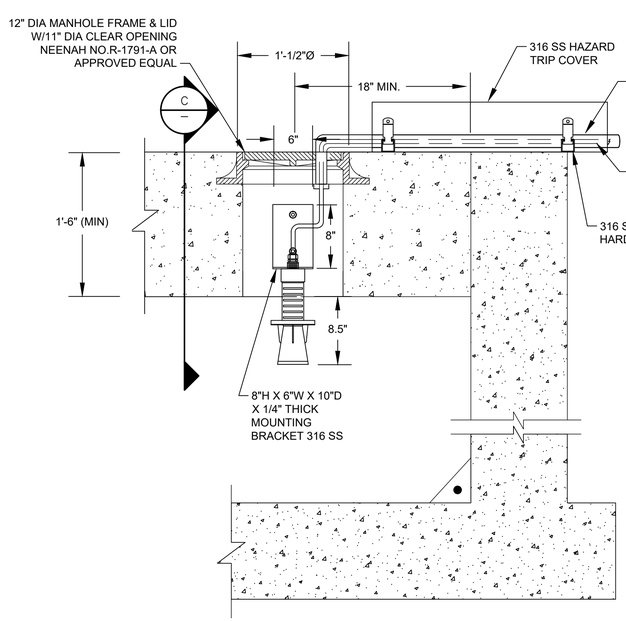


RAIL MOUNT LIGHT POLE

DETAIL 15
NTS

CROUSE HINDS FITTINGS OR EQUAL		
ITEM NO.	SIZE	MANUFACTURER CATALOG NO.
A	1-1/2" T	T57
B	1-1/2" TO 3/4"	RE52
C	1-1/2" COVER	570G

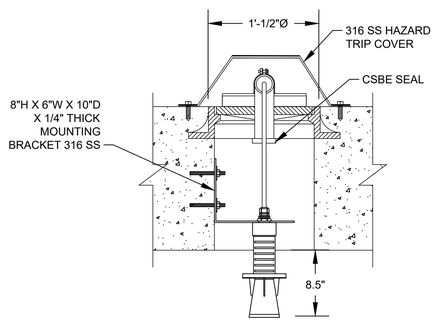
(SEE NOTE 10 & 11)



RADAR LEVEL TRANSMITTER MOUNTING
(TYP. LT-1, LT-2)

DETAIL 11
NTS

(SEE NOTES 1, 4, 5 & 6)



RADAR LEVEL TRANSMITTER MOUNTING
TYP. LT-1 & LT-2

SECTION 13
NTS

(SEE NOTES 1, 4, 5 & 6)

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

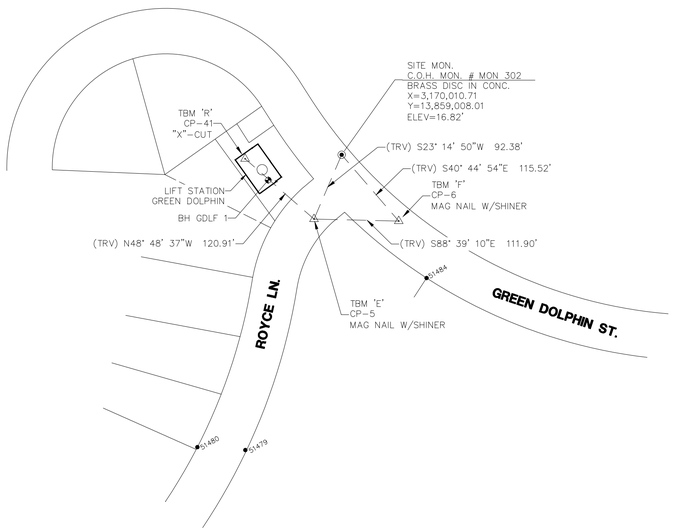
LIFT STATIONS RENEWAL
AND REHABILITATION

ELECTRICAL
RADAR LEVEL TRANSMITTER GAUGING SYSTEM INSTALLATION & DETAILS SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 47 OF 226	

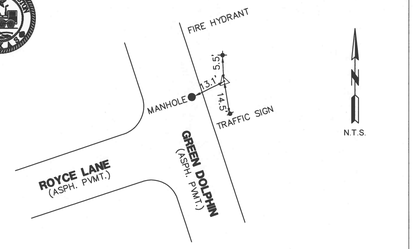
E-000-504

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\GENERAL E-000-504.dwg



CITY OF HOUSTON

CITY SURVEY 5759-8310
SITE CONTROL MONUMENT



Project WBS# R-000020-0089-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,170,010.71
Y= 13,859,008.01

Lat.= N 29°48'11.04"
Lon.= W 95°12'38.97"

Reference Frame Used: ITRF (EPOCH: 2010.0000)
Vertical Adjustment used: NAVD '88 (CORS '96)
General Location: INTERSECTION OF ROYCE LANE AND GREEN DOLPHIN.
Date Set: 09-26-24 Type of Mark: ALUMINUM DISK IN CONC.
3 Nearest project control points (bearings and distances stated below):
TO CP-5, MAG NAIL W/SHINER, S 23° 14' 50" W ~ 92.38'
TO CP-6, MAG NAIL W/SHINER, S 40° 44' 54" E ~ 115.52'

Keymap Page: 456Y & 456Z
Orthometric Elevation = 16.82
Ellipsoid Height= -72.74
Geoid: GEOID 12B
Datum Source & Adjustment:
NAD '83 (CORS '96)

NOTE:
1. Bearings are grid bearings.
2. Scale Factor = 0.999870017
3. Surface= Grid
S.F.

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
10-24-24

United Engineers, Inc.
6301 SOUTHWEST FREEWAY, SUITE 500
HOUSTON, TEXAS 77074
ENGINEERING FIRM # F-00142
TEL. (713) 271-2900
FAX (713) 271-2999
SURVEY FIRM # 10117B-00

Date Observed: September 30, 2024
City of Houston, Harris County, Texas

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM No.:	150025	**Reference Mark Status**	
Stream Number:	P100-00-00	**Date:**	6/4/2013
		Condition:	Recovered
County: Harris	**State:** Texas	**Established By:**	COS/Muery & Pate Eng.
Key Map No.:	456U	**Date Established:**	5/14/2003
NGS Classification(1):	Range VI	**Watershed:**	Greens Bayou
RM's Directly Tied:	150205,150260	**Survey Method Horz:**	GPSOBS
Units of Measure:	US Survey Foot	**Survey Method Vert:**	GPSOBS
Horizontal Datum:	NAD83	**Vertical Datum:**	NAVD88
Horizontal Adj.(2):	2001 Adjustment	**Vertical Adj.(3):**	2001 Adjustment
Projection Zone:	Texas South Central 4204	**Geoid Model Used:**	GEOID99 (CONUS)
Station Name:	150025	**Contractor PID:**	39
Marker:	Brass DISC	**Rod Depth:**	NA
Stamping:	P100 BM03	**Sleeve Depth:**	NA
Mark Logo:	HCFCD	**Geoid Height:**	-89.19
Latitude:	29° 48' 18.70847" N	**Northing:**	13859762.53
Longitude:	95° 12' 45.71690" W	**Easting:**	3169391.30
Ellipsoid Height:	-62.14	**Elevation(4):**	27.30
Convergence:	1° 51' 20"	**Scale Factor:**	0.99989681
Satellite Observable:	YES	**Elevation Factor:**	1.0000297
NGS PID (if applic):	NA	**Combined Factor:**	0.99989978

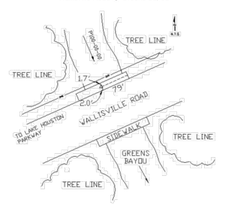
Notes:
1. This is NGS' new classification system. Range VI indicates that this position meets the 0.02m-0.05m Accuracy Standard for Horizontal Position, Ellipsoidal Height, and Orthometric Height (elevation) at the 95% confidence level (m=meters).
2. Horizontal Adjustment - This survey is constrained to the NGS Published Horizontal positions of the geodetic stations adjusted by NGS in 2001.
3. Vertical Adjustment - This survey is constrained to the NGS Published Elevation for Northeast 2250 CORS ARP adjusted by NGS in 2001 and as published in PID AJ6430, Epoch Date 1997.00.
4. The elevation shown equals the Ellipsoid Height minus Geoid Height (from GEOID99) plus a constant of 0.253 feet.
5. The elevation is established by differential leveling techniques, utilizing the published elevations from nearby Reference Marks.

Station Recovery Data: Report an Issue with a Reference Mark - submit to Harris County Flood Control

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM Number: 150025
Stream Number: P100-00-00
Northing: 13859762.53 **Easting:** 3169391.30 **Elevation:** 27.30

Location:
Wallisville Road @ Greens Bayou



To Reach Description
From the intersection of Normandy Street and Wallisville Road, travel West on Wallisville Road approximately 0.7 mile to bridge. Monument is located on the South sidewalk.

Photo 1-Station Detail:

Photo 2-Station Area Picture:

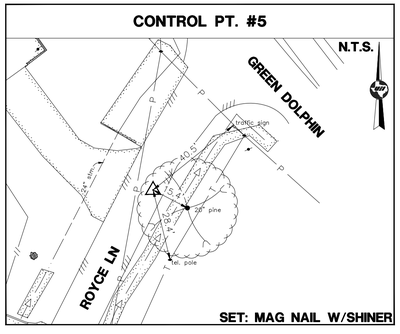
100 0 50 100 200
SCALE: 1" = 100'

LEGEND:
- HCAD PROPERTY LINE
- 10' U.E. EASEMENT
- RIGHT-OF-WAY PROPERTY LINE
- (TRV.) N 00° 00' 00" E. TRAVERSE LINE
- (BL.) N 00° 00' 00" E. BASELINE
- 10869 CONTROL MONUMENTS

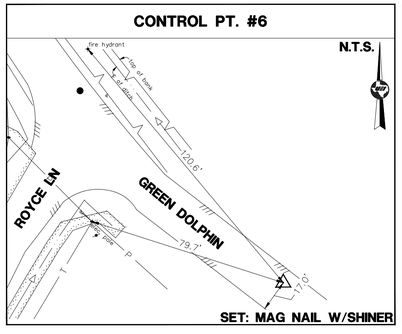
GENERAL NOTES:
CP= indicates Traverse Point
BP# indicates Baseline Point
(TRV.) indicates Traverse Line
(BL) indicates Baseline Line
CM indicates Control Monument
Fnd. indicates Found
RT indicates Right
LT indicates Left
XC indicates "X" Cut
I.P. indicates Iron Pipe
I.R. indicates Iron Rod
I.R.C. indicates Iron Rod w/Cap
P.I.P. indicates Pinch Iron Pipe
MAG indicates MAG Nail
U.T.S. indicates unable to set
PC indicates Point of Curve
PCC indicates Point of Compound Curvature
PT indicates Point of Tangent
TBM indicates Temporary Benchmark
#XXXX indicates Address
W.L.E. indicates Water Line Easement
U.E. indicates Utility Easement
S.S.E. indicates Sanitary Sewer Easement
S.E. indicates Storm Sewer Easement
B.L. indicates Building Line
M.R.H.C., TX. indicates Map Records Harris County, Texas
D.R.H.C., TX. indicates Deed Records Harris County, Texas
H.C.C.F. indicates Harris County Clerk's File
O.P.R.R.P.H.C., TX. indicates Official Public Records Real Property Harris County, Texas

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE TIED TO THE NSRS AND EXPRESSED IN THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, NAD 83 (2011), ITRF (EPOCH 2010.0000), NAVD '88 (GEOID 12B).
2. ALL DISTANCES SHOWN HEREON ARE SURFACE VALUES. ALL COORDINATES SHOWN HEREON ARE GRID VALUES UNLESS OTHERWISE NOTED. TO CONVERT SURFACE VALUES TO GRID VALUES MULTIPLY BY THE SCALE FACTOR OF 0.999870017.
3. THE RIGHT OF WAY SHOWN HEREON IS BASED ON THE BEST AVAILABLE EVIDENCE FOUND IN THE FIELD AT THE TIME OF THE SURVEY COUPLED WITH THE DOCUMENTS OF RECORD IN THE COUNTY CLERK'S OFFICE PROVIDED BY COURTHOUSE SPECIALIST.
4. TO CONVERT PROJECT TO TSARP DATUM (GD99) SUBTRACT 0.15 FEET FROM ALL ELEVATIONS.

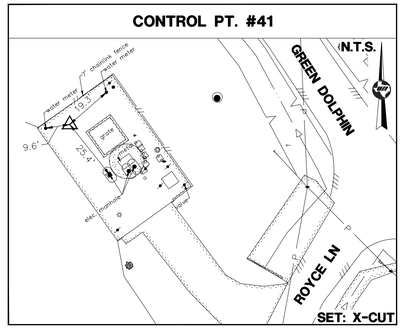
CONTROL PT. #5



CONTROL PT. #6



CONTROL PT. #41



HORIZONTAL AND VERTICAL TRAVERSE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
5	13,858,923.13'	3,169,974.25'	24.97'	SET MAG NAIL W/SHINER
6	13,858,920.50'	3,170,086.10'	20.22'	SET MAG NAIL W/SHINER
41	13,859,002.75'	3,169,883.27'	24.42'	SET X-CUT

RIGHT OF WAY CONTROL MONUMENT TABLE				
POINT #	GRID NORTHING	GRID EASTING	DESCRIPTION	CONTROL MONUMENT
51479	13,858,618.41'	3,169,883.62'	5/8"I.R.	
51480	13,858,622.24'	3,169,820.37'	3/8"I.R.	
51484	13,858,845.40'	3,170,122.76'	5/8"I.R.	

BOREHOLE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
30563	13,858,974.52'	3,169,913.87'	24.63'	BH GDLF 1

TSARP CONVERSION REFERENCE MONUMENT

(TSARP) HARRIS COUNTY FLOODPLAIN REFERENCE MARK NUMBER 150025
FLOOD PLAIN REFERENCE MARK, BRASS DISC, STAMPED P100 BM03.
FROM THE INTERSECTION OF NORMANDY STREET AND WALLISVILLE ROAD, TRAVEL WEST ON WALLISVILLE ROAD APPROXIMATELY 0.7 MILE TO BRIDGE. MONUMENT IS LOCATED ON THE SOUTH SIDEWALK.
PUBLISHED ELEV= 27.30' (NAVD 1988, 2001 ADJUSTMENT)
OBSERVED ELEV= 27.45' (NAVD 1988, (CORS '96) COMPUTED USING GEOID 12B)

TBM LIST:

TBM 'E', CP-5, MAG NAIL W/SHINER.
ELEV=24.97'

TBM 'F', CP-6, MAG NAIL W/SHINER.
ELEV=20.22'

TBM 'R', CP-41, X-CUT IN CONCRETE.
ELEV=24.42'

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
6-9-25

CERTIFICATION:

I HEREBY CERTIFY THAT: (1) THIS PLAT WAS PREPARED FROM AN ON THE GROUND SURVEY MADE UNDER MY SUPERVISION; (2) THAT THIS PLAT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF SURVEY; (3) THAT THIS PLAT AND THE SURVEY IT REPRESENTS, CONFORMS TO THE REQUIREMENTS OF THE LAND SURVEYING PRACTICES ACT IN EFFECT AT THE TIME OF THE SURVEY FOR THE TYPE OF PROFESSIONAL SERVICE SO STATED.

TYPE OF PROFESSIONAL SERVICE: TOPOGRAPHIC AND R.O.W. SURVEY

CHRISTIN M. NORRIS, R.P.L.S. 6207 — DATE 6-9-25

C-095-101

United Engineers, Inc.
CIVIL ENGINEERING • LAND DEVELOPMENT
CONSTRUCTION MANAGEMENT
SURVEYING • UTILITY ENGINEERING
ENGINEERING FIRM # F-00142 SURVEY FIRM # 10117B-00
10375 RICHMOND AVE., SUITE 1325 TEL. (713) 271-2900
HOUSTON, TEXAS 77042 FAX (713) 271-2999

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

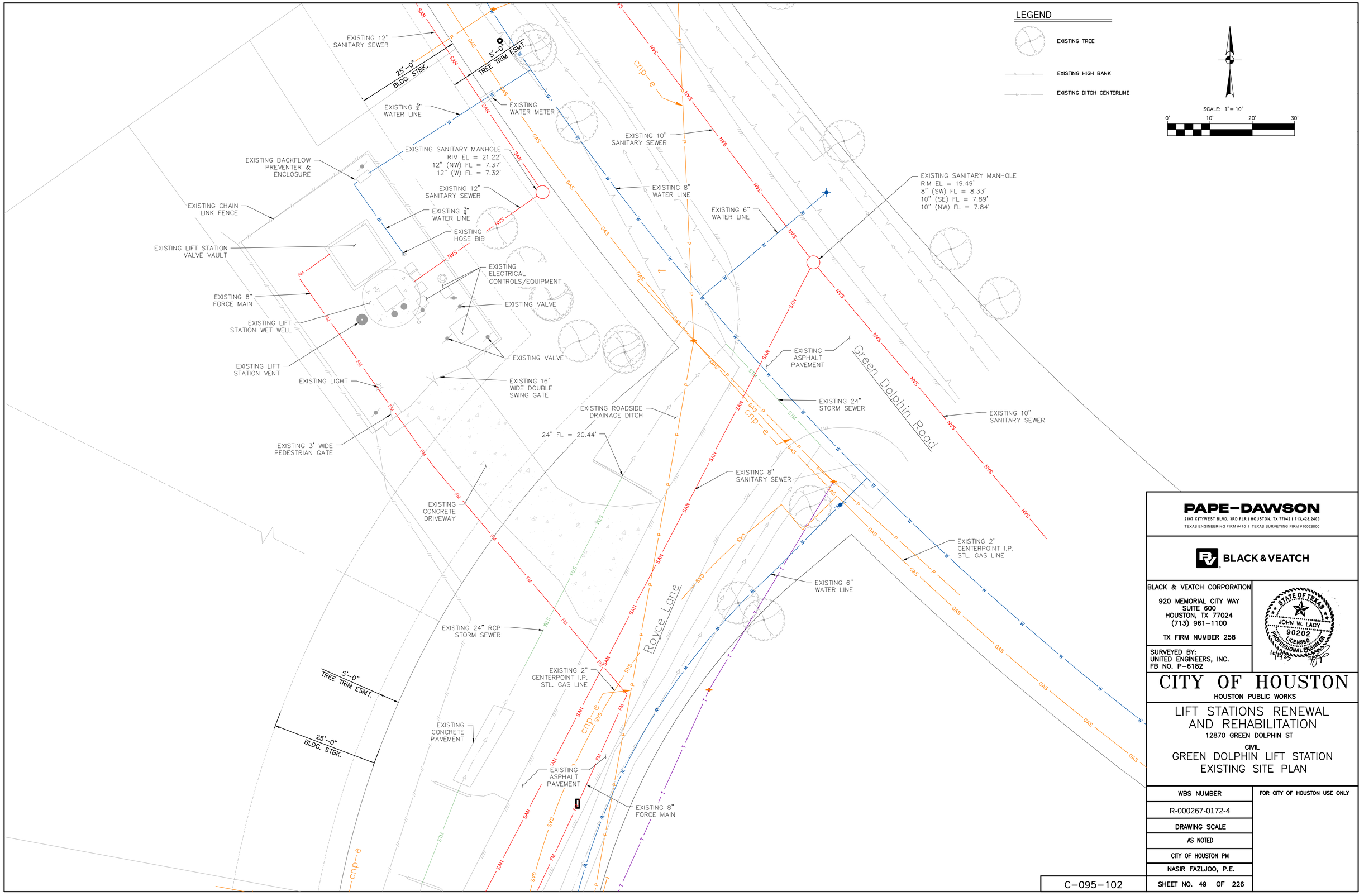
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATION RENEWAL AND REHABILITATION

GREEN DOLPHIN LIFT STATION
SURVEY CONTROL MAP
SHEET 1 OF 1
SURVEY

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
H: 1"=100'	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 48 OF 226	

K:\CIV\224-076 - Four LS Block and Veatch\Survey\Dwg\SURVEY CONTROL MAP\SCM MASTER 4LS.dwg Aug 08 2025



FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Green Dolphin\DWGs\EXISTING SITE PLAN.dwg

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/13/25

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

CIVIL
GREEN DOLPHIN LIFT STATION
EXISTING SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 49 OF 226	

C-095-102

LEGEND

- DEMOLISH/REMOVE
- EXISTING TREE
- EXISTING HIGH BANK
- EXISTING DITCH CENTERLINE

SCALE: 1" = 10'

0' 10' 20' 30'

NOTES:

1. THE SOUND PRODUCED BY THE ERECTION, EXCAVATION, CONSTRUCTION, OR DEMOLITION OF ANY BUILDING OR STRUCTURE, INCLUDING THE USE OF ANY NECESSARY TOOLS OR EQUIPMENT, CONDUCTED BETWEEN THE HOURS OF 7 A.M. AND 8 P.M., SHALL NOT PRODUCE A SOUND EXCEEDING 85 DB(A) WHEN MEASURED FROM THE PROPERTY LINE OF THE RESIDENTIAL PROPERTY WHERE THE SOUND IS BEING RECEIVED.
2. PER SECTION 01145S, THE CITY OF HOUSTON TO HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED.

EXISTING 12" SANITARY SEWER
25'-0" BLDG. STBK.
5'-0" TREE TRIM ESMT.
EXISTING ¾" WATER LINE
EXISTING WATER METER
REMOVE BACKFLOW PREVENTER & ENCLOSURE
REMOVE EXISTING HOSE BIB
REMOVE EXISTING CHAIN LINK FENCE
EXISTING SANITARY MANHOLE
RIM EL = 21.22'
12" (NW) FL = 7.37'
12" (W) FL = 7.32'
EXISTING 12" SANITARY SEWER
EXISTING ¾" WATER LINE
ABANDON EXISTING LIFT STATION VALVE VAULT (SEE MECHANICAL/STRUCTURAL SHEETS FOR DETAILS)
REMOVE ELECTRICAL CONTROLS/EQUIPMENT
EXISTING 8" FORCE MAIN
Existing Valve
LIFT STATION MODIFICATIONS (SEE MECHANICAL/STRUCTURAL SHEETS FOR DETAILS)
EXISTING PIPE BOLLARD
EXISTING VALVE
REMOVE LIFT STATION VENT
REMOVE LIGHT
REMOVE 3' WIDE PEDESTRIAN GATE
REMOVE 16' WIDE DOUBLE SWING GATE
24" FL = 20.44'
REMOVE EXISTING CONCRETE PAVEMENT
EXISTING 24" RCP STORM SEWER
5'-0" TREE TRIM ESMT.
25'-0" BLDG. STBK.
EXISTING CONCRETE PAVEMENT
EXISTING 2" CENTERPOINT I.P. STL. GAS LINE
EXISTING ASPHALT PAVEMENT
EXISTING 8" FORCE MAIN
EXISTING 10" SANITARY SEWER
EXISTING 8" WATER LINE
EXISTING 6" WATER LINE
EXISTING SANITARY MANHOLE
RIM EL = 19.49'
8" (SW) FL = 8.33'
10" (SE) FL = 7.89'
10" (NW) FL = 7.84'
EXISTING ASPHALT PAVEMENT
EXISTING 24" STORM SEWER
EXISTING ROADSIDE DRAINAGE DITCH
EXISTING 8" SANITARY SEWER
EXISTING 2" CENTERPOINT I.P. STL. GAS LINE
EXISTING 6" WATER LINE
EXISTING 10" SANITARY SEWER
Green Dolphin Road
Royce Lane
street light
cnp-e

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Green Dolphin\DWGs\SITE DEMOLITION PLAN.dwg

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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/19/22

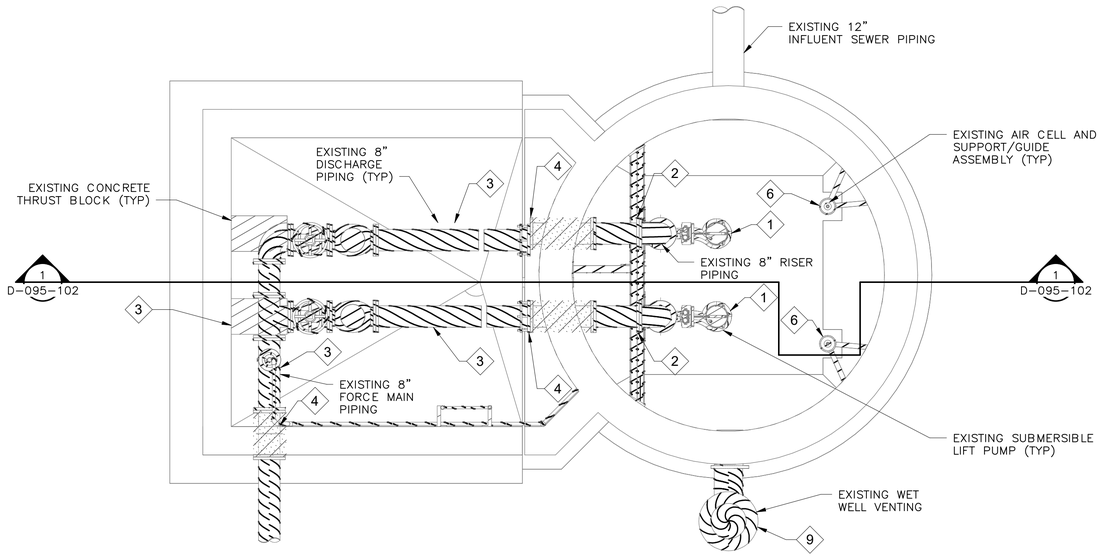
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

DEMOLITION
GREEN DOLPHIN LIFT STATION
SITE DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 50 OF 226	

D-095-101



LOWER LEVEL – DEMOLITION PLAN

3/8" = 1'-0"

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING SUBMERSIBLE PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE.
2	DEMOLISH ALL EXISTING RISER PIPING UP TO THE WALL PIPE. INSTALL A PLUG ON THE WALL PIPE AND ABANDON IN PLACE.
3	DEMOLISH ALL DISCHARGE PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE LOCATED INSIDE THE EXISTING VALVE VAULT.
4	PLUG ALL WALL PIPE CONNECTIONS LOCATED INSIDE THE EXISTING VALVE VAULT AND ABANDON IN PLACE.
5	PLUG THE EXISTING VALVE VAULT DRAIN AND ABANDON IN PLACE.
6	DEMOLISH THE EXISTING AIR CELL SYSTEM, ASSOCIATED SUPPORTS, GUIDES, ASSEMBLY ITEMS, AND HARDWARE.
7	DEMOLISH THE EXISTING WET WELL HATCHES, ASSOCIATED SUPPORTS, HARDWARE, AND CABLE HOLDER ASSEMBLY.
8	DEMOLISH EXISTING VALVE VAULT GRATING PANELS, HATCHES, ACCESS LADDERS, SUPPORTS, AND ASSOCIATED HARDWARE.
9	DEMOLISH EXISTING WET WELL VENTING AND ASSOCIATED HARDWARE.

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

3/8" = 1'-0"

N

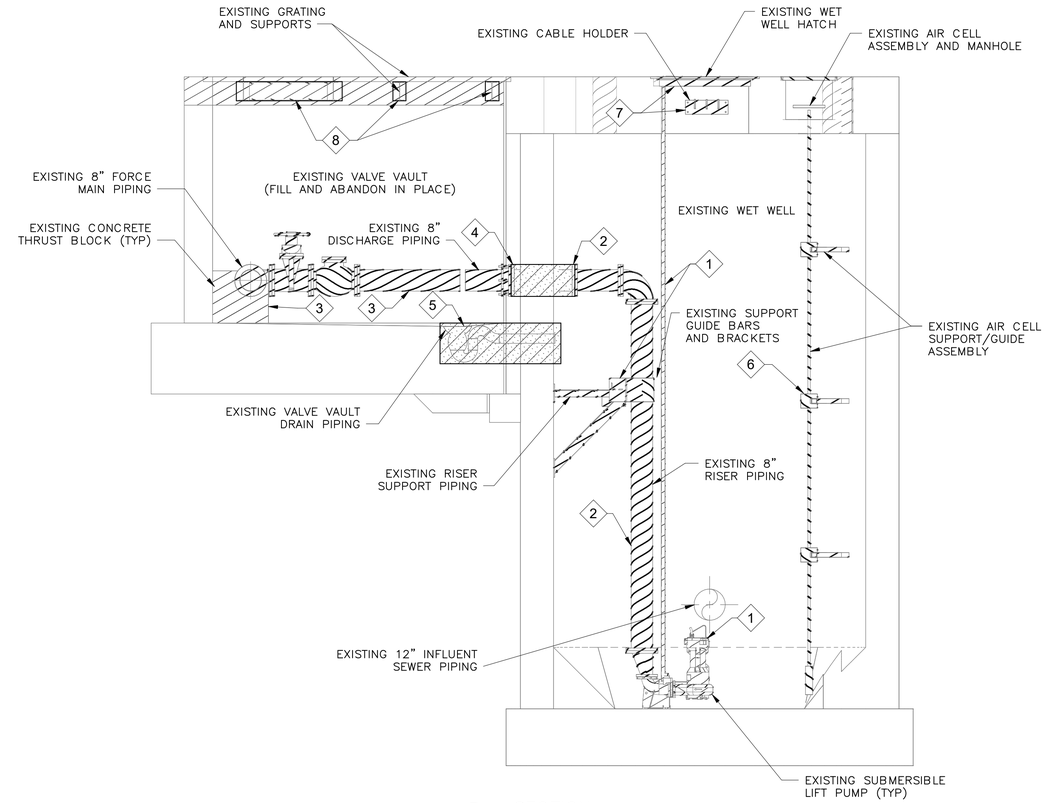
LEGEND

TO BE DEMOLISHED

TO BE ABANDONED-IN-PLACE

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON-SHRINK GROUT.
3. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STRUCTURE AFTER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
4. ALL DEMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONSTRUCTION PHASING PLANS.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
6. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED. OWNER SHALL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOBSITE AT NO ADDITIONAL COST TO THE OWNER.
7. REFER TO SPECIFICATIONS FOR DIVERSION PUMPING REQUIREMENTS.



1 SECTION

D-095-102 3/8" = 1'-0"

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

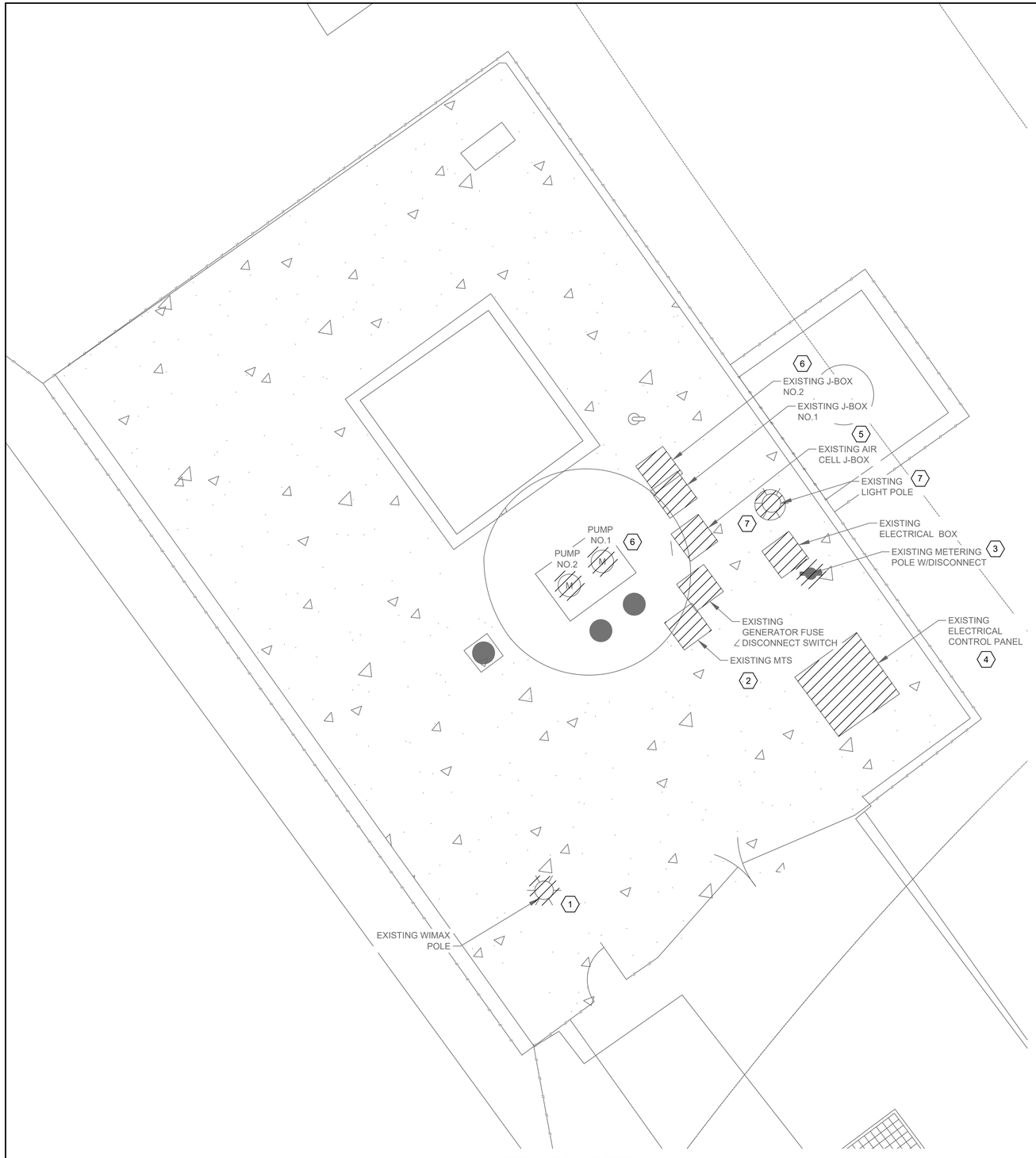
DEMOLITION

GREEN DOLPHIN LIFT STATION DEMOLITION PLAN AND SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 51 OF 226	

D-095-102

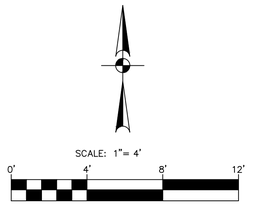
FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-095-GREEN_DOLPHIN_LS-BV.rvt



GREEN DOLPHIN ELECTRICAL DEMOLITION SITE

PLAN

1"= 4'-0"

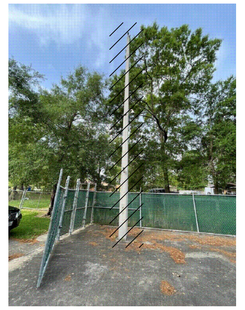


NOTES BY SYMBOL "⟨#⟩":

1. EXISTING WIMAX POLE TO BE DEMOLISHED AND REMOVED.
2. EXISTING MTS AND GENERATOR DISCONNECT SWITCH TO BE REMOVED AND RETURNED TO THE WASTEWATER FACILITY MAINTENANCE DEPARMENT OF THE CITY.
3. EXISTING SERVICE POLE, METER, AND SERVICE DISCONNECT TO BE DEMOLISHED AND REMOVED.
4. EXISTING LIFT STATION CONTROL CABINET TO BE DEMOLISHED AND REMOVED.
5. EXISTING AIR CELL J-BOX TO BE DEMOLISHED AND REMOVED.
6. EXISTING PUMP NO.1 AND NO.2 J-BOX TO BE DEMOLISHED AND REMOVED.
7. EXISTING YARD LIGHT TO BE DEMOLISHED AND REMOVED.

EXISTING METERING DISCONNECT AND ELECTRICAL BOX 3

PHOTOGRAPH A - NTS



EXISTING WIMAX POLE 1

PHOTOGRAPH B - NTS

EXISTING PUMP J-BOX NO.1 & NO.2 6

PHOTOGRAPH C - NTS

EXISTING SERVICE POLE AND LIGHITNG POLE 3 7

PHOTOGRAPH D - NTS

EXISTING AIR CELL BOX 5

PHOTOGRAPH E - NTS

EXISTING SERVICE RACK GENERATOR & MTS 2

PHOTOGRAPH F - NTS

EXISTING CONTROL PANEL 4

PHOTOGRAPH G - NTS

LEGEND:

ITEMS TO BE DEMOLISHED.

GAI
Gupta & Associates, Inc.
CONSULTING ENGINEERING
Registration No. F-2593
302 Dennis St.
Houston, Texas 77006
Tel: 713-636-2936
Fax: 713-636-2987
email: hforouzan@gaiconsulting.com

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

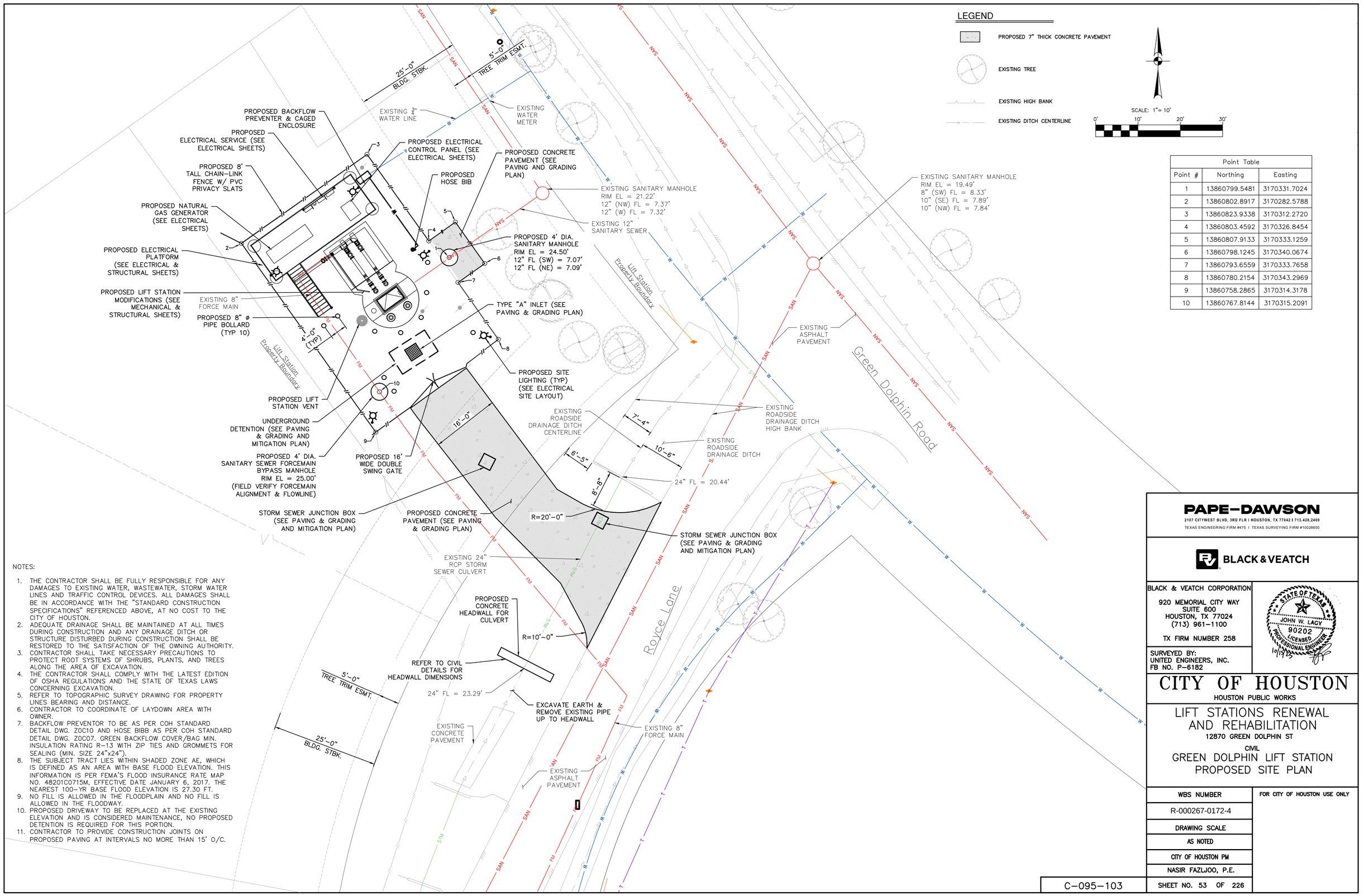
ELECTRICAL

GREEN DOLPHIN LIFT STATION 12870 GREEN DOLPHIN ST. DEMOLITION SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 52 OF 225	

D-095-103

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin D-095-103.dwg



Point Table		
Point #	Northing	Easting
1	13860799.5481	3170331.7024
2	13860802.8917	3170282.5788
3	13860823.9338	3170312.2720
4	13860803.4592	3170326.8454
5	13860807.9133	3170333.1259
6	13860798.1245	3170340.0674
7	13860793.6559	3170333.7658
8	13860780.2154	3170343.2969
9	13860758.2865	3170314.3178
10	13860767.8144	3170315.2091

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. BACKFLOW PREVENTOR TO BE AS PER COH STANDARD DETAIL DWG. ZOC10 AND HOSE BIBB AS PER COH STANDARD DETAIL DWG. ZOC07. GREEN BACKFLOW COVER/BAG MIN. INSULATION RATING R-13 WITH ZIP TIES AND GROMMETS FOR SEALING (MIN. SIZE 24"x24").
8. THE SUBJECT TRACT LIES WITHIN SHADED ZONE AE, WHICH IS DEFINED AS AN AREA WITH BASE FLOOD ELEVATION. THIS INFORMATION IS PER FEMA'S FLOOD INSURANCE RATE MAP NO. 48201C0715M, EFFECTIVE DATE JANUARY 6, 2017. THE NEAREST 100-YR BASE FLOOD ELEVATION IS 27.30 FT.
9. NO FILL IS ALLOWED IN THE FLOODPLAIN AND NO FILL IS ALLOWED IN THE FLOODWAY.
10. PROPOSED DRIVEWAY TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.
11. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.

PAPE-DAWSON
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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/17/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

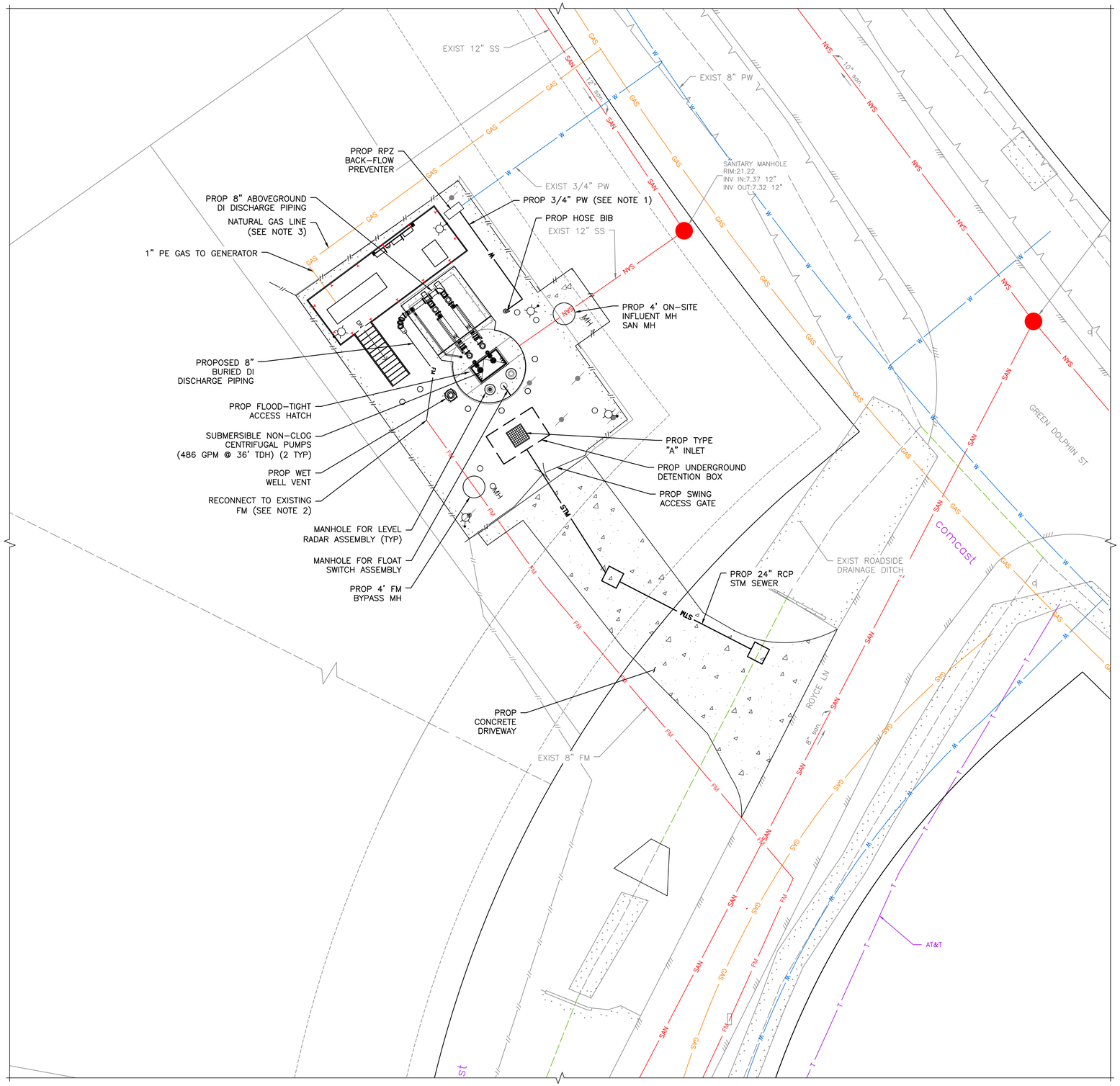
CIVIL

GREEN DOLPHIN LIFT STATION PROPOSED SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 53 OF 226	

C-095-103

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Green Dolphin\DWGs\PROPOSED SITE PLAN.dwg



NOTES:

1. CONTRACTOR TO REROUTE APPROXIMATELY 11' OF THE 3/4" PW PVC PIPE FROM THE BACKFLOW PREVENTER TO THE HOSE BIB SO IT IS NOT IN CONFLICT WITH THE PROPOSED GENERATOR PLATFORM.
2. CONNECT TO EXISTING FORCE MAIN. EXISTING FORCE MAIN ESTIMATED TO BE APPROXIMATELY 6' DEEP. CUT AND PLUG EXISTING 8" FORCE MAIN AND ABANDON IN PLACE BETWEEN CONNECTION POINT AND EXISTING LIFT STATION VALVE VAULT.
3. LOCATION OF NATURAL GAS LINE TO BE DETERMINED AFTER COORDINATION WITH CENTERPOINT GAS. CONTRACTOR SHALL COORDINATE CONNECTION TO PROPOSED EQUIPMENT AS DETERMINED BY THE LOCATION OF THE NATURAL GAS.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

CIVIL

GREEN DOLPHIN LIFT STATION PROPOSED YARD PIPING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 54 OF 226	

C-095-104

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 - COH Lift Station Renew-Replace\Project Files\5.0 Design Files - B&V\5.0.5 Civil 3D\C-095-104.dwg

PROPOSED PAVEMENT			
ITEM	LOCATION	ACTION	SQUARE FOOTAGE
CONCRETE PAVEMENT	INSIDE PROPERTY BOUNDARY	ADDING CONCRETE AROUND PROPOSED MANHOLE	±92.55
ACCESS DRIVEWAY	INSIDE PROPERTY BOUNDARY	REMOVING & REPLACING EXISTING CONCRETE (REPAVE/REPAIR)	±552.15
ACCESS DRIVEWAY/ DRIVEWAY APRON	OUTSIDE PROPERTY BOUNDARY	REMOVEING & REPLACING EXISTING CONCRETE (REPAVE/REPAIR)	±629.53

LEGEND

- DRAINAGE DIRECTION
- PROPOSED 7" THICK CONCRETE PAVEMENT
- EXISTING TREE
- EXISTING HIGH BANK
- EXISTING DITCH CENTERLINE

SCALE: 1"= 10'
0' 10' 20' 30'

Point Table			
Point #	Northing	Easting	Elevation
1	13860773.4231	3170335.7297	24.400
2	13860722.6246	3170357.9885	25.520
3	13860707.2605	3170364.2149	27.760
4	13860741.7973	3170381.7129	24.000
5	13860744.8010	3170357.1466	24.340
6	13860771.9999	3170320.6477	
7	13860751.2811	3170340.5996	
8	13860777.2212	3170323.2434	
9	13860803.7737	3170327.2887	25.330
10	13860798.1245	3170340.0674	25.500
11	13860793.9851	3170334.2300	25.230
12	13860807.9132	3170333.1260	25.500
13	13860741.4120	3170363.0699	24.560
14	13860739.2788	3170371.6553	2421.000
15	13860714.3581	3170362.3828	26.080
16	13860738.1206	3170342.6267	24.460
17	13860763.9940	3170322.5362	24.600
18	13860737.3827	3170367.3127	

PROPOSED DRAINAGE AREA BOUNDARY – 0.04 ACRES
PROPOSED 7" THICK CONCRETE PAVEMENT
SEE EXISTING/PROPOSED SITE PLAN
PROPOSED TYPE "A" INLET GRATE EL = 24.89'
PROPOSED RCB UNDERGROUND DETENTION (2' DEEP) (SEE MITIGATION PLAN)
24" RCP w/ 6" PVC RESTRICTOR (SEE MITIGATION PLAN) FL = 21.31'
26 LF ~ 24" RCP STORM SEWER @ 0.18% SLOPE (SEE MITIGATION PLAN)
PROPOSED STORM SEWER JUNCTION BOX W/ SOLID TOP RIM EL = 24.69' 24" (NW) FL = 21.26' 24" (SE) FL = 21.16'
29 LF ~ 24" RCP STORM SEWER @ 0.18% SLOPE (SEE MITIGATION PLAN)
24" FL = 20.44'
PROPOSED STORM SEWER JUNCTION BOX W/ SOLID TOP RIM EL = 24.78' 24" (NE) FL = 21.11' 24" (NW) FL = 21.11' 24" (SW) FL = 21.11'
TIE PROPOSED CONCRETE DRIVEWAY INTO EXISTING PAVEMENT
EXISTING 24" RCP STORM SEWER CULVERT
R=10'-0"
PROPOSED 7" THICK CONCRETE PAVEMENT
REFER TO CIVIL DETAILS FOR HEADWALL DIMENSIONS
PROPOSED CONCRETE HEADWALL FOR CULVERT
24" FL = 23.29'
EXCAVATE EARTH & REMOVE EXISTING PIPE UP TO HEADWALL
EXISTING CONCRETE PAVEMENT
EXISTING ASPHALT PAVEMENT
EXISTING SANITARY MANHOLE RIM EL = 21.22' 12" (NW) FL = 7.37' 12" (W) FL = 7.32'
EXISTING SANITARY MANHOLE RIM EL = 19.49' 8" (SW) FL = 8.33' 10" (SE) FL = 7.89' 10" (NW) FL = 7.84'
EXISTING ASPHALT PAVEMENT
EXISTING ROADSIDE DRAINAGE DITCH CENTERLINE
EXISTING ROADSIDE DRAINAGE DITCH HIGH BANK
EXISTING ROADSIDE DRAINAGE DITCH
EXISTING WATER METER
25'-0" BLDG. STBK.
5'-0" TREE TRIM ESMT.
Lift Station Property Boundary
Green Dolphin Road
Royce Lane
STM
NLS
OUT
A1
A2
R=20'-0"

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. PROPOSED DRIVEWAY TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.
8. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.

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BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

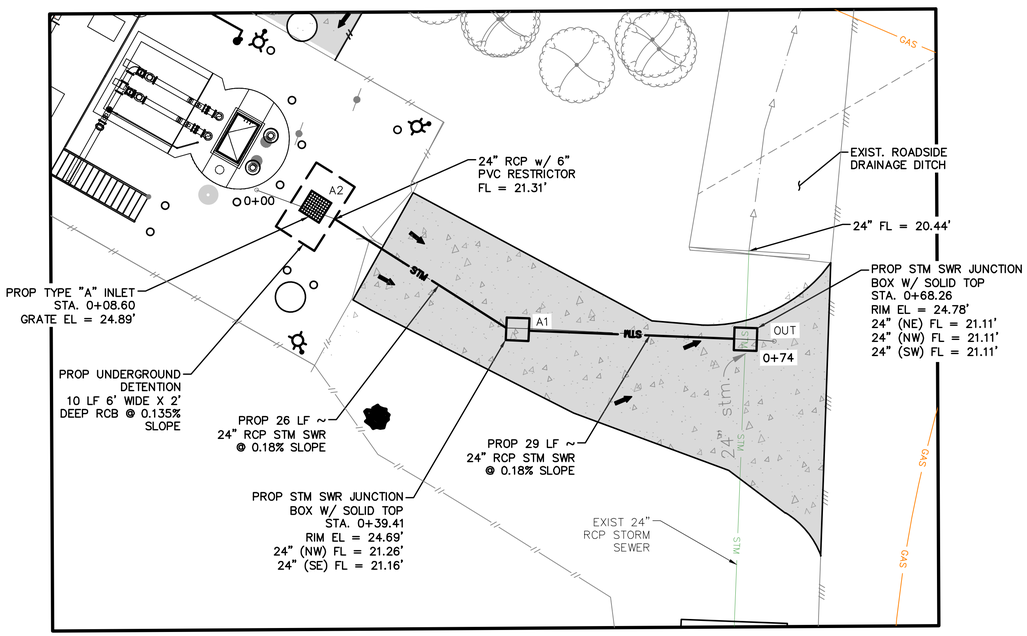
CIVIL

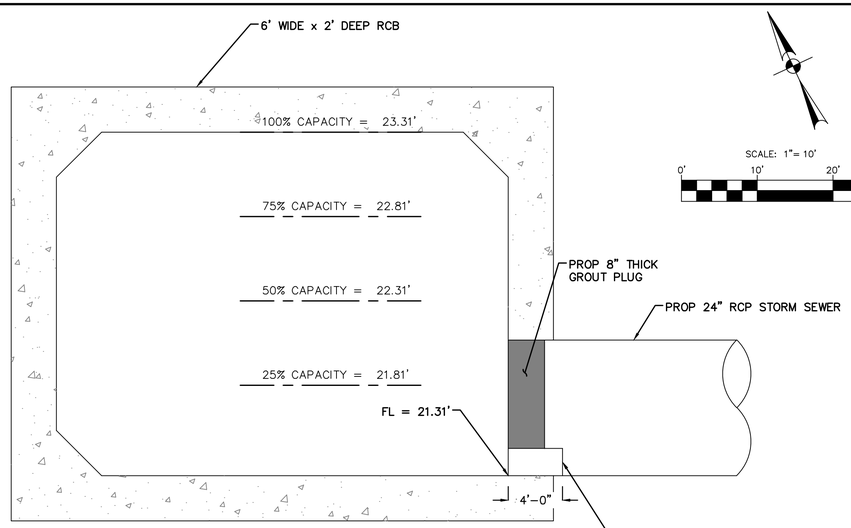
GREEN DOLPHIN LIFT STATION PROPOSED PAVING & GRADING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 55 OF 226	

C-095-105

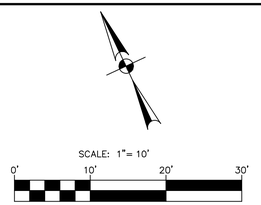
FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Green Dolphin\DWGs\PROPOSED PAVING & GRADING PLAN.dwg





RCB/RESTRICTOR SECTION DETAIL

N.T.S.



NOTES:

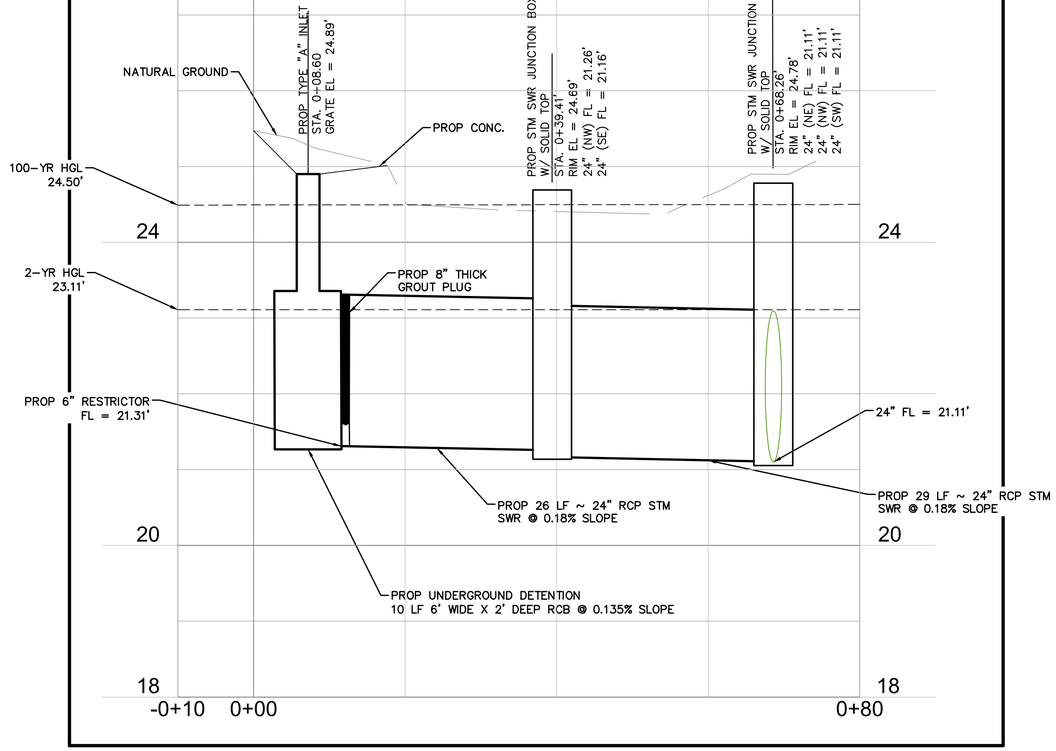
1. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
2. CONTRACTOR TO REHABILITATE ALL DISTURBED SITE & LANDSCAPING TO PRE-CONSTRUCTION OR BETTER CONDITIONS.
3. ALL BORE & JACK WORK TO INCLUDE BORE PITS FOR OPERATIONS.
4. STORMWATER DETENTION BOX TO BE MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.
5. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/ OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/ GEOTECHNICAL/ SAFETY/ EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.



Detention Rate (R_d)	0.80	ac-ft/ac	
Proposed (final) Impervious Area (A_p) =	0.0042	ac	
Existing Impervious Area To Be Removed (A_e) =	0.0033	ac	
Required Detention Volume =	(Ap * Rd) - (Ae * 0.40	ac-ft/ac)	
Total Required Detention Volume =	0.0021	ac-ft	
Provided Detention Volume =	6' x 2' x 10' (W x D x L)	=	0.0028 ac-ft

Low Level Restrictor (25% Flow)

Total Drainage Area =	0.0400	ac
Outflow Rate Allowed for Low Flow QL1 =	0.0200	cfs
Head HL1 (water surface differential) for Low Flow =	0.25	ft
Calculated Low Level Restrictor Size DL =	1.07	in
Provided/Designed Low Level Restrictor Size DL1 =	6	in

High Level Restrictor (75% Flow)

Total Drainage Area =	0.0400	ac
Total Outflow Rate (100%) Q =	0.0800	cfs
Re-calculated Head HL2 (water surface differential) for Low Level Restrictor =	1.25	ft
Re-calculated Low Flow Q L2 for Low Level Restrictor =	1.409	cfs
Outflow Rate Allowed for High Flow Qh1 (75%) =	-1.3293	cfs
Head Hh2 (water surface differential) for High Level Restrictor =	0.25	ft
Calculated High Level Restrictor Size Dh =	#NUM!	in
Provided/Designed High Level Restrictor Size Dh1 (75%) =	N/A	in

No need for High Level Restrictor

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STATE OF TEXAS · JOHN W. LACY · 90202 · LICENSED PROFESSIONAL ENGINEER · 10/9/22

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

CIVIL

GREEN DOLPHIN LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 56 OF 226	

C-095-106

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Green Dolphin\DWGs\MITIGATION PLAN & DRAINAGE CALCULATIONS.dwg

DESIGN STORM SEWER CALCULATIONS (2-YEAR)

Project Name: GREEN DOLPHIN LS IMPROVEMENTS
Project No: 42305-00
Prepared By: WB Date: #######
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 2 year
Design Multiplier: 1.00
Starting W.S. Elev.: 23.11 feet

Rainfall Coeff.
b = 75.0
d = 16.2
e = 0.832

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.00	0.04	0.90	0.04	0.0	20.7	3.74	0.00	0.13	RCP	29	24	1	0.180	0.013	9.6	3.1	0.05	N/A	21.16	21.11	0.04	0.000	0.00	23.11	23.11	23.11	23.11	24.45	No Curb	24.45	0.0 in.
A2	A1	0.04	0.04	0.90	0.04	20.7	20.7	3.74	0.13	0.13	RCP	26	24	1	0.180	0.013	9.6	3.1	0.05	0.10	21.31	21.26	0.04	0.000	0.00	23.11	23.11	23.11	23.11	24.89	No Curb	24.89	0.0 in.

EXTREME EVENT STORM SEWER CALCULATIONS (100-YEAR)

Project Name: GREEN DOLPHIN LS IMPROVEMENTS - EXTREME EVENT ANALYSIS
Project No: 42305-00
Prepared By: WB Date: #######
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 100 year
Design Multiplier: 1.00
Starting W.S. Elev.: 24.50 feet

Rainfall Coeff.
b = 125.4
d = 21.8
e = 0.750

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.00	0.04	0.90	0.04	0.0	20.7	7.54	0.0	0.3	RCP	29	24	1	0.180	0.013	9.6	3.1	0.05	N/A	21.16	21.11	0.09	0.000	0.00	24.50	24.50	24.50	24.50	24.45	No Curb	24.45	*0.6 in.*
A2	A1	0.04	0.04	0.90	0.04	20.7	20.7	7.54	0.3	0.3	RCP	26	24	1	0.180	0.013	9.6	3.1	0.05	0.10	21.31	21.26	0.09	0.000	0.00	24.50	24.50	24.50	24.50	24.89	No Curb	24.89	0.0 in.

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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
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FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/13/23

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

CIVIL
GREEN DOLPHIN LIFT STATION
STORM SEWER CALCULATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
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SHEET NO. 57 OF 226	

C-095-107

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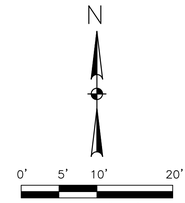

NOTES:

1. CONTRACTOR SHALL DECIDE WHICH AREA NEEDS TO HAVE POLLUTION PREVENTION ACCORDING TO CONSTRUCTION SEQUENCE.
2. FILTER FABRIC FENCE SHALL NOT BE PLACED ACROSS DRIVEWAYS OR SIDEWALKS ACCESSING PRIVATE PROPERTY.
3. CONTRACTOR SHALL PROTECT THE GRATE INLET ON THE DRIVEWAY ADJACENT TO THE LIFT STATION FROM ANY WATER ENCOUNTER DURING THE PROGRESS OF WORK.
4. CONTRACTOR SHALL REMOVE AND REPLACE INLET PROTECTION BARRIER PER REQUEST BY THE CITY RELATED TO SEVERE WEATHER EVENTS.

–X–FF–X—— FILTER FABRIC FENCE

IPB–II TYPE 2 INLET PROTECTION BARRIER

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STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

CIVIL

GREEN DOLPHIN LIFT STATION STORM WATER POLLUTION PREVENTION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 58 OF 226	

C–095–108

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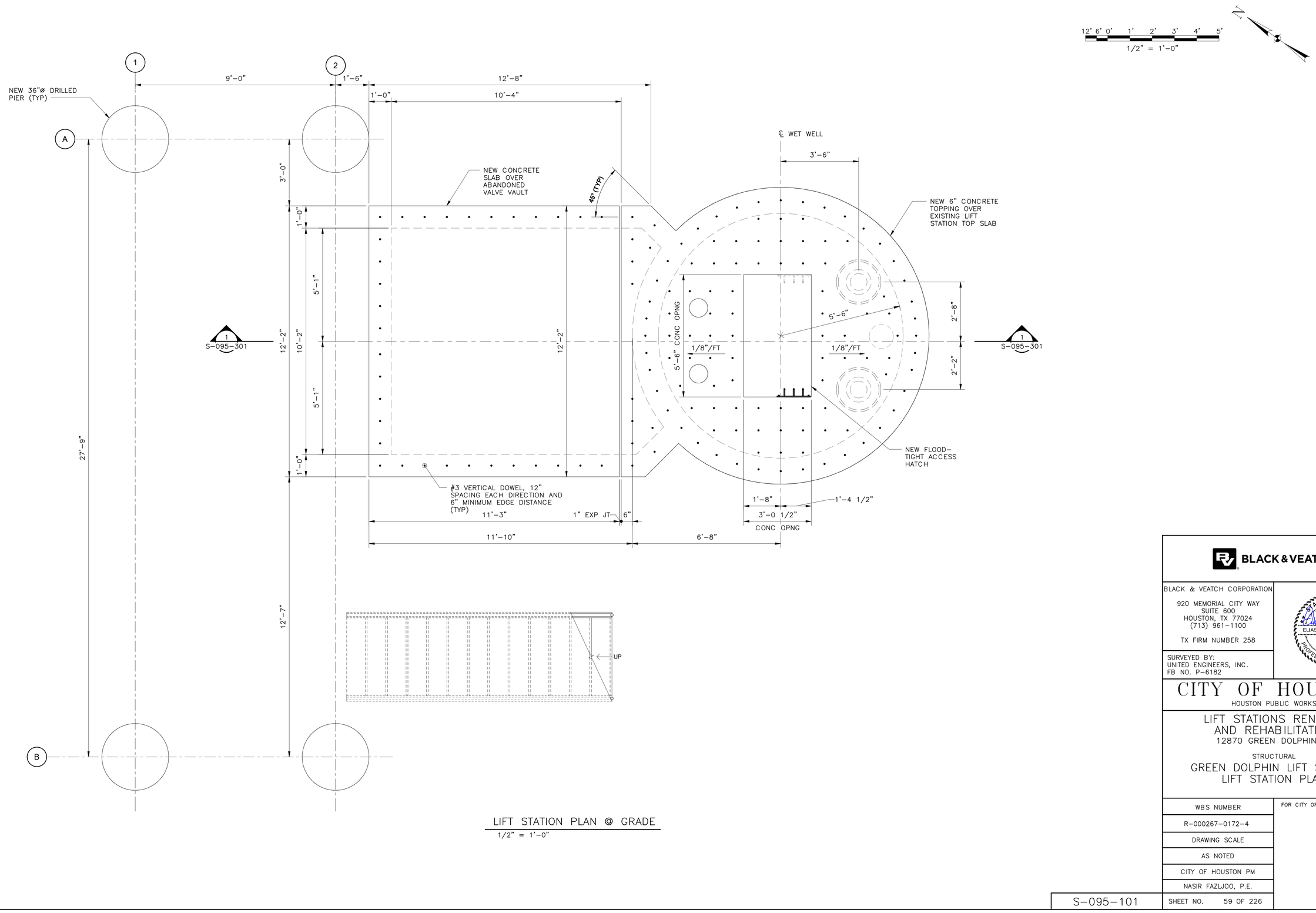

LIFT STATION PLAN @ GRADE

1/2" = 1'-0"

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-095-GREEN_DOLPHIN_LS-BV.rvt

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STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

STRUCTURAL

GREEN DOLPHIN LIFT STATION
LIFT STATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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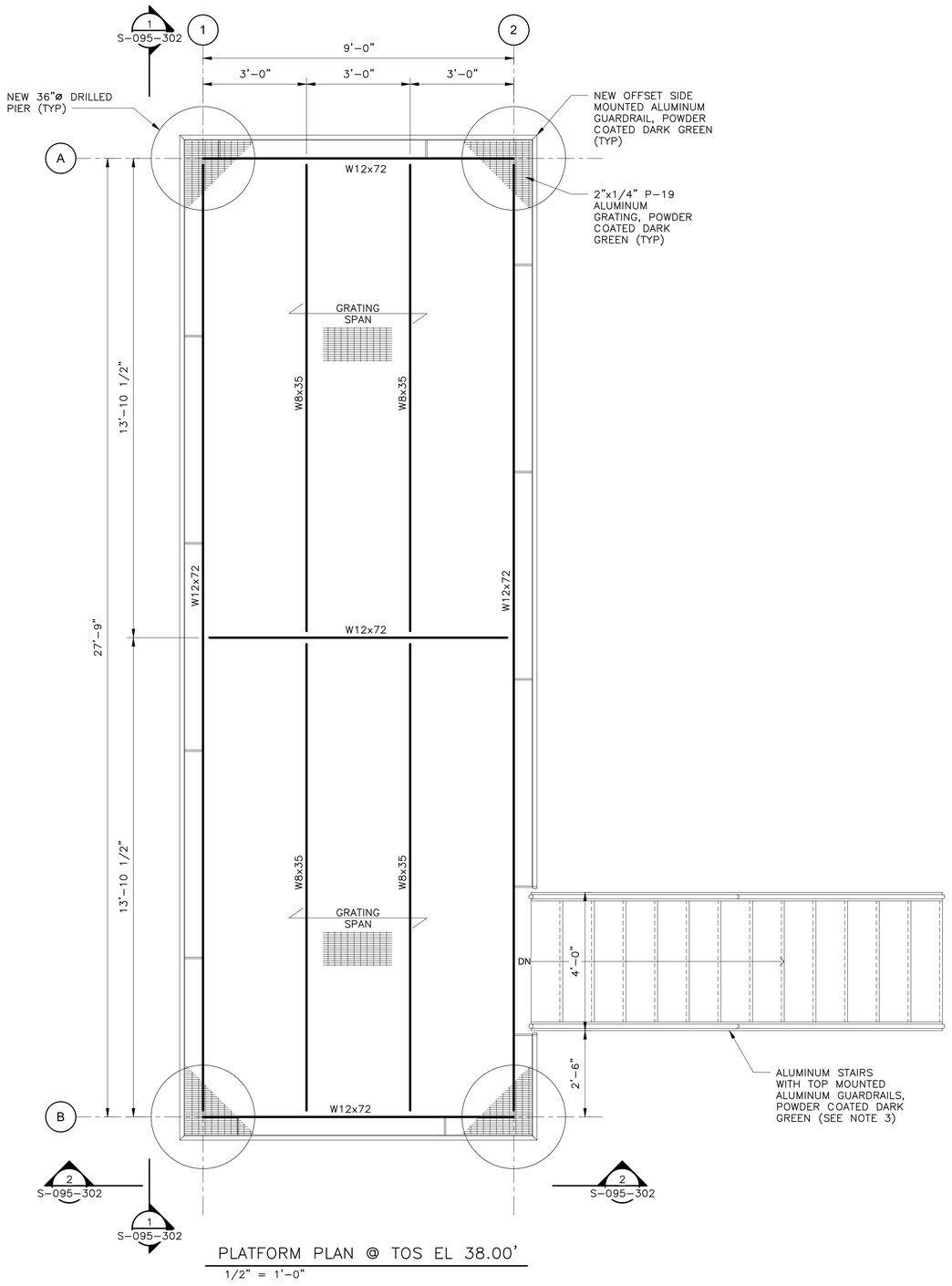
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 59 OF 226	

S-095-101



PLATFORM PLAN @ TOS EL 38.00'

1/2" = 1'-0"

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

1/2" = 1'-0"

N

NOTES:

1. COORDINATE STRUCTURAL SUPPORT MEMBERS AND ANCHORAGE WITH EQUIPMENT MANUFACTURER PRIOR TO FABRICATION. SEE ELECTRICAL AND MECHANICAL DRAWINGS FOR EQUIPMENT LAYOUT.
2. ALL PLATFORM BEAMS TO BE HDG STEEL.
3. THE RISER HEIGHTS SHALL NOT BE LESS THAN 4 INCHES OR GREATER THAN 7 INCHES. THE MINIMUM TREAD DEPTH IS 11 INCHES. STAIR TREADS AND RISERS SHALL BE OF UNIFORM SIZE AND SHAPE. THE TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTH SHALL NOT EXCEED 3/8 INCH IN A STAIRWAY FLIGHT.

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

STRUCTURAL

GREEN DOLPHIN LIFT STATION EQUIPMENT PLATFORM PLAN

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CITY OF HOUSTON PM	
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S-095-102

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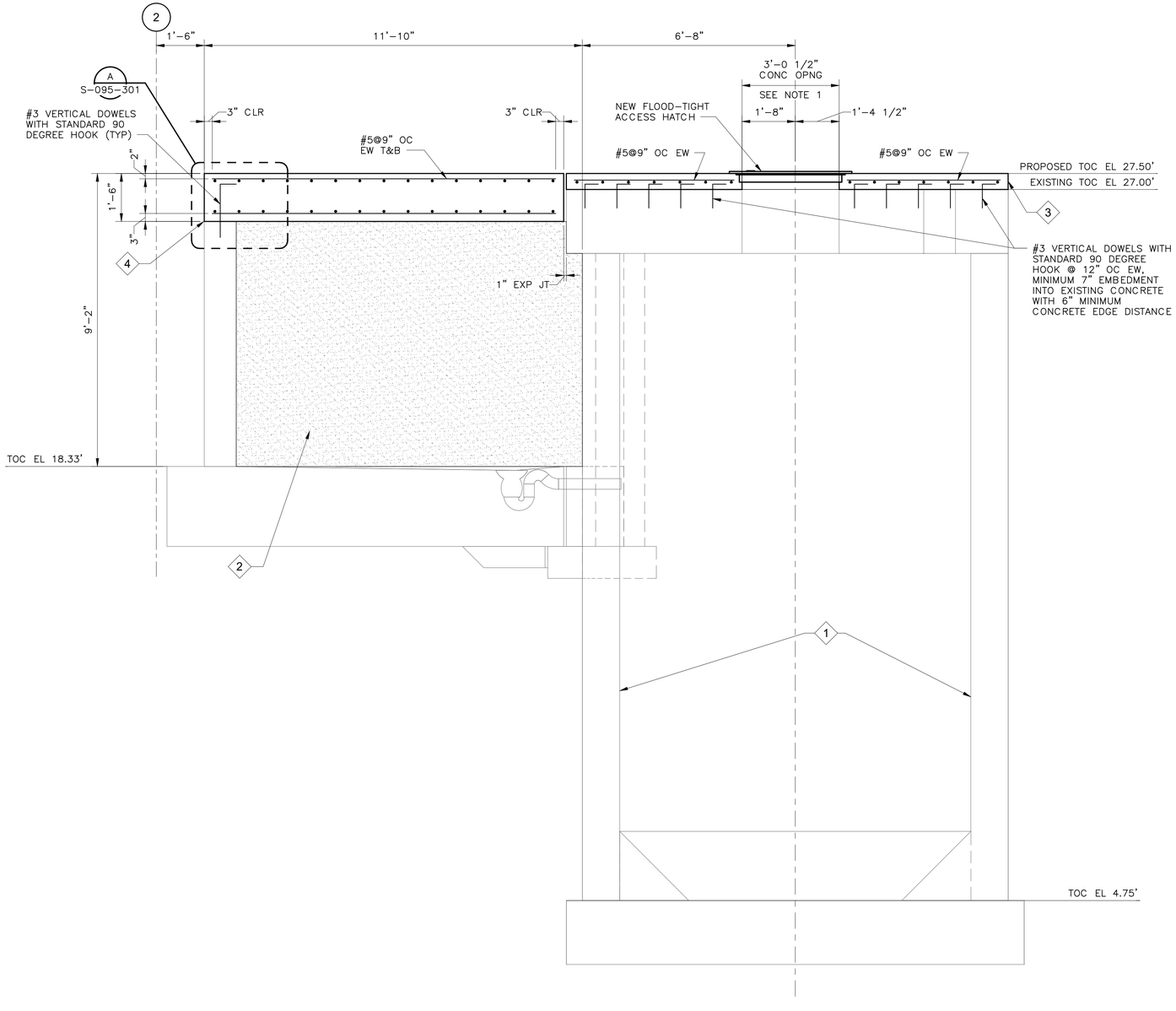
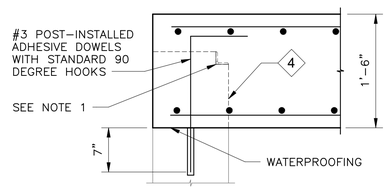


1 LIFT STATION SECTION
S-095-101 1/2" = 1'-0"



A DETAIL
S-095-301 1" = 1'-0"

NOTES:

1. EXISTING ANGLE FRAMING AROUND INSIDE PERIMETER OF VALVE VAULT AND PUMP ACCESS HATCH TO BE SAWCUT AND REMOVED PRIOR TO INSTALLATION OF WATERPROOFING, DOWELS, REBAR, AND NEW CONCRETE. EXISTING CONCRETE STUDS ATTACHING TO ANGLE FRAMING TO BE CUT AND LEFT IN PLACE WHERE CONCRETE IS TO REMAIN.

ITEMS OF WORK	
NO.	DESCRIPTION
1	INTERIOR SURFACE OF WET WELL AND ACCESSIBLE PORTIONS OF INFLUENT MANHOLE TO BE CLEANED AND ALL SIGNS OF SURFACE DAMAGE AND/OR CRACKS TO BE REPAIRED. REFER TO SHEET S-000-513 AND SPECIFICATION SECTIONS 03920 AND 03930. SURFACES TO BE COATED PER COH STANDARDS.
2	FILL VALVE VAULT WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM) MAXIMUM LIFTS OF 4FT WITH 7 DAYS OF CURING IN BETWEEN LIFTS.
3	ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE AND INSTALL ADDITIONAL 6 INCHES OF CONCRETE OVER LIFT STATION TOP SLAB.
4	DEMOLISH TOP 1FT OF VALVE VAULT WALLS ON THREE SIDES TO ACCOMMODATE INSTALLATION OF NEW CONCRETE SLAB OVER TOP OF EXISTING VALVE VAULT. ROUGHEN EXISTING SURFACES OF NEW CONCRETE JOINT TO A 1/4" AMPLITUDE PRIOR TO PLACING CONCRETE.

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

BLACK & VEATCH

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SUITE 600
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STATE OF TEXAS
ELIAS A. POURLADIAN
133589
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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
12870 GREEN DOLPHIN ST

STRUCTURAL
GREEN DOLPHIN LIFT STATION
LIFT STATION SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
S-095-301	SHEET NO. 61 OF 226

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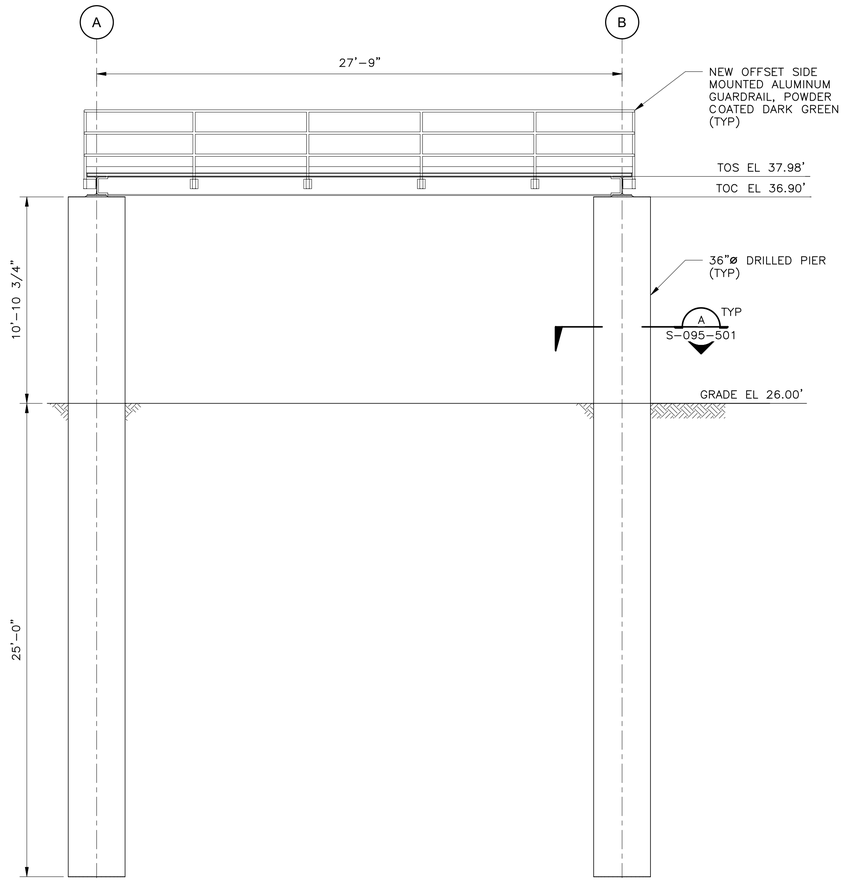
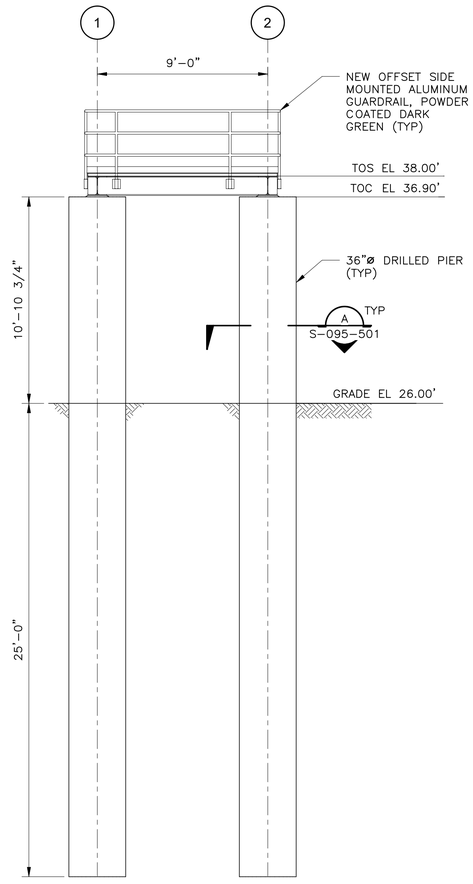


1 SECTION
S-095-102 1/4" = 1'-0"



2 SECTION
S-095-102 1/4" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

S-095-302

BLACK & VEATCH

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920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
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TX FIRM NUMBER 258

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STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

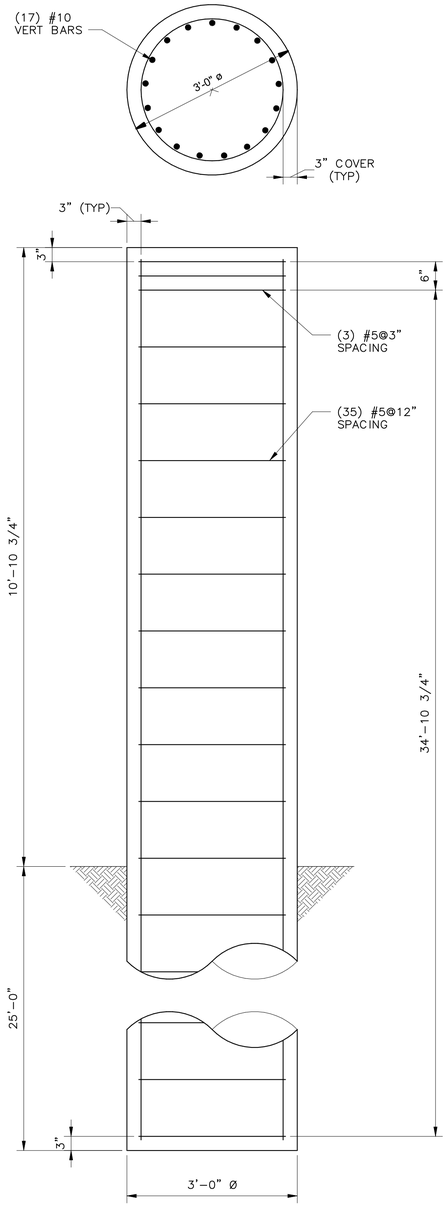
LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

STRUCTURAL

GREEN DOLPHIN LIFT STATION EQUIPMENT PLATFORM SECTIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 62 OF 226	

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-095-GREEN_DOLPHIN_LS-BV.rvt



A DRILLED PIER DETAIL
S-095-302 3/4" = 1'-0"

12" 6" 0' 1' 2' 3'
3/4" = 1'-0"

S-095-501

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
12870 GREEN DOLPHIN ST

STRUCTURAL

GREEN DOLPHIN LIFT STATION EQUIPMENT PLATFORM DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 63 OF 226	

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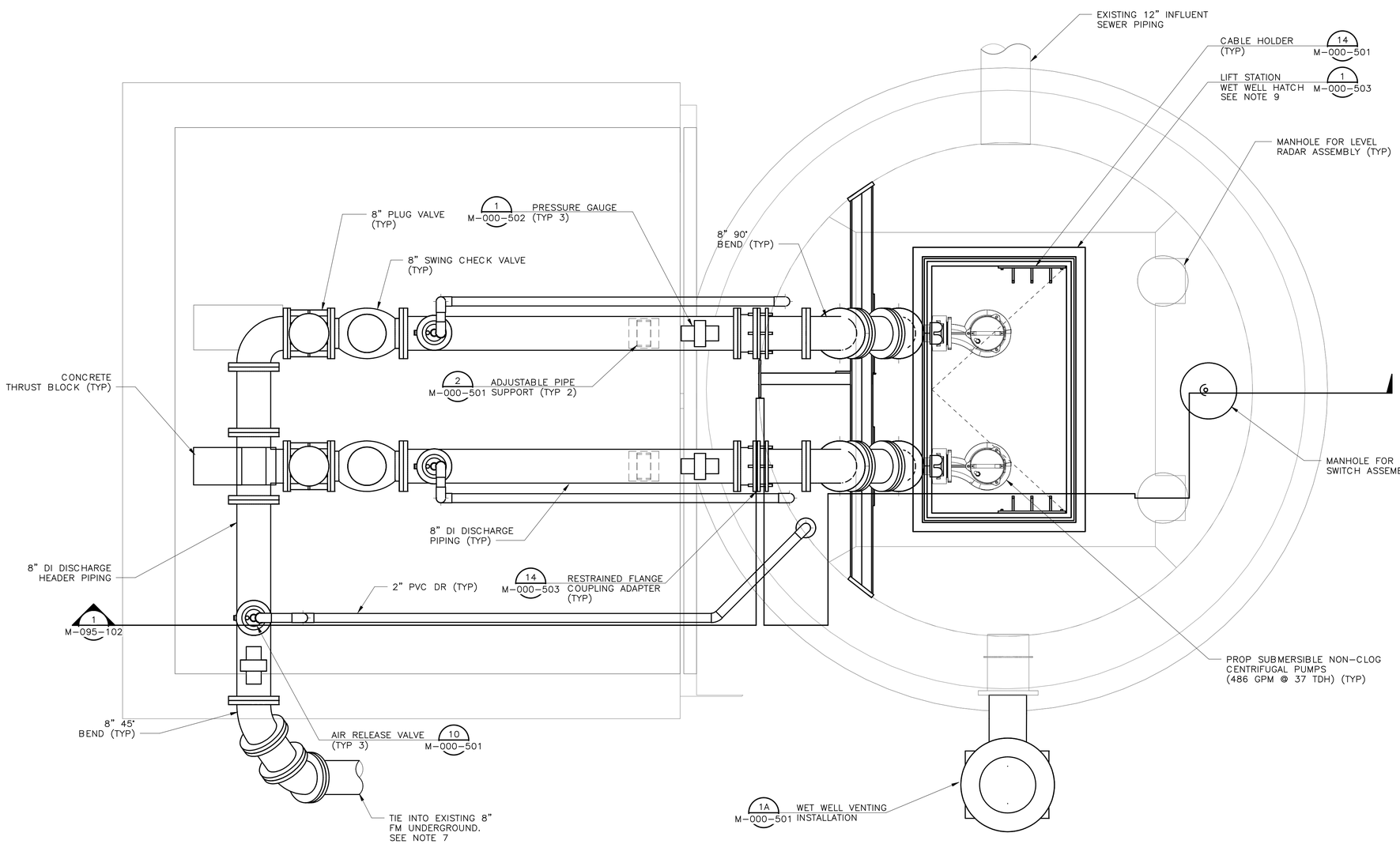

LIFT STATION PLAN

3/4" = 1'-0"

12" 6" 0' 1' 2' 3'

3/4" = 1'-0"

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. INSTALL PLUG VALVES TO OPEN UPWARD AND TO CLOSE TO A SEATING POSITION.
4. INSTALL CHECK VALVES SO THAT THE WEIGHT LEVEL IS APPROXIMATELY 45° BELOW THE VALVE HORIZANTAL CENTER LINE IN THE CLOSED POSITION; AND APPROXIMATELY 45° ABOVE THE VALVE HORIZANTAL CENTER LINE IN THE FULL OPEN POSITION.
5. SLEEVED OR CORED DISCHARGE PIPE OPENINGS SEALED WITH LINK-SEAL (OR APPROVED EQUAL), MAY BE SUBSTITUTED FOR POURED IN PLACE WALL PIPES TO ACCOMODATE CONSTRUCTION METHOD.
6. LABEL HATCHES WITH THE CORRESPONDING PUMP NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING WELDED TO THE HATCH. LABEL VALVE NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING ADHERED TO THE TOP OF THE CHECK VALVE.
7. CONTRACTOR SHALL CONFIRM THE LOCATION ALIGNMENT, AND DEPTH OF THE EXISTING 8" FORCE MAIN AT THE LIFT STATION STRUCTURE PRIOR TO INSTALLING THE PROPOSED ABOVE GROUND DISCHARGE PIPING. PROPOSED 8" FORCE MAIN TO BE ROUTED AROUND THE STAIRS AND CONNECT TO THE EXISTING PIPE IN THE YARD. SEE C-095-104 FOR DETAILS. PROPOSED 8" FORCE MAIN TO BE ROUTED AROUND THE STAIRS AND CONNECT TO EXISTING PIPE IN THE YARD. SEE C-095-104 FOR DETAILS.
8. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
9. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUMUM CLEARANCE WITH OPENING EDGE.
10. CONTRACTOR SHALL PROVIDE PIPE SUPPORTS FOR PIPES 12" AND SMALLER

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LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

PROCESS MECHANICAL

GREEN DOLPHIN LIFT STATION
LIFT STATION PLAN

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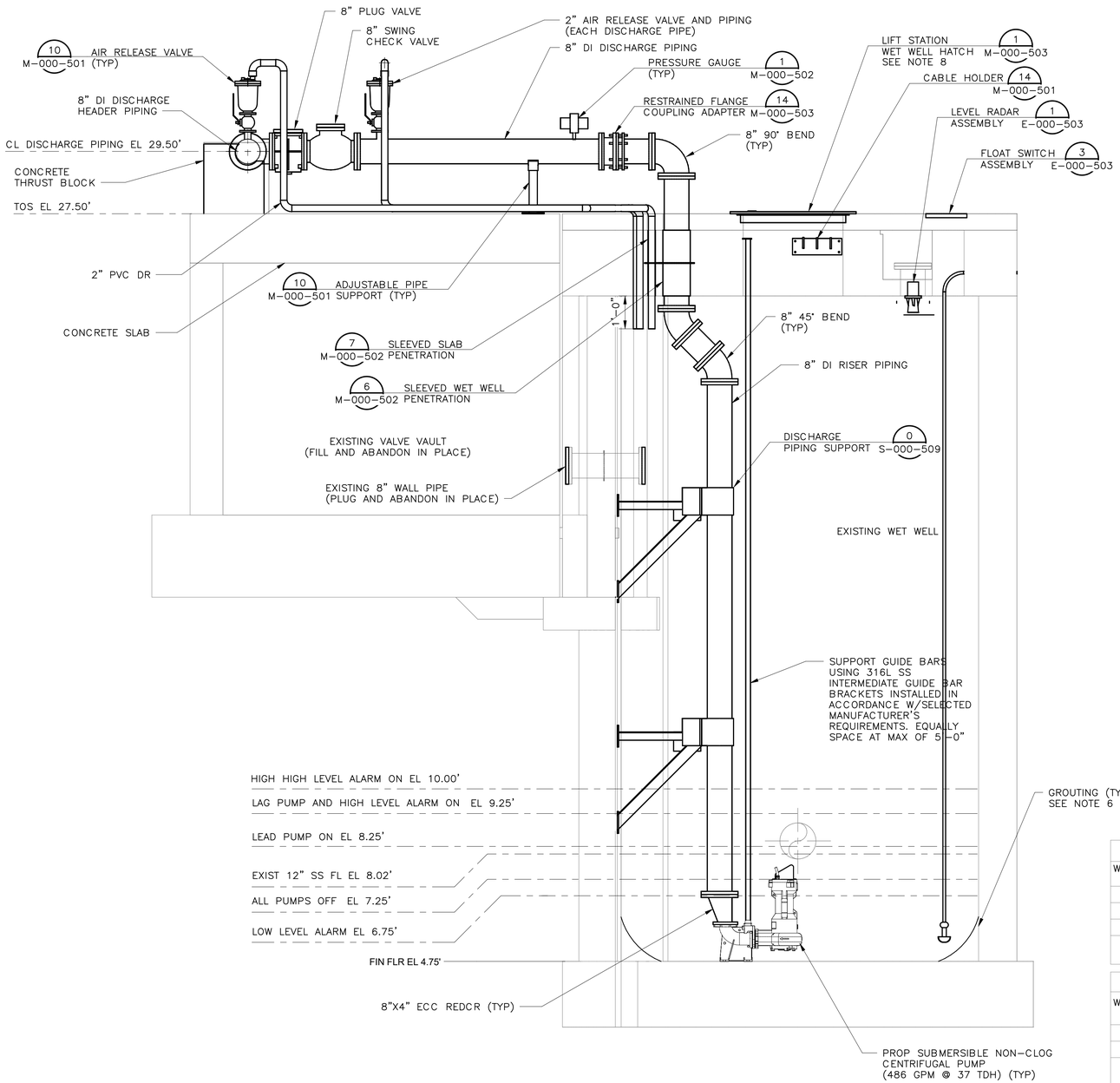
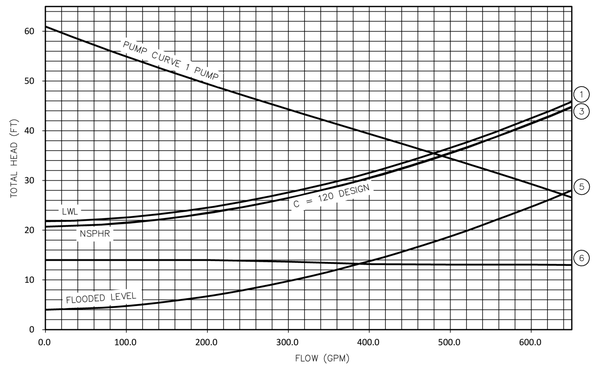


LIFT STATION SECTION

1/2" = 1'-0"



PUMP OPERATION CURVES

PUMP CURVE NOTES:

1. LOW NORMAL OPERATING LEVEL C=120 – DESIGN.
2. HIGH NORMAL OPERATING LEVEL C=100 – INFORMATION ONLY (TCEQ).
3. HIGH NORMAL OPERATING LEVEL C=120 – DESIGN.
4. HIGH NORMAL OPERATING LEVEL C=140 – INFORMATION ONLY
5. EMERGERNCY FLOODED OPERATING LEVEL C=140 – MAXIMUM DISCHARGE
6. NET POSITIVE SUCTION HEAD REQUIRED (NPSHR) BASED ON NORMAL OPERATING WATER LEVELS.
7. PUMP CURVES ARE MODIFIED FOR STATION LOSSES.

PUMP DATA TABLE

PUMP CHARACTERISTICS	PUMP NO. 1	PUMP NO. 2
MOTOR DATA NOMINAL SIZE (HP) MAX SPEED (RPM)	9.0 1,750	9.0 1,750
SOLIDS PASSAGE MIN SPHERE (IN)	3	3
CAPACITY (GPM) DESIGN	486	486
DISCHARGE HEAD (FT) DESIGN	37	37
EFFICIENCY (%) DESIGN	69	69
NPSHR (FT) DESIGN	14	14
PUMP CYCLE TIME (MIN)	6	6
CUMULATIVE CAPACITY (GPM)	486	NA*

*NOTE: CUMULATIVE CAPACITY PROVIDED FOR PUMP FIRM CAPACITY (N-1)

STATION OPERATION TABLES

RISING LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
2.5'	7.25'	PUMPS OFF LEVEL – NO ACTION	ALL PUMPS ARE OFF
3.5'	8.25'	LEAD PUMP TURNS ON	LEAD PUMP ON
4.5'	9.25'	HIGH WATER ALARM ON	HIGH WATER ALARM SOUNDS
5.25'	10.00'	HIGH HIGH LEVEL ALARM (FLOAT ON LEVEL)	DUTY PUMP ON (FLOATS)

FALL LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
–	–	FLOAT OFF LEVEL	ALL PUMPS OFF (FLOATS)
3.5'	8.25'	HIGH WATER LEVEL ALARM OFF	LEAD PUMP ON
2.5'	7.25'	LEAD PUMP TURNS OFF	ALL PUMPS OFF – STANDBY PUMP SWITCHES TO LEAD PUMP
2.0'	6.75'	LOW LEVEL ALARM	–

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

1/2" = 1'-0"

NOTES:

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2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. PUMP ANCHOR BOLTS ARE TO BE ADHESIVE TYPE, AND EMBEDDED IN CONCRETE SLAB. CONTRACTOR TO SUBMIT DESIGN OF PUMP ANCHOR BOLTS AND PATTERN INCLUDING CALCULATIONS, DURING SHOP DRAWINGS SUBMISSION.
4. CONTRACTOR TO PROVIDE ADHESIVE ANCHORS IN LIEU OF WEDGE ANCHORS FOR ALL SUBMERGED CONDITIONS. AND SUBMIT DESIGN OF ANCHOR BOLTS DURING SHOP DRAWINGS SUBMISSION.
5. ALL PIPING IN THE WET WELL SHALL BE FLANGED, NO FLANGED COUPLING ADAPTORS, OR VICTAULIC STYLE COUPLINGS SHALL BE PERMITTED INSIDE THE WET WELL.
6. CONTRACTOR SHALL COORDINATE WITH SUPPLIED PUMPS TO ENSURE GROUT IN WET WELL IS OUTSIDE THE MINIMUM REQUIRED CLEARANCE AREA FOR PUMPS IF THE EXISTING GROUT COINCIDES WITH THE MANUFACTURER'S MINIMUM CLEAR AREA REQUIRED AROUND THE PROPOSED PUMPS. THE EXISTING GROUT SHALL BE DEMOLISHED AND REPLACED SUCH THAT THE GROUT IS OUTSIDE THE MINIMUM CLEAR AREA AT NO ADDITIONAL COST TO THE OWNER.
7. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
8. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

PROCESS MECHANICAL

GREEN DOLPHIN LIFT STATION
LIFT STATION SECTION

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M-095-102

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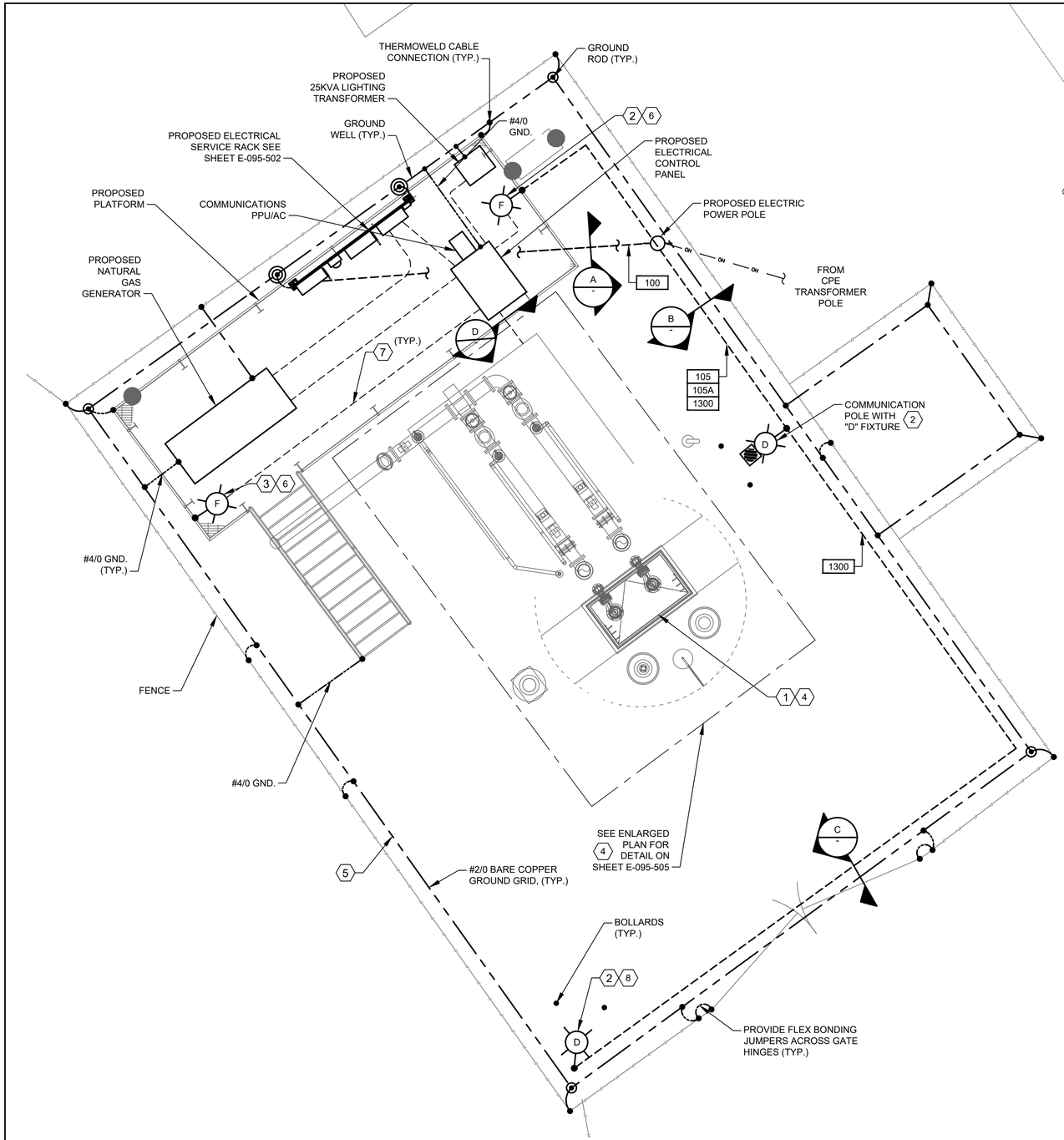
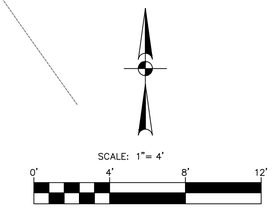
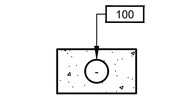


GREEN DOLPHIN ELECTRICAL
PROPOSED SITE (B)

PLAN

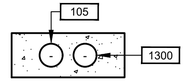
1"= 4'-0"





DUCTBANK

SECTION A
NTS



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SECTION B
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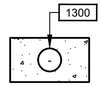

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SECTION C
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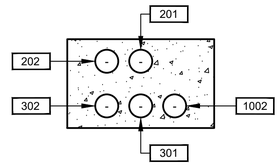

DUCTBANK

SECTION D
NTS

NOTES BY SYMBOL "⟨#⟩":

1. THE ELECTRICAL INSTALLATION IN THE WET WELL SHALL BE EXPLOSION PROOF, IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR CLASS I, DIVISION 1 LOCATIONS.
2. YARD LIGHT CONTROLLED BY LIGHTING SWITCH.
3. DUSK TO DAWN PHOTOCELL CONTROL.
4. INSIDE WETWELL RATED NEMA CLASS 1, DIV. 1. OUTSIDE ABOVE GROUND, AROUND WETWELL RATED CLASS 1, DIV. 2 ACCORDING TO NFPA 820.
5. GROUNDING LOOP SHALL BE BURIED 30" BELOW FINISHED GRADE.
6. AREA LIGHTING MOUNTED ON PLATFORM. REFER TO SHEET E-000-504 FOR THE INSTALLATION OF THE LIGHT.
7. CONDUIT TO BE INSTALLED BELOW PLATFORM.
8. TYPE "B" FIXTURE TO BE INSTALLED ON THE POLE PROVIDING WIRES FOR THE "B" LIGHT.

GENERAL NOTES:

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION
12870 GREEN DOLPHIN ST.
PROPOSED SITE PLAN

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SHEET NO. 66 OF 226	

E-095-101

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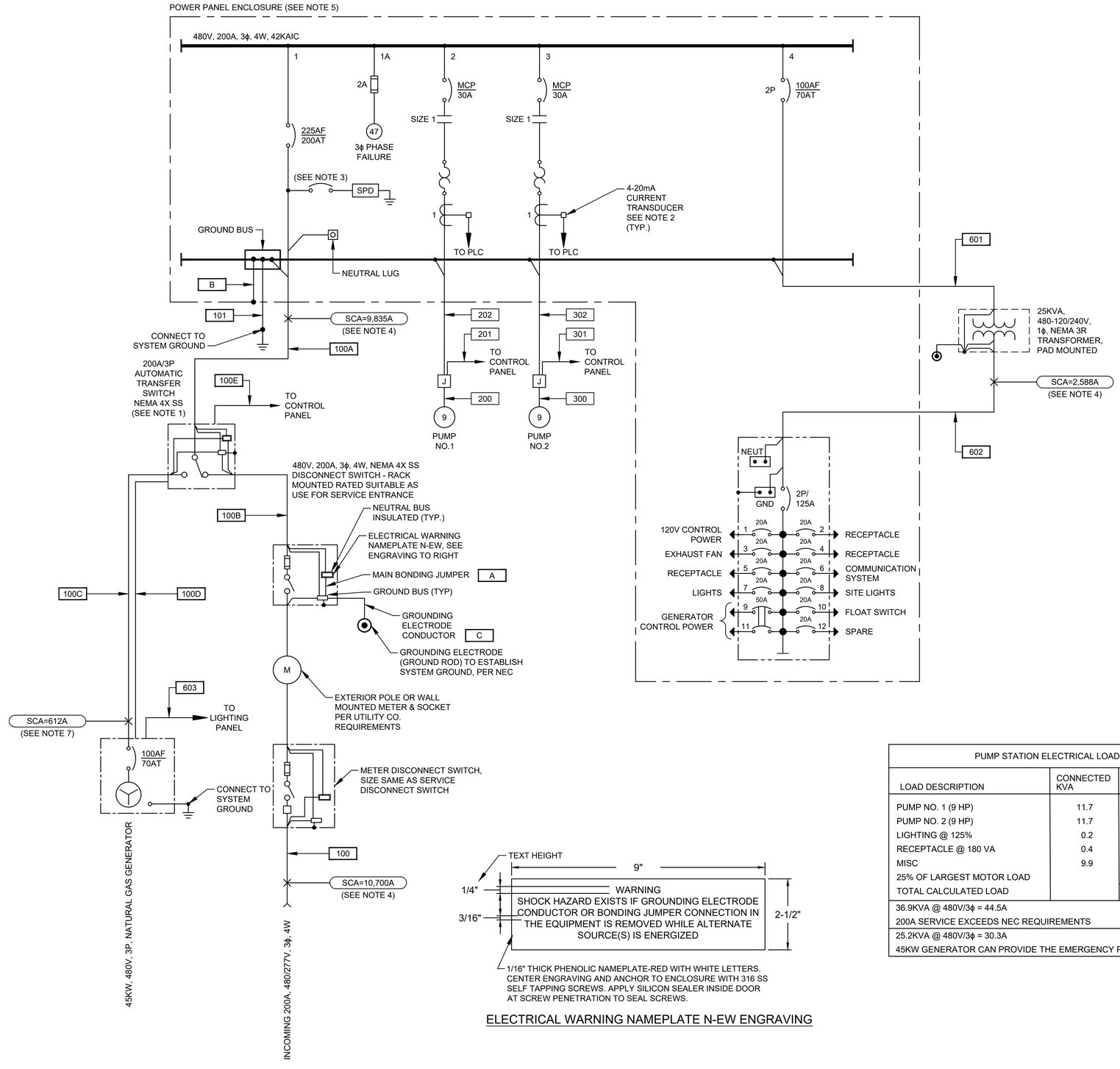

NOTES:

1. PROVIDE A NORMALLY OPEN (NO) AUXILIARY CONTACT FOR BOTH ON POSITIONS.
2. PROVIDE 5A PRIMARY TO 4-20mA CURRENT TRANSDUCER.
3. PROVIDE BREAKER ACCORDING TO MANUFACTURER'S REQUIREMENTS.
4. POINT TO POINT METHOD IS USED FOR SHORT CIRCUIT CURRENT CALCULATION.
5. CONTRACTOR SHALL PROVIDE A PERMANENTLY AFFIXED LABEL (2" X 3") SHOWING THE AVAILABLE FAULT CURRENT AND CALCULATION DATE. THE LABEL SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND.
6. THE INSULATION TYPES OF ALL ELECTRICAL CONDUCTOS USED IN THE PROJECT HAVE BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS (16120, 16121, AND 16122). THE TYPES OF CONDUITS USED IN THE PROJECT HAS BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS 16111.
7. THE INFORMATION IS PROVIDED BY GENERATOR MANUFACTURER (CUMMINS).

GENERAL NOTES:

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1/16" THICK PHENOLIC NAMEPLATE-RED WITH WHITE LETTERS. CENTER ENGRAVING AND ANCHOR TO ENCLOSURE WITH 316 SS SELF TAPPING SCREWS. APPLY SILICON SEALER INSIDE DOOR AT SCREW PENETRATION TO SEAL SCREWS.

ELECTRICAL WARNING NAMEPLATE N-EW ENGRAVING

PUMP STATION ELECTRICAL LOAD ANALYSIS			
LOAD DESCRIPTION	CONNECTED KVA	DEMAND KVA	EMERGENCY POWER KVA
PUMP NO. 1 (9 HP)	11.7	11.7	11.7
PUMP NO. 2 (9 HP)	11.7	11.7	--
LIGHTING @ 125%	0.2	0.3	0.3
RECEPTACLE @ 180 VA	0.4	0.4	0.4
MISC	9.9	9.9	9.9
25% OF LARGEST MOTOR LOAD		2.9	2.9
TOTAL CALCULATED LOAD		36.9	25.2
36.9KVA @ 480V/3ϕ = 44.5A 200A SERVICE EXCEEDS NEC REQUIREMENTS			
25.2KVA @ 480V/3ϕ = 30.3A 45KW GENERATOR CAN PROVIDE THE EMERGENCY POWER			

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION 12870 GREEN DOLPHIN ST. ONE-LINE DIAGRAM

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E-095-701

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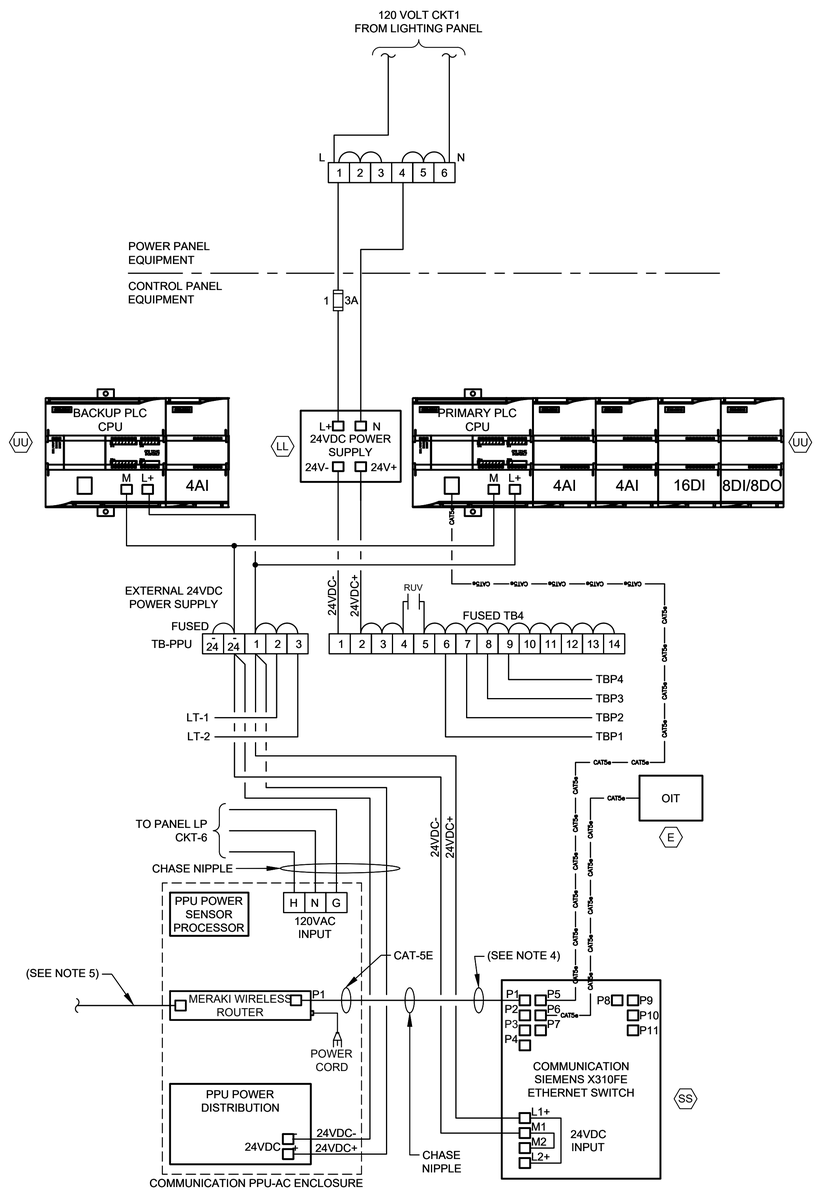
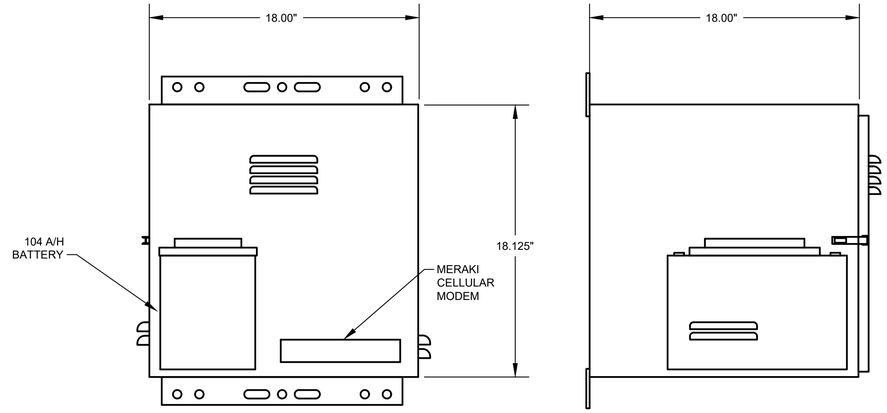


CONTROL POWER &
COMMUNICATIONS WIRING

DIAGRAM

NTS

(SEE NOTE 2 & 6)



PPU-AC ENCLOSURE
FRONT VIEW

PPU-AC ENCLOSURE
SIDE VIEW

PPU-AC
CONTROL ENCLOSURE

ELEVATION

NTS

(SEE NOTE 7)

NOTES:

1. FOR DESCRIPTION AND RATINGS OF ITEMS INDICATED WITH ITEM TAG, SEE DEVICE RATINGS SCHEDULE.
2. REFER TO SPEC SECTION 16120 FOR CONDUCTOR COLOR CODE.
3. THE PLC POWER SUPPLY SHALL FEED THE 24VDC I/O.
4. ETHERNET CABLE FOR MERAKI CELLULAR ROUTER (P1).
5. POE CABLE TO RADIO.
6. COMMUNICATION PPU-AC & SCADA SHALL BE PROVIDED BY CONTRACTOR INCLUDING TO RUN CONDUITS & WIRES.
7. COORDINATE WITH VENDOR TO PROVIDE PROPER VENTILATION WHERE APPLICABLE.

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12870 GREEN DOLPHIN ST

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GREEN DOLPHIN LIFT STATION 12870 GREEN DOLPHIN ST. COMMUNICATION DIAGRAM

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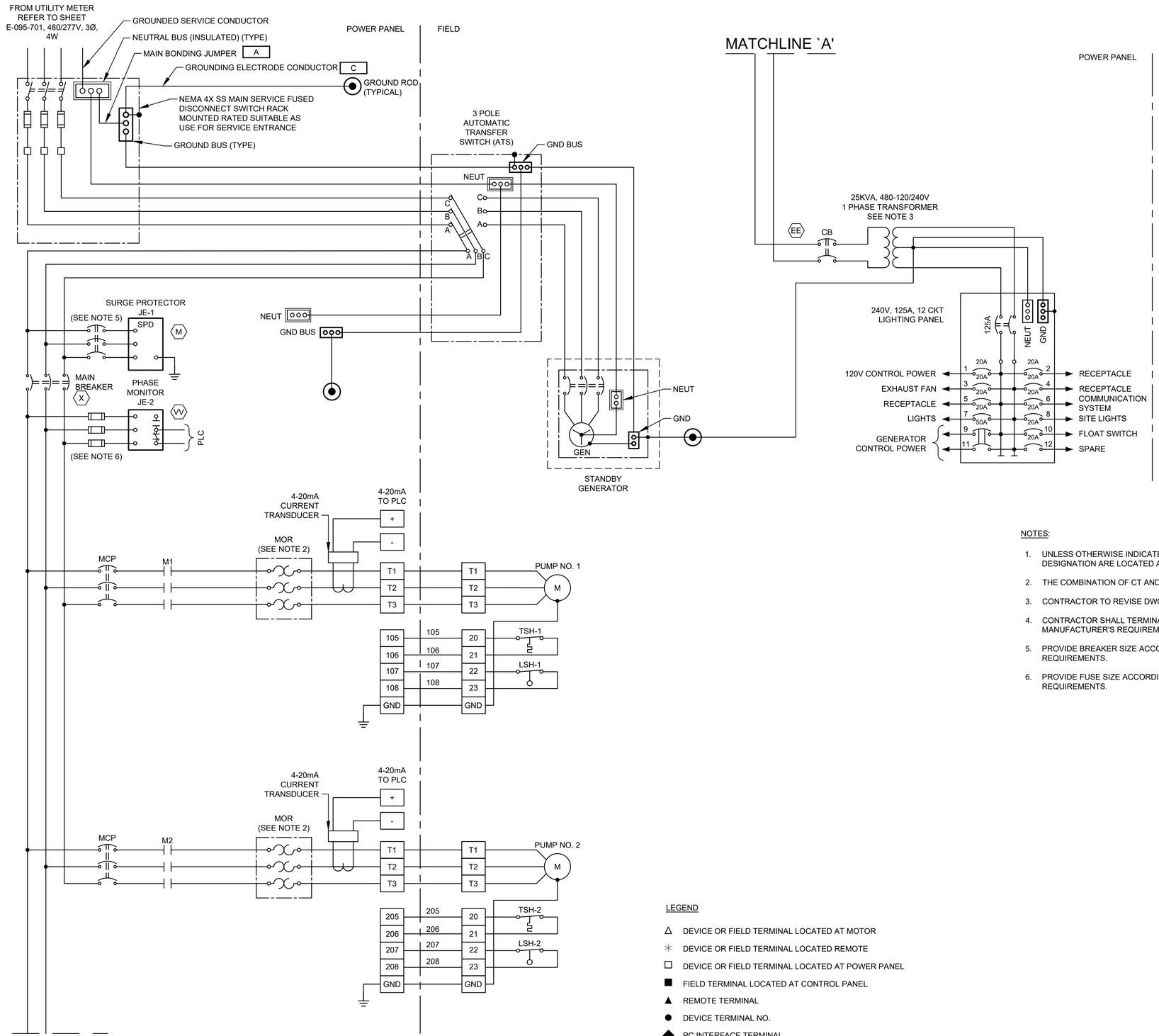
E-095-702

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin E-095-702.dwg



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NOTES:

1. UNLESS OTHERWISE INDICATE, ALL DEVICES WITHOUT FURTHER DESIGNATION ARE LOCATED AT THE CONTROL PANEL.
2. THE COMBINATION OF CT AND MOTOR OVERLOAD RELAY IF REQUIRED.
3. CONTRACTOR TO REVISE DWG. BASED ON MANUFACTURE AND SIZE.
4. CONTRACTOR SHALL TERMINATE POWER & CONTROL WIRES PER MANUFACTURER'S REQUIREMENTS.
5. PROVIDE BREAKER SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
6. PROVIDE FUSE SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PC INTERFACE TERMINAL

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION 12870 GREEN DOLPHIN ST. THREE-LINE DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-095-703

SHEET NO. 69 OF 226

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CONDUIT AND CABLE SCHEDULE

ITEM NO.	CONDUIT TAG.	CONDUIT QUANTITY	CONDUIT SIZE	# CONDS PAIRS/TRIADS	CONDUCTOR SIZE	AMPS OR HP	VOLTAGE LEVEL	FROM	TO	DESCRIPTION
1	A	1	-	-	#2 GND.	-	-	MAIN FUSED DISCONNECT NEUTRAL	MAIN FUSED DISCONNECT GROUND	MAIN BONDING JUMPER
2	B	1	-	-	#2 GND.	-	-	MAIN FUSED DISCONNECT GROUND	POWER/CONTROL PANEL & EQUIPMENT	EQUIPMENT BONDING JUMPER
3	C	1	1"	-	#2 GND.	-	-	GROUNDING ELECTRODE	MAIN SERVICE FUSED DISCONNECT	GROUNDED ELECTRODE CONDUCTOR
4	100	1	2-1/2"	1/C	4#3/0 AWG., #2 AWG. NEUT., #2 AWG GND.,	200A	480V	UTILITY POWER SERVICE	METER DISCONNECT	SERVICE ENTRANCE
5	100A	1	2-1/2"	1/C	4#3/0 AWG., #2 AWG. NEUT., #2 AWG GND.,	200A	480V	AUTOMATIC TRANSFER SWITCH	POWER PANEL	MCC SERVICE POWER
6	100B	1	2-1/2"	1/C	4#3/0 AWG., #2 AWG. NEUT., #2 AWG GND.,	200A	480V	AUTOMATIC TRANSFER SWITCH	MAIN SERVICE FUSED DISCONNECT	UTILITY POWER ENTRANCE
7	100C	1	2"	1/C	4#3/0 AWG., #2 AWG. NEUT., #2 AWG GND.,	200A	480V	GENERATOR	AUTOMATIC TRANSFER SWITCH	EMERGENCY POWER
8	100D	1	1"	1/C	8#14 AWG.,	-	120V	AUTOMATIC TRANSFER SWITCH	GENERATOR	GENERATOR START, FAIL, LOW FUEL SIGNALS
9	100E	1	3/4"	1/C	4#14 AWG.,	-	120V	AUTOMATIC TRANSFER SWITCH	CONTROL PANEL	NORMAL/EMERGENCY POWER STATUS
10	100F	1	1"	1/C	12#14 AWG., #14 GND.	-	120V	GENERATOR	CONTROL PANEL	GENERATOR RUN AND ALARM SIGNALS
11	101	1	1"	1/C	#2 AWG GND.,	-	-	POWER PANEL	GROUND FIELD	GROUND ELECTRODE CONDUCTOR
12	104	1	1"	-	#2 AWG GND.,	-	-	CONTROL PANEL	GROUND FIELD	GROUND ELECTRODE CONDUCTOR
13	105	1	1"	-	POE CABLE	-	24VDC	COMMUNICATION POLE	PPU-AC ENCLOSURE	COMMUNICATION
14	200	1	2-1/2"	-	MANUFACTURER CABLE	9HP	480V/120V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 POWER & CONTROL
15	201	1	1"	1/C	4#14 AWG.,	-	120V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	PUMP NO.1 CONTROLS
16	202	1	1-1/2"	1/C	3#8 AWG., #10 GND.,	9HP	480V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	PUMP NO.1 POWER
17	300	1	2-1/2"	-	MANUFACTURER CABLE	9HP	480V/120V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 POWER & CONTROL
18	301	1	1"	1/C	4#14 AWG.,	-	120V	PUMP NO.2 JUNCTION BOX	PUMP STARTER	PUMP NO.2 CONTROLS
19	302	1	1-1/2"	1/C	3#8 AWG., #10 GND.,	9HP	480V	PUMP NO.2 JUNCTION BOX	PUMP STARTER	PUMP NO.2 POWER
20	601	1	1"	-	2#4 AWG., #6 GND.	25KVA	480V	POWER PANEL	LIGHTING TRANSFORMER	LIGHTING TRANSFORMER FEEDER
21	602	1	1"	1/C	3#1 AWG., #6 GND.	25KVA	120/240V	LIGHTING TRANSFORMER	LIGHTING PANEL	LIGHTING PANEL FEEDER
22	603	1	1-1/2"	1/C	3#6 AWG., #8 GND.,		120/240V	LIGHTING PANEL	GENERATOR	LIGHTING PANEL
23	1000	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	LEVEL TRANSMITTER NO.1	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER NO.1
24	1001	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	LEVEL TRANSMITTER NO.2	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER NO.2
25	1002	1	1"	-	2-TRIAD #16, 4#14,	-	24VDC	TRANSMITTER JUNCTION BOX	CONTROL PANEL	COMBINED LEVEL TRANSMITTERS & FLOAT SWITCH
26	1003	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	FLOAT SWITCHES	TRANSMITTER JUNCTION BOX	WELL FLOAT SWITCHES
27	1100	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
28	1200	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
29	1300	1	1"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL VIA LIGHT SWITCH	SITE LIGHTS	SITE LIGHTING
30	1300A	1	1"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	SITE LIGHTING SWITCH	SITE LIGHTING FOR CONTROL

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION
12870 GREEN DOLPHIN ST.
CONDUIT SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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DRAWING SCALE	
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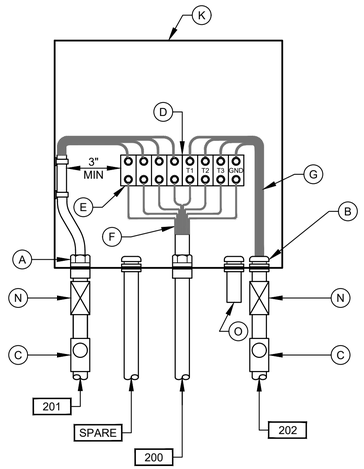
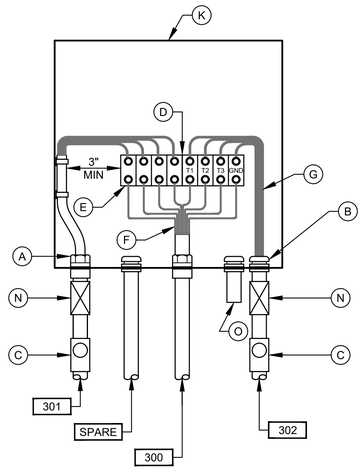
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin E-095-601.dwg



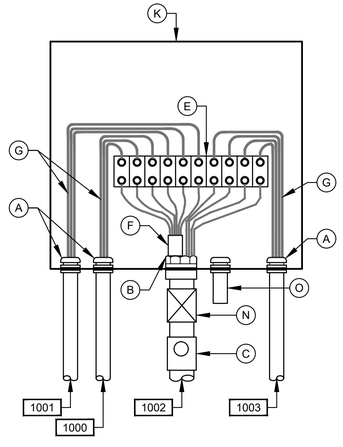
PUMP NO.1
JUNCTION BOX

DETAIL 3
NTS
(SEE NOTE 7)



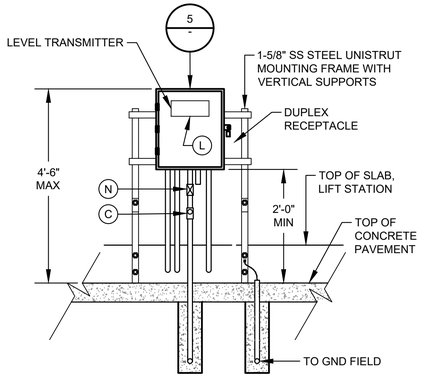
PUMP NO.2
JUNCTION BOX

DETAIL 4
NTS
(SEE NOTE 7)



LEVEL TRANSMITTER
JUNCTION BOX

DETAIL 5
NTS
(SEE NOTE 7)



DETAIL 6
NTS
(SEE NOTE 9)

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO JUNCTION BOXES USING 316 STAINLESS STEEL HARDWARE.
2. MAINTAIN MINIMUM SEPARATION REQUIRED UNDER NEC ARTICLE 504, BETWEEN INTRINSICALLY SAFE CONTROL WIRING AND NON INTRINSICALLY SAFE MOTOR FEEDER WIRING.
3. UNLESS OTHERWISE NOTED, ALL EXTERIOR EXPOSED CONDUITS SHALL BE PVC COATED ALUMINUM.
4. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, SCREWS WASHERS, ETC SHALL BE TYPE 316 STAINLESS STEEL.
5. ALL UNDERGROUND CONDUITS TO BE ENCASED IN REINFORCED CONCRETE DUCTBANK.
6. PROVIDE ANTI-CORROSIVE SPRAY ON ANY BARE METAL PARTS OR EXPOSED WIRE.
7. SEE WIRING SCHEMATICS FOR TERMINALS AND WIRE NUMBERS.
8. ANY CONDUIT REQUIRING A CSBE SEAL, SHALL BE A MINIMUM SIZE OF 2 1/2" PER CABLE.
9. DETAIL SHOWN MAY BE MODIFIED PER SITE SITUATION.
10. COORDINATE WITH WASTE WATER OPERATIONS ELECTRICAL ORGANIZATION FOR THE OPENING OF JUNCTION BOXES TO THE SIDE OF WET WELL IF REQUIRED DURING CONSTRUCTION.
11. THE ENCLOSURES WITH ELECTRICAL CIRCUITS SHALL BE A MINIMUM OF 5 FEET FROM ANY CLASSIFIED AREA, OTHERWISE EXPLOSION PROOF TYPE ENCLOSURES SHALL BE USED.

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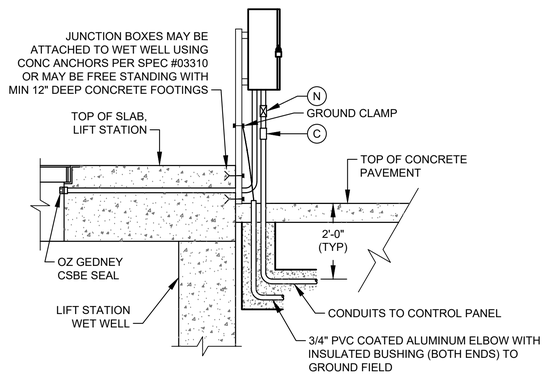
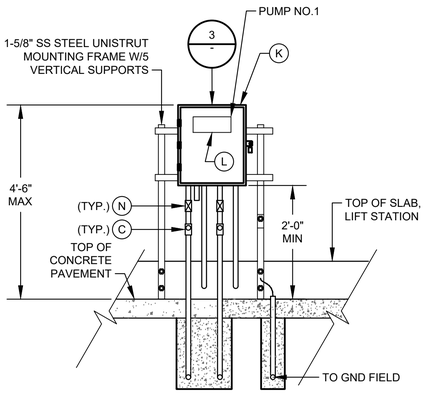
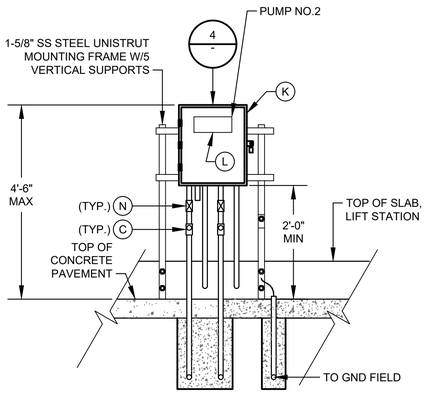


TYP SIDE VIEW FOR DETAIL 1, 2, & 6

(SEE NOTE 10)



DETAIL 1
NTS
(SEE NOTE 9)



DETAIL 2
NTS
(SEE NOTE 9)

JUNCTION BOX EQUIPMENT SCHEDULE

A - OZ GEDNEY CSBE SEAL
B - WATERTIGHT CONDUIT HUB WITH INSULATED BUSHING
C - CLASS I, DIV 1, EXPLOSION PROOF SEAL INSTALLED PER NEC DIV 501
D - POWER TERMINAL BLOCK W/SCREW DOWN BOX LUGS
E - CONTROL TERM BLOCK W/SCREW DOWN BOX LUGS
F - MULTI-CONDUCTOR CABLE, REMOVE OUTER JACKET AS SHOWN
G - WIRING AS SCHEDULED
H - NOT USED.
I - NOT USED.
J - NOT USED
K - NEMA 6P STAINLESS STEEL JUNCTION BOX WITH GASKETED FRONT COVER, SINGLE QUARTER TURN, OIL-TIGHT LATCH AND PADLOCKING PROVISIONS, MINIMUM SIZE: 12"W X 16"H X 6"D
L - NAMEPLATE, SEE SPECIFICATIONES (SEE NAMEPLATE SCHEDULE)
M - NOT USED.
N - EXPANSION FITTING
O - DRAIN VENT

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION
12870 GREEN DOLPHIN ST.
TYPICAL JUNCTION BOX DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-095-501

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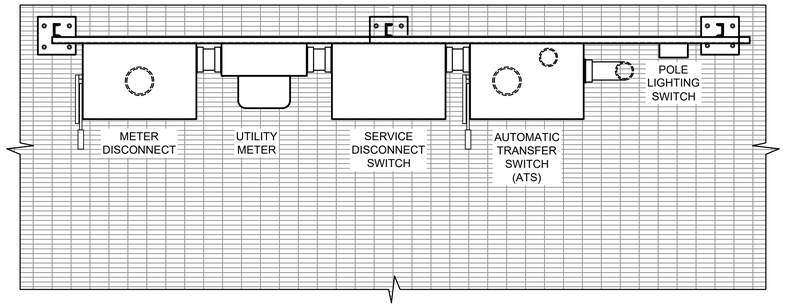
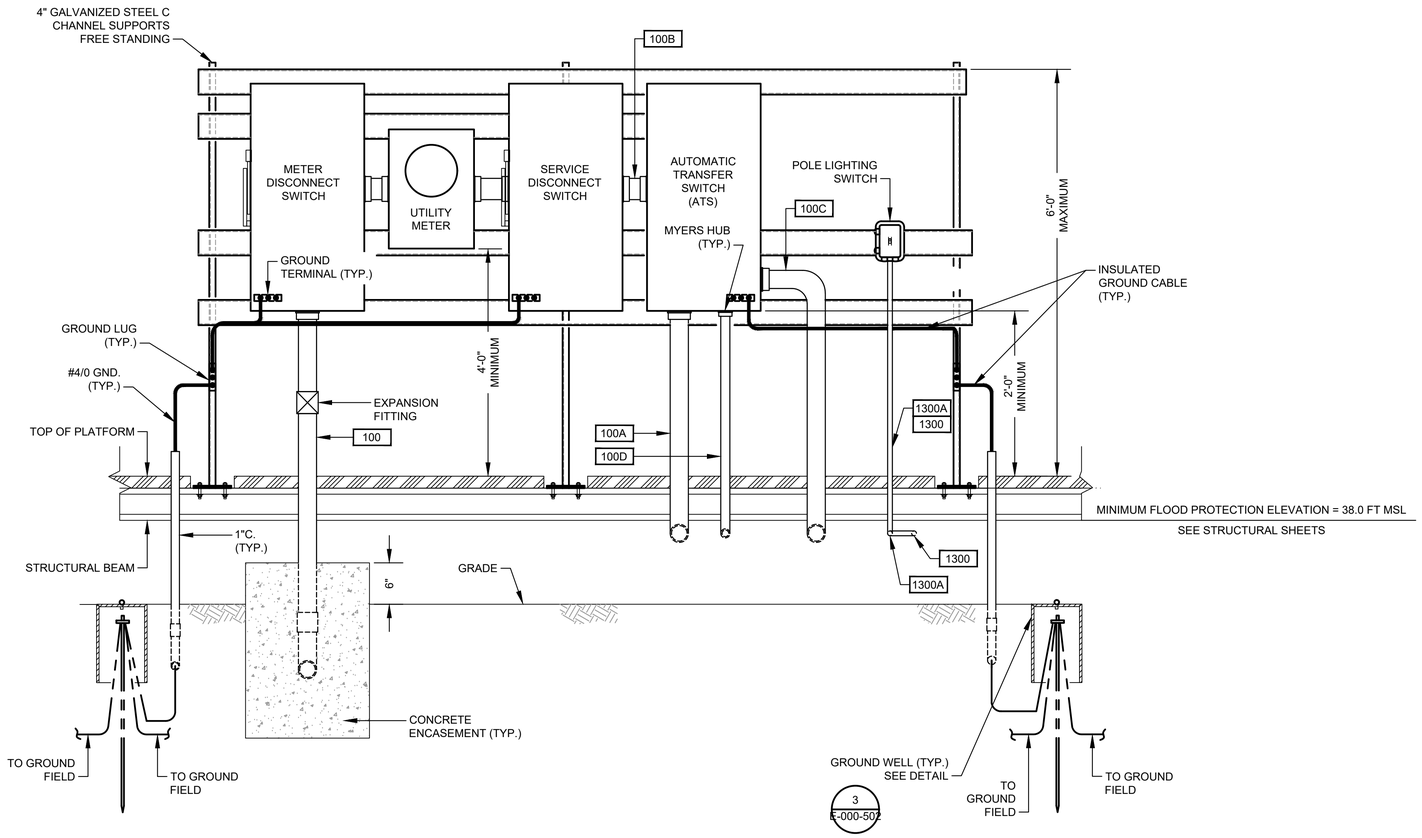


PLAN



SERVICE MOUNTING RACK

DETAIL 1
NTS. -

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION
12870 GREEN DOLPHIN ST.
SERVICE RACK DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
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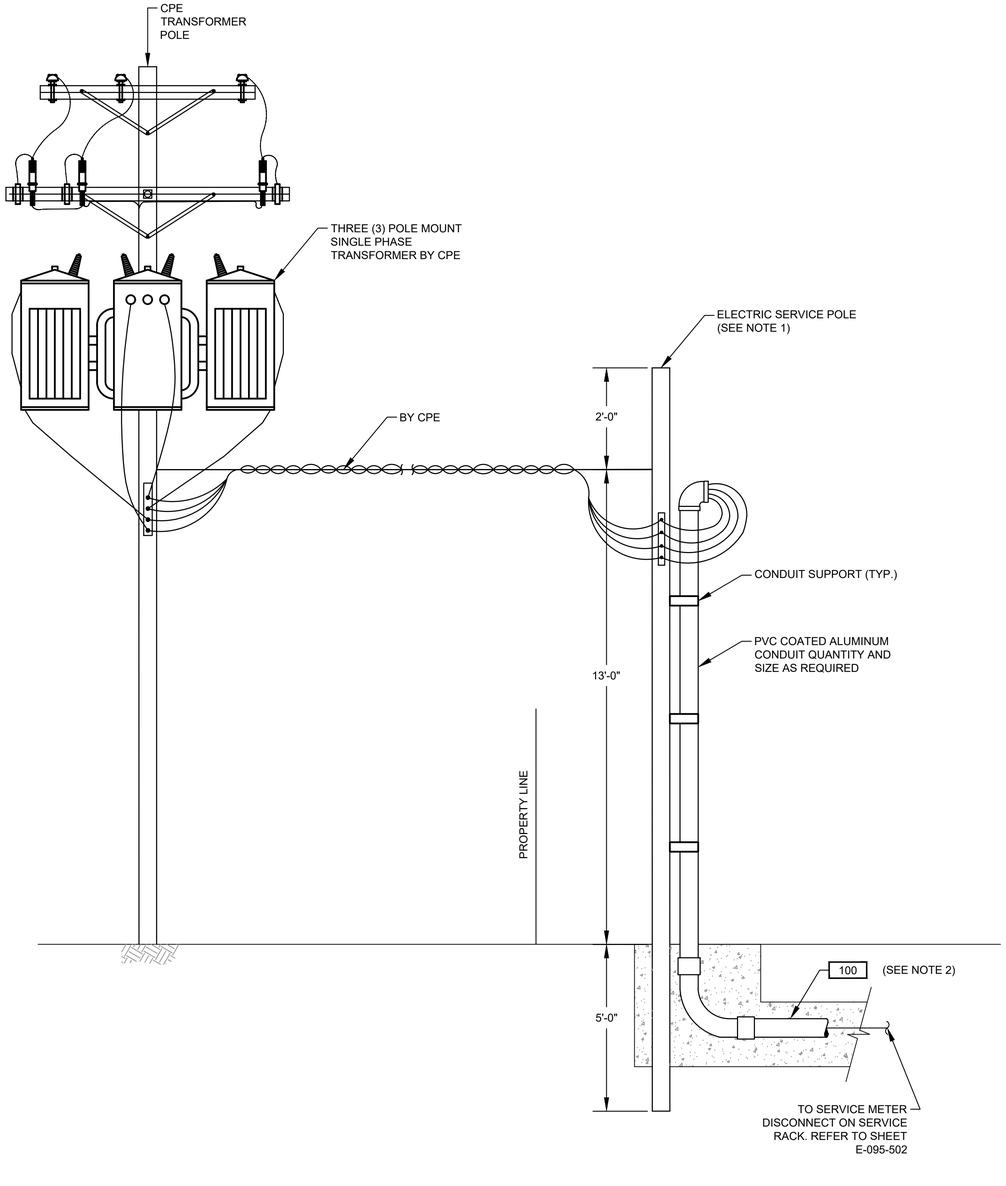
E-095-502

SHEET NO. 72 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin E-095-502.dwg



ELECTRICAL SERVICE ENTRANCE

DETAIL 1
NTS. -

NOTES:

1. WOODEN POLE 20' LONG. TOP DIAMETER 6", BOTTOM DIAMETER 8" PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2. ELECTRICAL SERVICE FEEDER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. COORDINATE WITH CPE FOR THE REQUIREMENTS OF THE INSTALLATION.

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HOUSTON PUBLIC WORKS

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SERVICE POLE DETAILS

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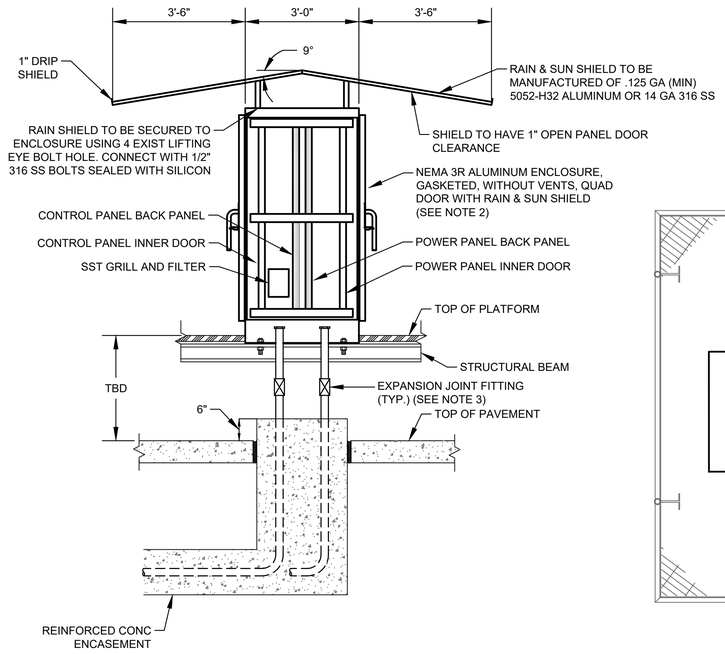
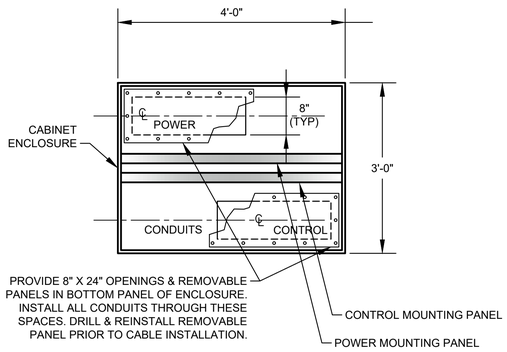
SHEET NO. 73 OF 226

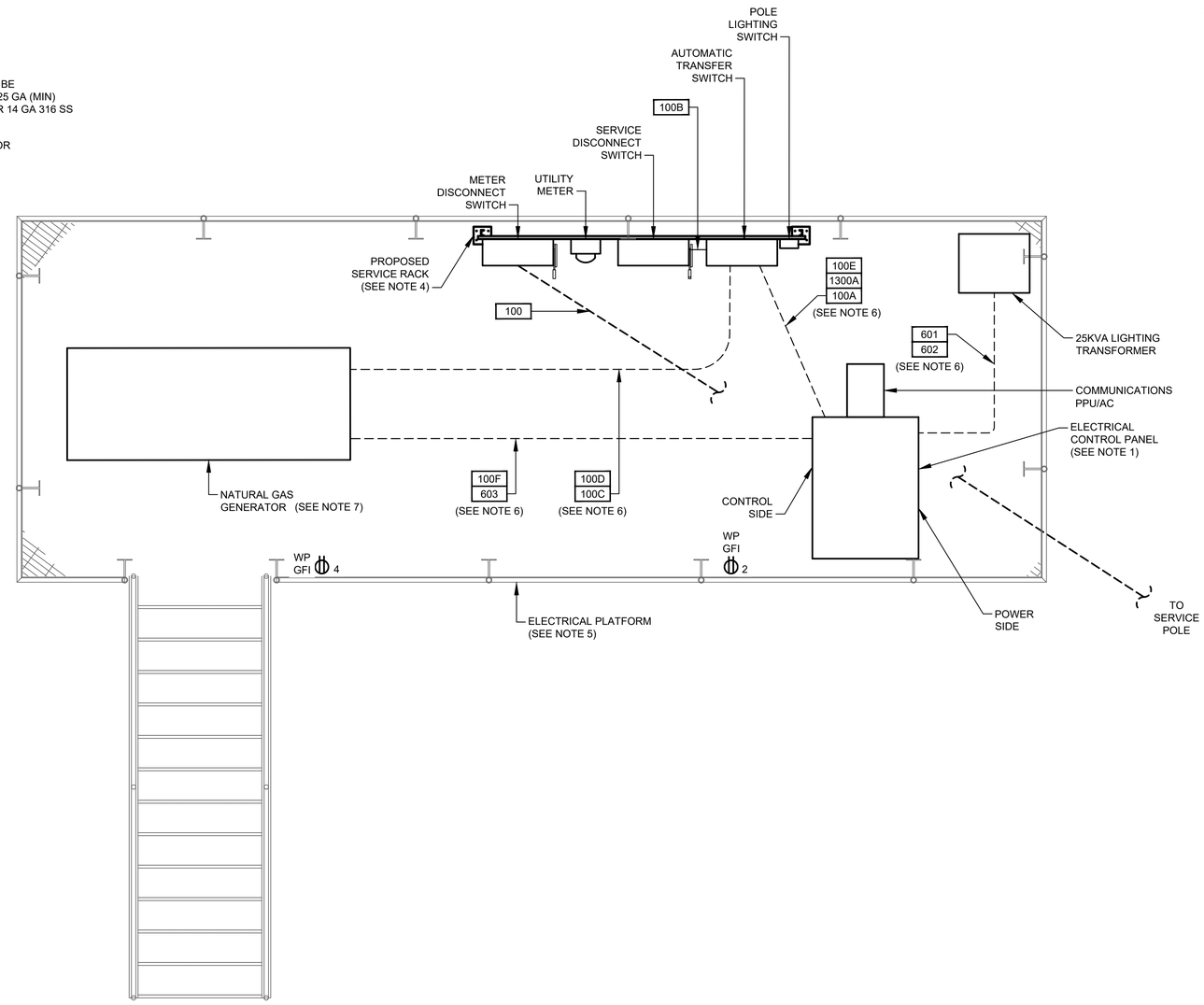
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin E-095-503.dwg



CONTROL CABINET ENCLOSURE WITH PLATFORM



SECTION 2 / - (SEE NOTE 7)
NTS



CONTROL CABINET ENCLOSURE ON ELEVATED PLATFORM DETAIL

DETAIL 1 / - (SEE NOTE 7)
1/2" = 1'-0"

NOTES:

1. SEE SHEET I-095-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO SPEC 13325-8 FOR PANEL DIMENSIONS.
3. EXPANSION JOINT FITTINGS AS REQUIRED.
4. REFER TO SERVICE RACK FOR DETAIL.
5. REFER TO STRUCTURAL DRAWINGS FOR DETAIL OF THE PLATFORM.
6. CONDUIT TO BE MOUNTED BELOW PLATFORM GRATING.
7. THIS GENERATOR WILL BE USED IN EMERGENCY USE ONLY.

GENERAL NOTES:

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UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

ELECTRICAL

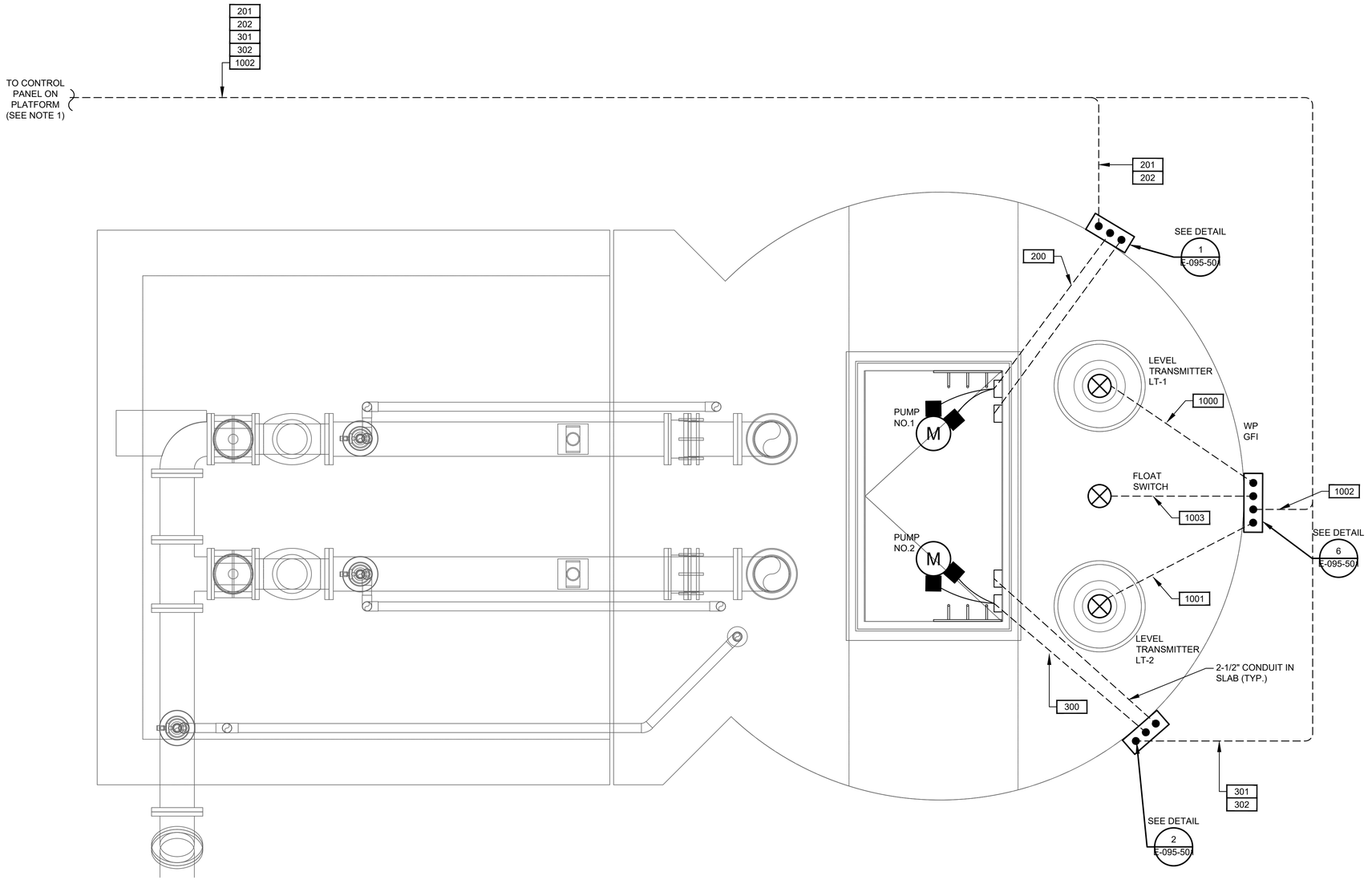
GREEN DOLPHIN LIFT STATION 12870 GREEN DOLPHIN ST. CONTROL CABINET ENCLOSURE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-095-504

SHEET NO. 74 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin E-095-504.dwg



GREEN DOLPHIN LIFT STATION
ENLARGED PLAN

PLAN
3/4"=1'-0"

6' 0 1 2
SCALE: 3/4" = 1'-0"

NOTES:

1. SEE SHEET E-095-101 FOR CONTINUATION.

GENERAL NOTES:

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

ELECTRICAL

GREEN DOLPHIN LIFT STATION
12870 GREEN DOLPHIN ST.
ENLARGED PLAN VIEW

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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CITY OF HOUSTON PM	
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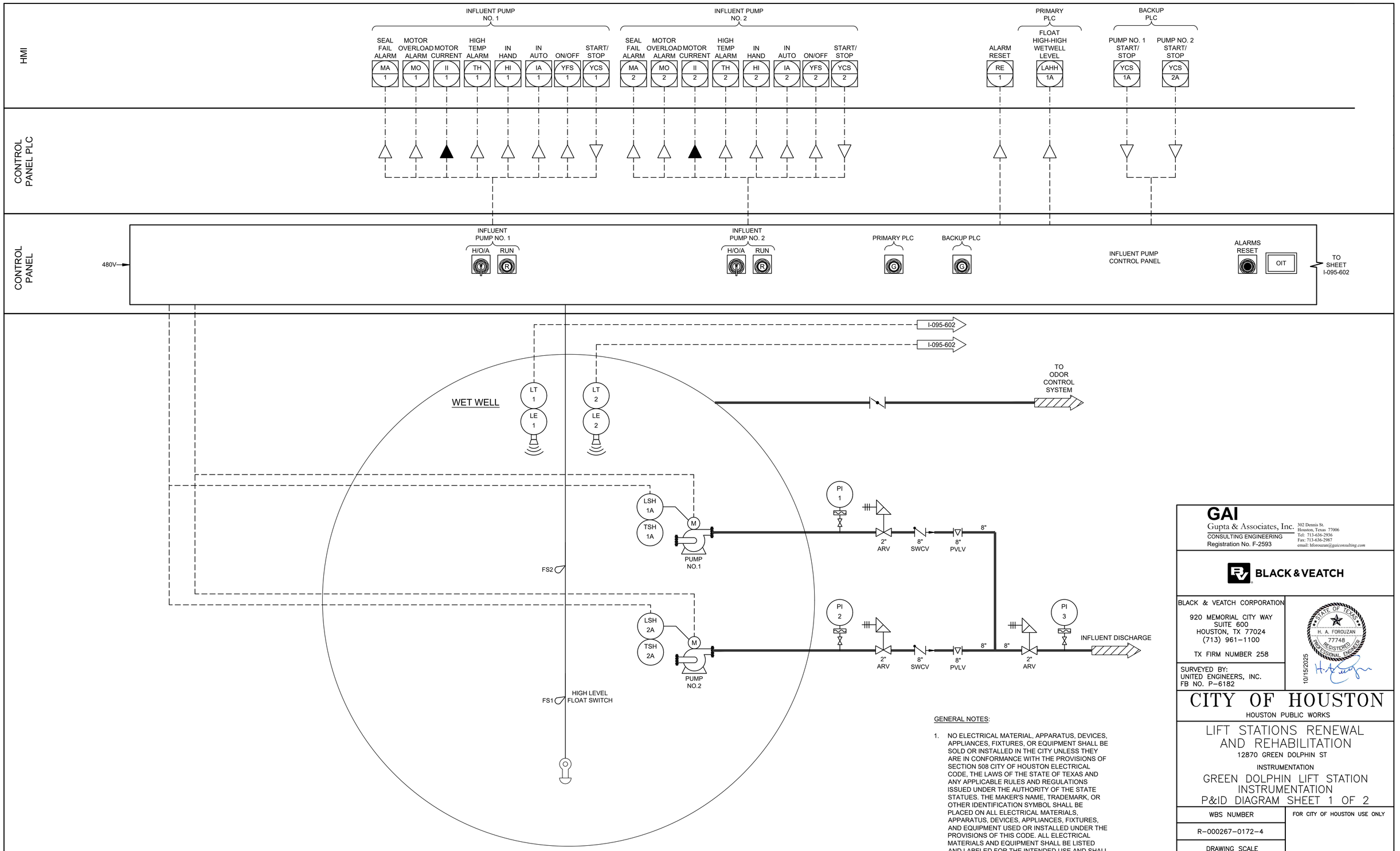
E-095-505

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Green Dolphin\Green Dolphin E-095-505.dwg



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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

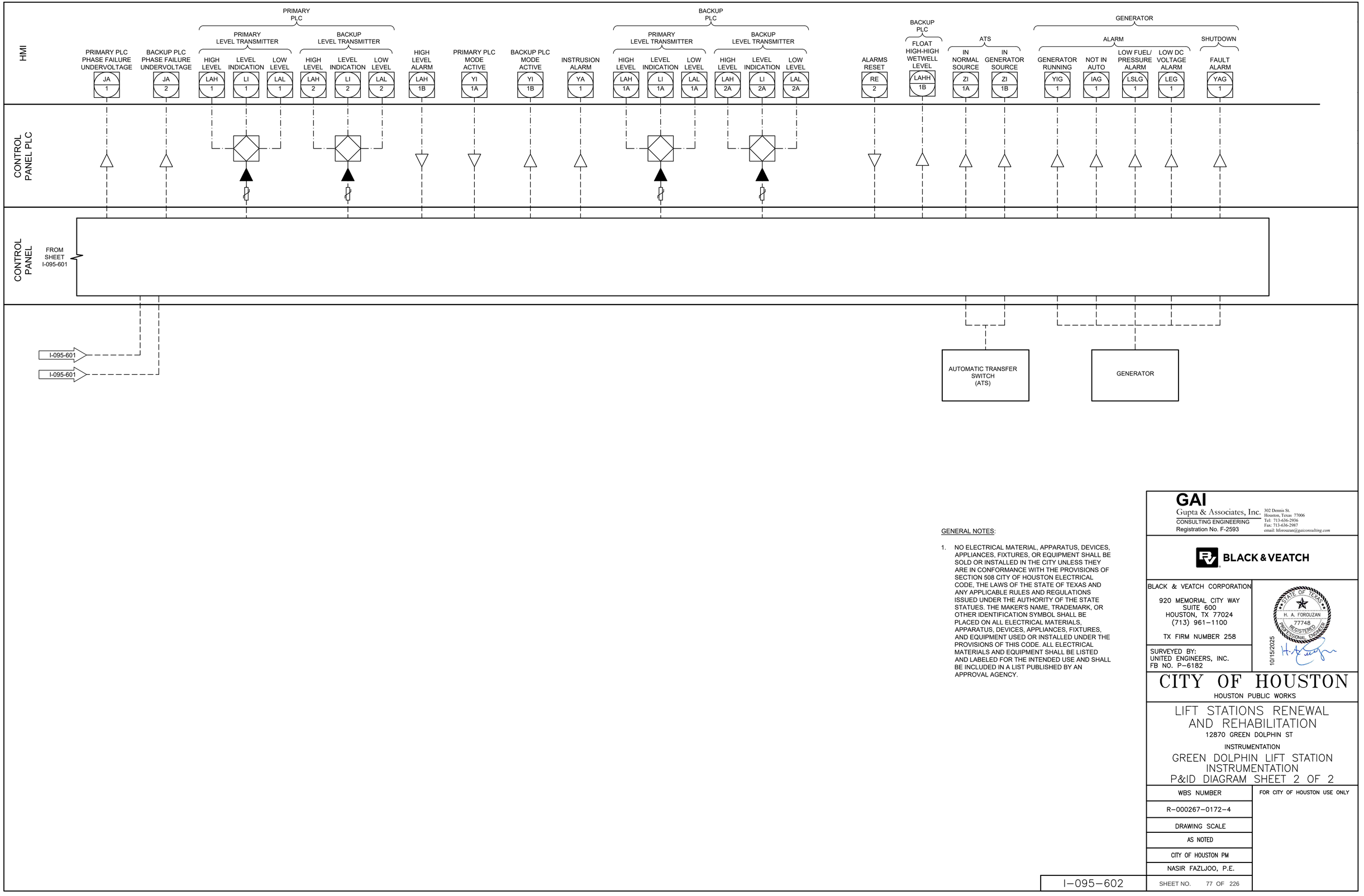
INSTRUMENTATION

GREEN DOLPHIN LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 76 OF 226	

I-095-601

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-601.dwg



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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 2 OF 2

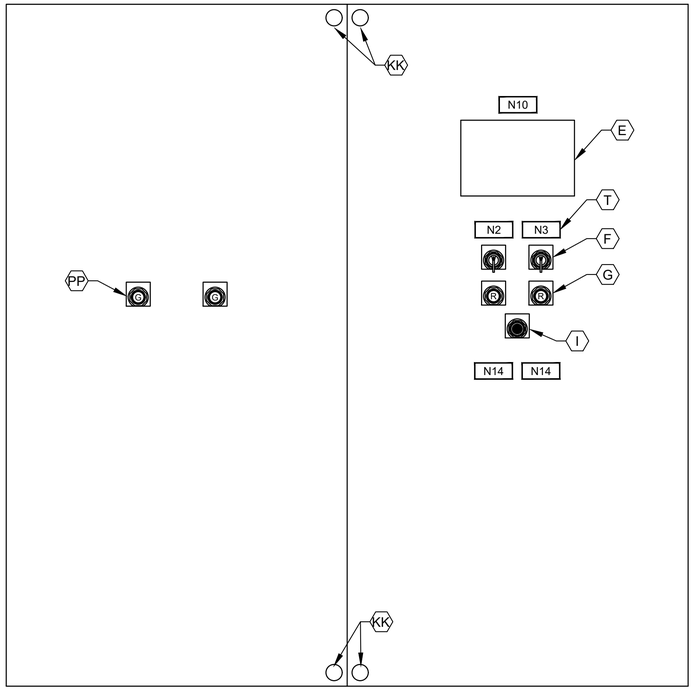
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-095-602

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-602.dwg

EQUIPMENT AND DEVICE SCHEDULE		
ITEM	QUANTITY	DESCRIPTION
A	1	PANEL BOARD, 120/240V, 1 PHASE, 3 WIRE, 100A, 12 CKTS
B	2	FULL VOLTAGE, NON-REVERSING, SINGLE SPEED, AUTOMATIC MOTOR STARTER W/120 VOLT CONTROL COIL, NEMA SIZE AS SCHEDULED.
C	2	TIME DELAY RELAY WITH THREE FORM C CONTACTS, 120VAC COIL AND 11 PIN SOCKET BASE.
D	1	SINGLE CHANNEL INTRINSICALLY SAFE RELAY
E	1	PROGRAMMING SCREEN (OIT)
F	2	HAND-OFF-AUTO SWITCH, 3 POSITION, HEAVY-DUTY, OILTIGHT WITH 2 SETS OF CONTACT BLOCKS (PUMP CONTROL)
G	2	INDICATING LIGHT, HEAVY DUTY, OILTIGHT, RED, 24 VDC, LED, WITH "RUN" LEGEND
H	1	PERPETUAL POWER UNIT (PPU)
I	1	PUMP ALARM RESET PUSHBUTTON
J	2	SWITCH FOR CABINET LIGHT, 120V, 20A, SPST
K	3	DUPLEX RECEPTACLE, 120V, 20A, 2 WIRE, GROUNDED
L	2	24" LED STRIP LIGHT 120V SUITABLE FOR ZERO DEGREE OPERATION.
M	1	SURGE PROTECTOR - INCOMING POWER
N	*	NOT USED.
P	2	CURRENT TRANSFORMER, RATIO AS SCHEDULED W/4-20mA OUTPUT.
Q	12	TERMINAL BLOCKS, SIZED FOR MOTOR POWER REQUIREMENTS
R	*	RELAY WITH THREE FORM C CONTACTS, AND 11 PIN SOCKET BASE
S	*	NOT USED.
T	*	NAMEPLATES, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
U	2	SOLID STATE MOTOR OVERLOAD RELAY
V	6	FUSE HOLDER & FUSES - PHASE FAILURE
W	1	NEMA 3R GASKETED ALUMINUM ENCLOSURE WITHOUT VENTS 72"H x 48"W x 36"D
X	1	DOOR MOUNTED ROTARY HANDLE DISCONNECT SWITCH (SUITABLE FOR ENVIRONMENT)
Y	1	THERMAL-MAGNETIC MOLDED CASE MAIN CIRCUIT BREAKER, SIZE AS SCHEDULED
Z	2	ADJUSTABLE INSTANTENOUS TRIP MOTOR CIRCUIT PROTECTOR, SIZE AS SCHEDULED
AA	*	TERMINAL BLOCKS
BB	2	EXTERNAL OVERLOAD RESET PUSHBUTTON MECHANISM
CC	2	ANALOG I/O SURGE SUPPRESSOR
DD	1	WIRE DUCT 2" WIDE x 2" DEEP MINIMUM
EE	1	THERMAL-MAGNETIC MODLED CASE CIRCUIT BREAKER FOR LIGHTING TRANSFORMER, SIZE AS SCHEDULED
FF	1	GROUND BUS
GG	1	25 KVA, 480 - 240/120V,1ϕ, 3W DRY TYPE NEMA 3R ENCLOSURE TRANSFORMER (PAD MOUNTED)
HH	*	NOT USED.
II	1	120VAC - 24VAC POWER SUPPLY (AS REQUIRED)
JJ	11	CARTRIDGE FUSES & FUSE HOLDER
KK	8	QUARTER TURN CAPTIVE DOOR CLOSURE
LL	1	120VAC - 24VDC PLC POWER SUPPLY 5A
MM	2	MOTION SWITCH
NN	*	NOT USED
PP	2	INDICATING LED LIGHT, HEAVY DUTY, OILTIGHT, GREEN, 24 VDC, LED WITH " PRIMARY PLC" & "BACKUP PLC" LEGEND
QQ	*	NOT USED
RR	*	NOT USED
SS	1	COMMUNICATION ETHERNET SWITCH
TT	1	POWER SURGE PROTECTOR - CONTROL POWER
UU	2	PROGRAMMABLE LOGIC CONTROLLER WITH EXPANSION UNIT
VV	1	PHASE AND UNDER VOLTAGE MONITOR
WW	*	FUSED TERMINAL BLOCKS
XX	2	PUMP PROTECTION MODULE RATED FOR CLASS I, DIVISION I
YY	2	ANALOG SIGNAL ISOLATOR
ZZ	-	NOT USED
AB	-	NOT USED.
AC	1	POWER DISTRIBUTION BLOCK
AD	1	NEUTRAL LUG
AE	1	6" EXHAUST FAN, 120V, STAINLESS FILTERS & GRILL PACKAGE W/BUG GUARD
AF	1	T-STAT FOR EXHAUST FAN

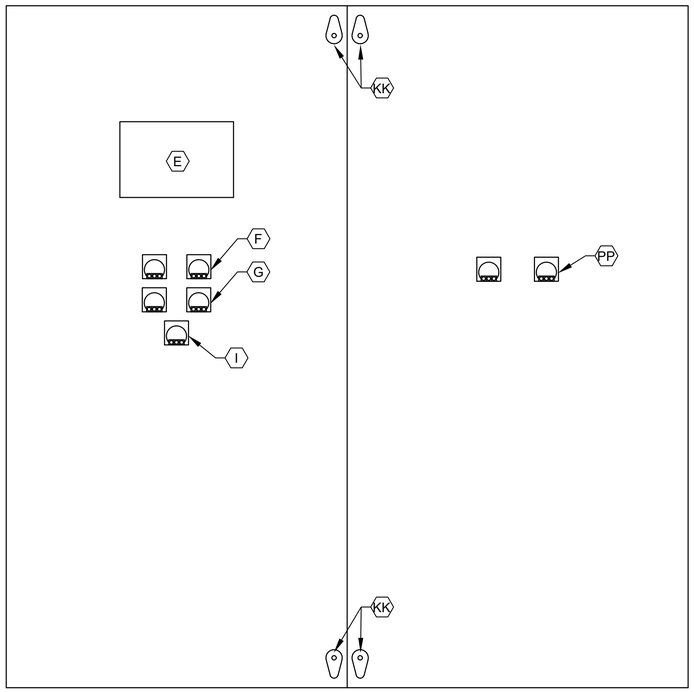
* - AS SCHEDULED



CONTROL PANEL FRONT INNER DOOR

ELEVATION

NTS



CONTROL PANEL BACK INNER DOOR

ELEVATION

NTS

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO PANELS USING STAINLESS STEEL HARDWARE.
2. REFER SPECIFICATIONS FOR ALL PANEL COMPONENTS.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

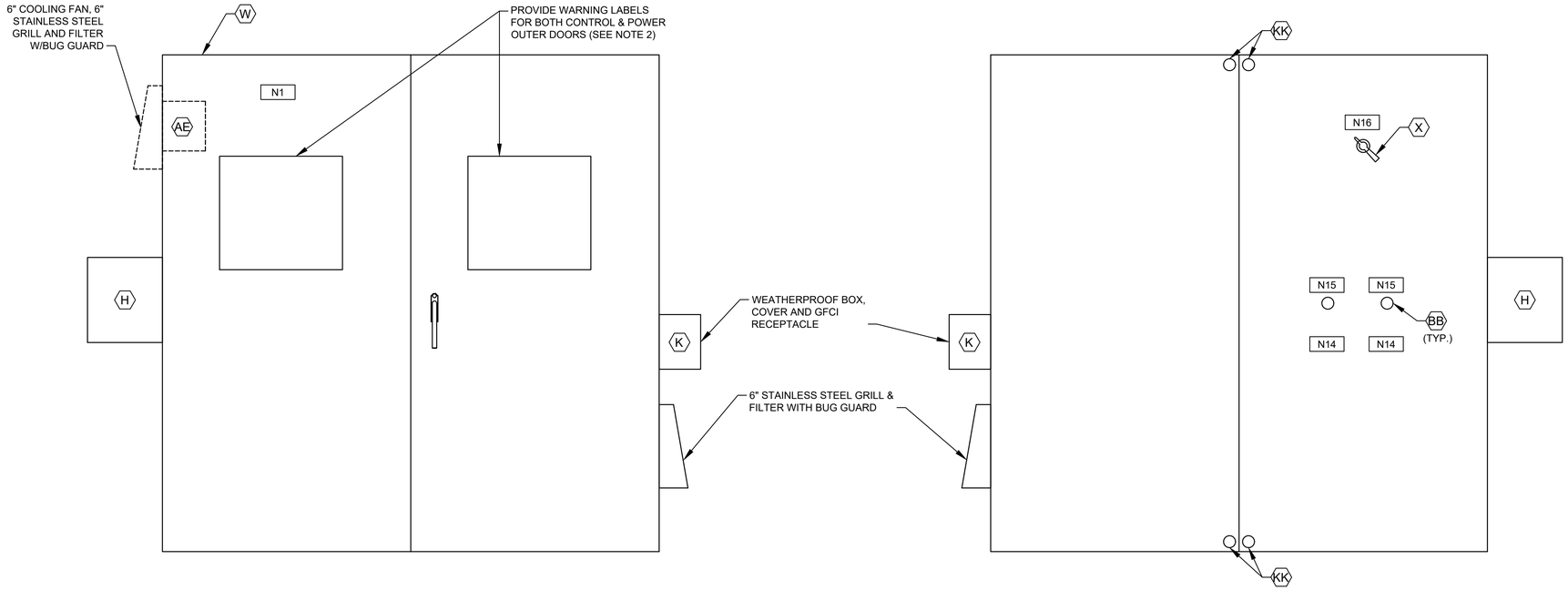
INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT & SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-095-603

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-603.dwg



CONTROL CABINET (CONTROL SIDE)
OUTER DOOR

ELEVATION

NTS

CONTROL CABINET (POWER SIDE)
INNER DOOR

ELEVATION

NTS
(SEE NOTE 1)

NOTES:

1. SEE SHEET I-095-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO NEC SECTIONS 110.16 & 110.21

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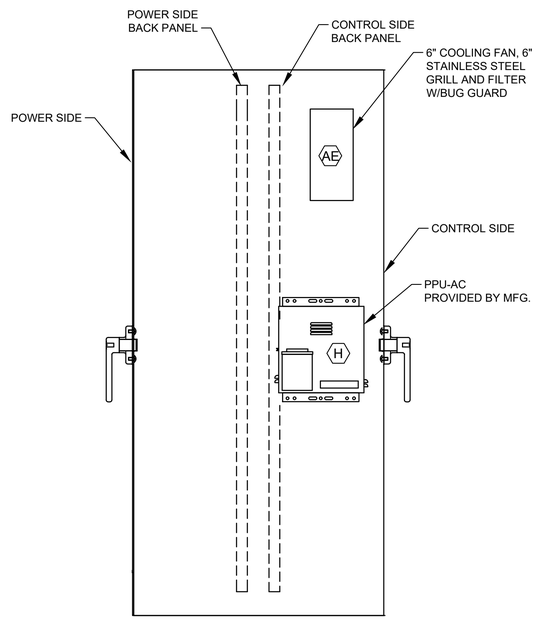
NAMEPLATE SCHEDULE

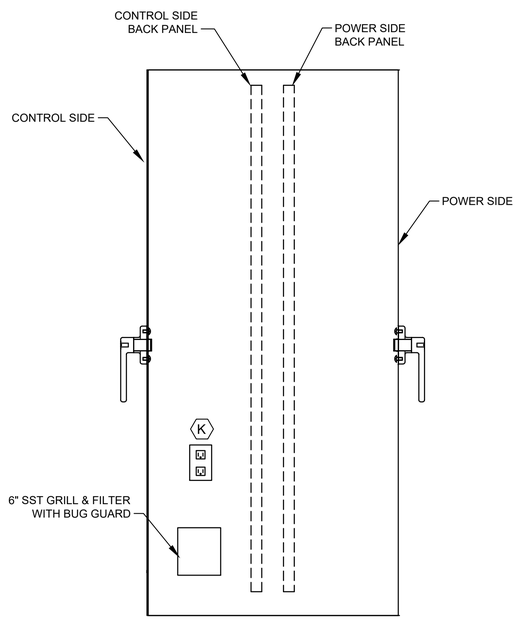
DESIGNATION	ENGRAVED
N1	PUMP STATION DESIGNATION
N2	PUMP NO. 1
N3	PUMP NO. 2
N4	NOT USED.
N5	NOT USED.
N6	NOT USED.
N7	NOT USED.
N8	NOT USED.
N9	NOT USED.
N10	PROGRAMMING SCREEN
N11	NOT USED.
N12	PRIMARY PLC
N13	BACKUP PLC
N14	MOTOR DATA HORSEPOWER (OUTPUT) ---------- RPM AT FULL LOAD ---------- TIME RATING ---------- FREQUENCY ---------- NUMBER OF PHASES ---------- MODEL NUMBER ---------- RATED VOLTAGE ---------- SERVICE FACTOR ---------- FULL LOAD AMPS ---------- INSULATION CLAS ---------- NEMA DESIGN LETTER ---------- TEMPERATURE RISE ---------- NEMA FRAME SIZE ---------- DATE OF MANUFACTURE ---------- THERMO PROTECTION (IF REQUIRED) -- MOISTURE PROTECTION (IF REQUIRED)-
N15	EXTERNAL OVERLOAD RESET PUSH BUTTON MECHANISM
N16	MAIN BREAKER



CONTROL CABINET (LEFT SIDE VIEW)

ELEVATION

NTS



CONTROL CABINET (RIGHT SIDE VIEW)

ELEVATION

NTS

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION
CONTROL CABINET
EQUIPMENT LAYOUT SHEET 1 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

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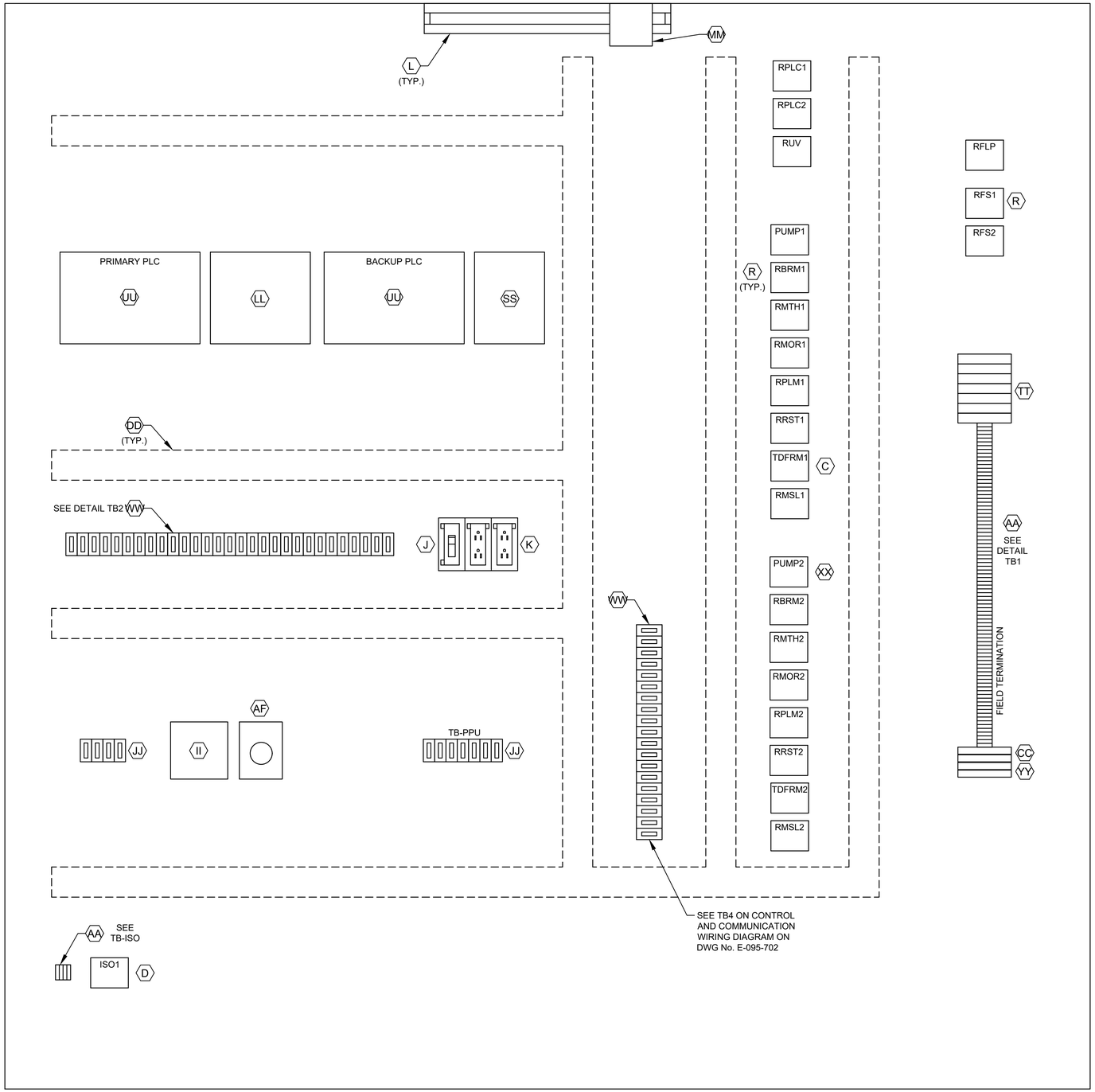


CONTROL PANEL
ELEVATION

L1A
L1N
SPARE
3
3N
49
50
51
52
53
54
1004
1
24V-
24V-
1002
2
11
1001
1001A
12
1003
1003A
1002
1004
18
3N
19
20
36
36N
41
42
43
44
SPARE
L1A
L1N
103
104
105
106
107
108
110
113
115
116
119
SPARE
203
204
205
206
207
208
210
213
215
216
219

DETAIL TB1

ALL L AND N FOR EACH PUMP CONTROL TO BE FUSED

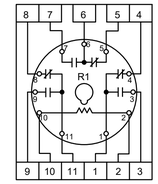
36A
37A
50
52
54
52A
54A
L+
M
35B
38B
41B
47B
13B
13AB
13GB
L+
M
14B
14AB
14GB
L+
M
13
13A
13G
14
14A
14G
SPARE
18
SPARE
28
29
32
35B
33
42
44
SPARE
103
104
115
109
110
118
120
121
122
123
SPARE
209
210
211
218
220
222
223

DETAIL TB2

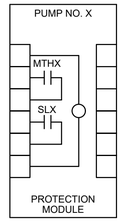
1500
1501
1503
1504

DETAIL TB-ISO

LEGEND	
TAG	DESCRIPTION
RMTH	MOTOR HIGH TEMPERATURE ALARM RELAY
RPLM	PLC PUMP RUN RELAY
RRST	PUMP RESET AUX RELAY
RPLC	PLC MODE AUX RELAY
RMOR	MOTOR OVERLOAD ALARM RELAY
RBRM	BACKUP SYSTEM RUN RELAY
RUV	UNDER VOLTAGE RELAY
ISO	INTRINSICALLY SAFE RELAY
RFS	PUMP RUN FLOAT SWITCH RELAY
TDFRM	TIMER FLOAT SWITCH RUN RELAY
RMSL	MOTOR SEAL LEAK ALARM RELAY
RFLP	FLOAT LOCKOUT PUMP RELAY



RELAY DETAIL
ITEM R



PUMP PROTECTION MODULE
DETAIL, ITEM XX

NOTE: REPLACE "X" WITH APPROPRIATE PUMP NO.

GENERAL NOTES:

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NOTES:

1. SEE SHEET I-095-603 FOR EQUIPMENT SCHEDULE.

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UNITED ENGINEERS, INC.
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STATE OF TEXAS
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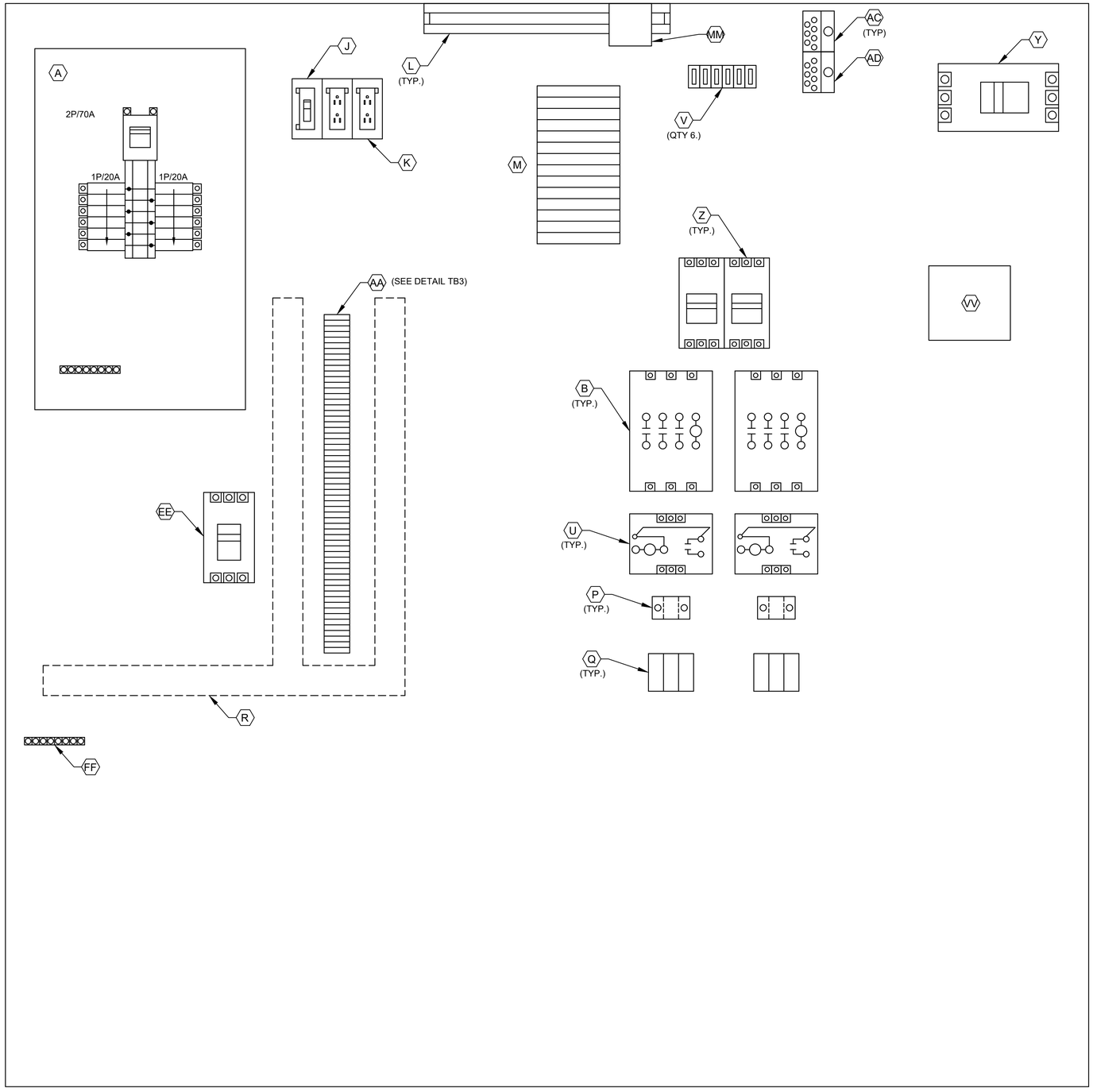
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
12870 GREEN DOLPHIN ST
INSTRUMENTATION
GREEN DOLPHIN LIFT STATION
CONTROL CABINET
EQUIPMENT LAYOUT SHEET 2 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-605.dwg



POWER PANEL
ELEVATION

3
18
L1A
L1N
SPARE
SPARE
103
104
105
106
107
108
110
113
115
116
119
SPARE
203
204
205
206
207
208
210
213
215
216
219
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE

DETAIL TB3

NOTES:

1. SEE SHEET I-095-603 FOR EQUIPMENT SCHEDULE.

GENERAL NOTES:

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

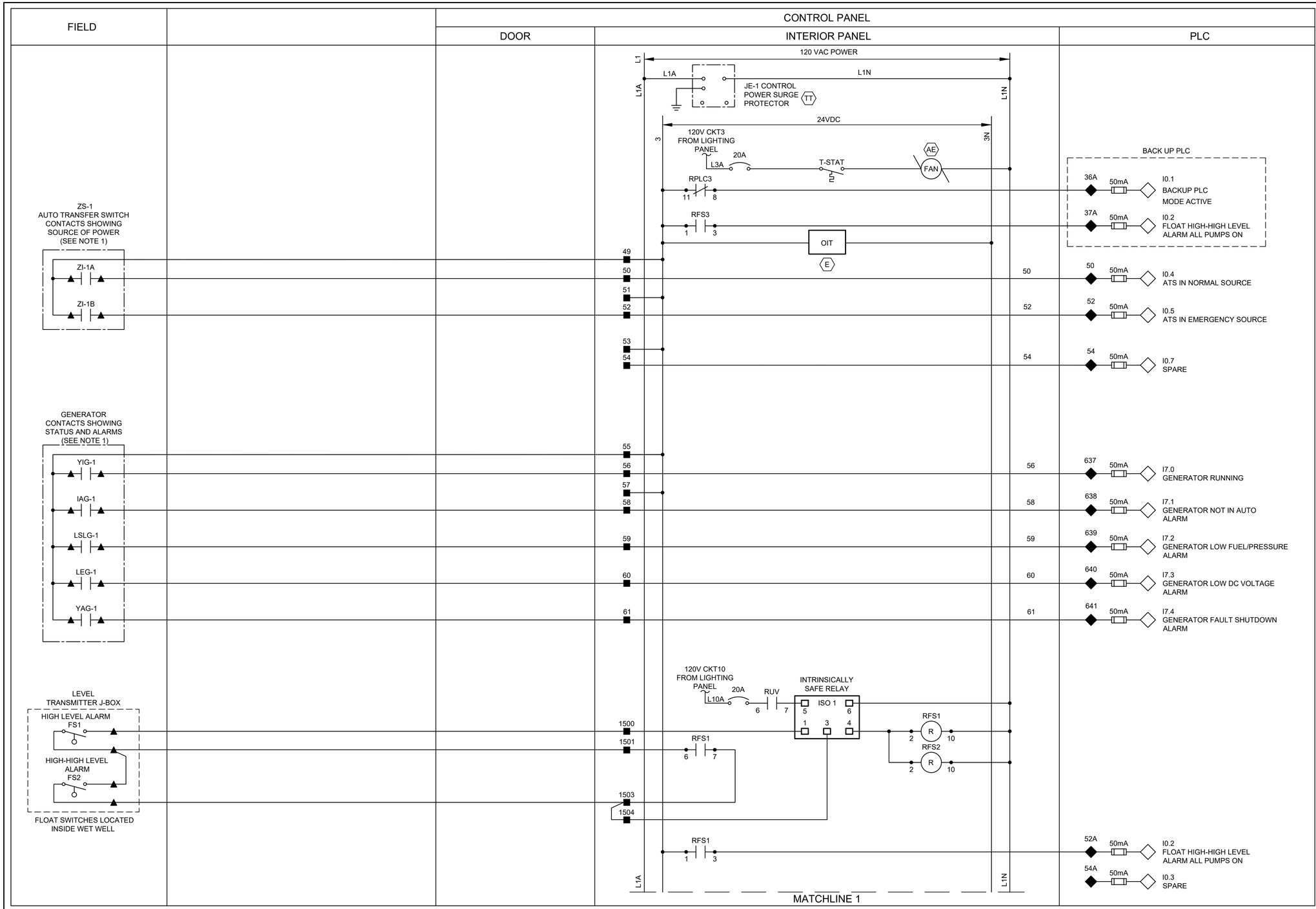
LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 3 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-606.dwg



NOTES:

1. PROVIDE MANUAL TRANSFER SWITCH DRY CONTACT.
2. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

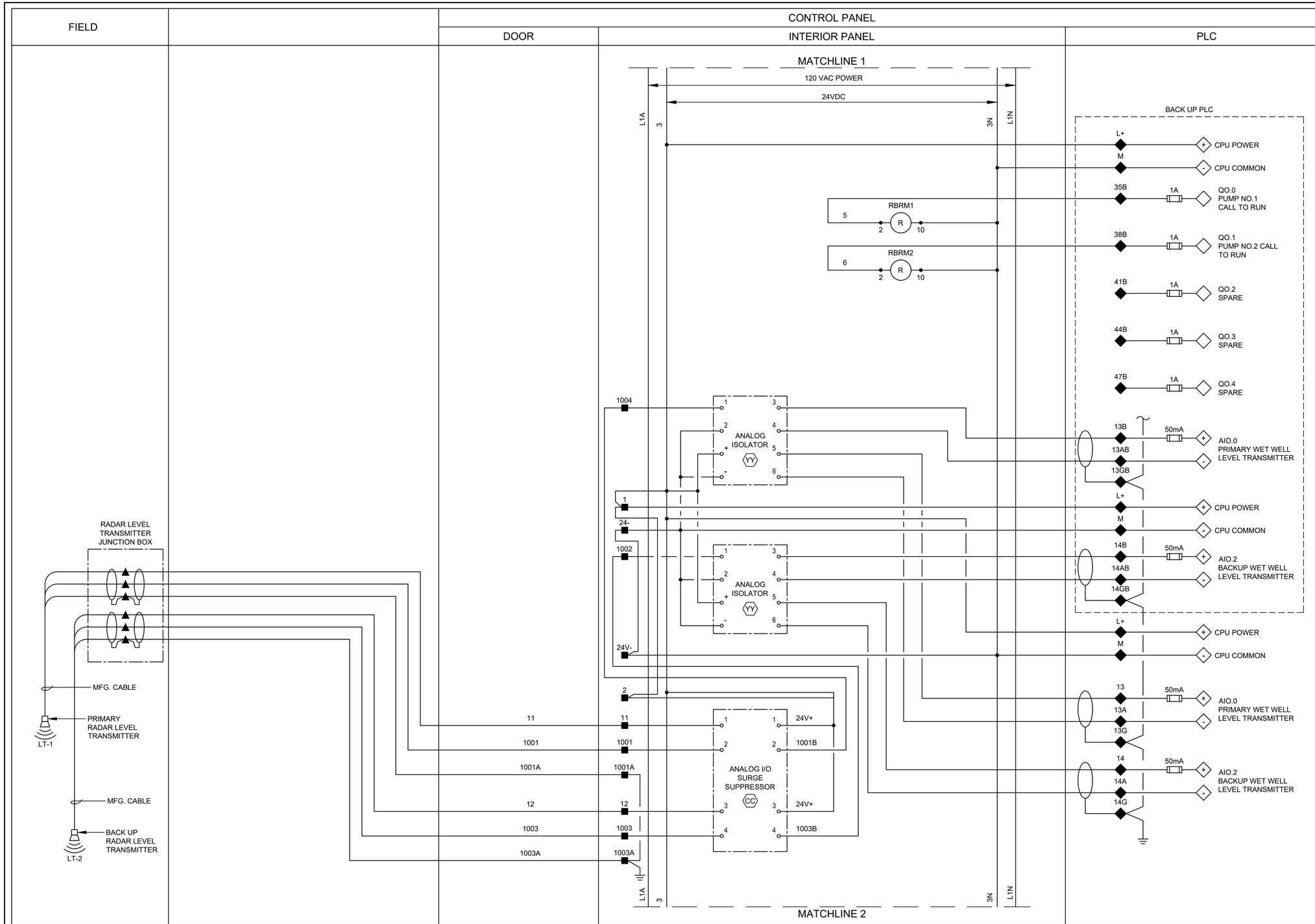
12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 1 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
I-095-607	SHEET NO. 82 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-607.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

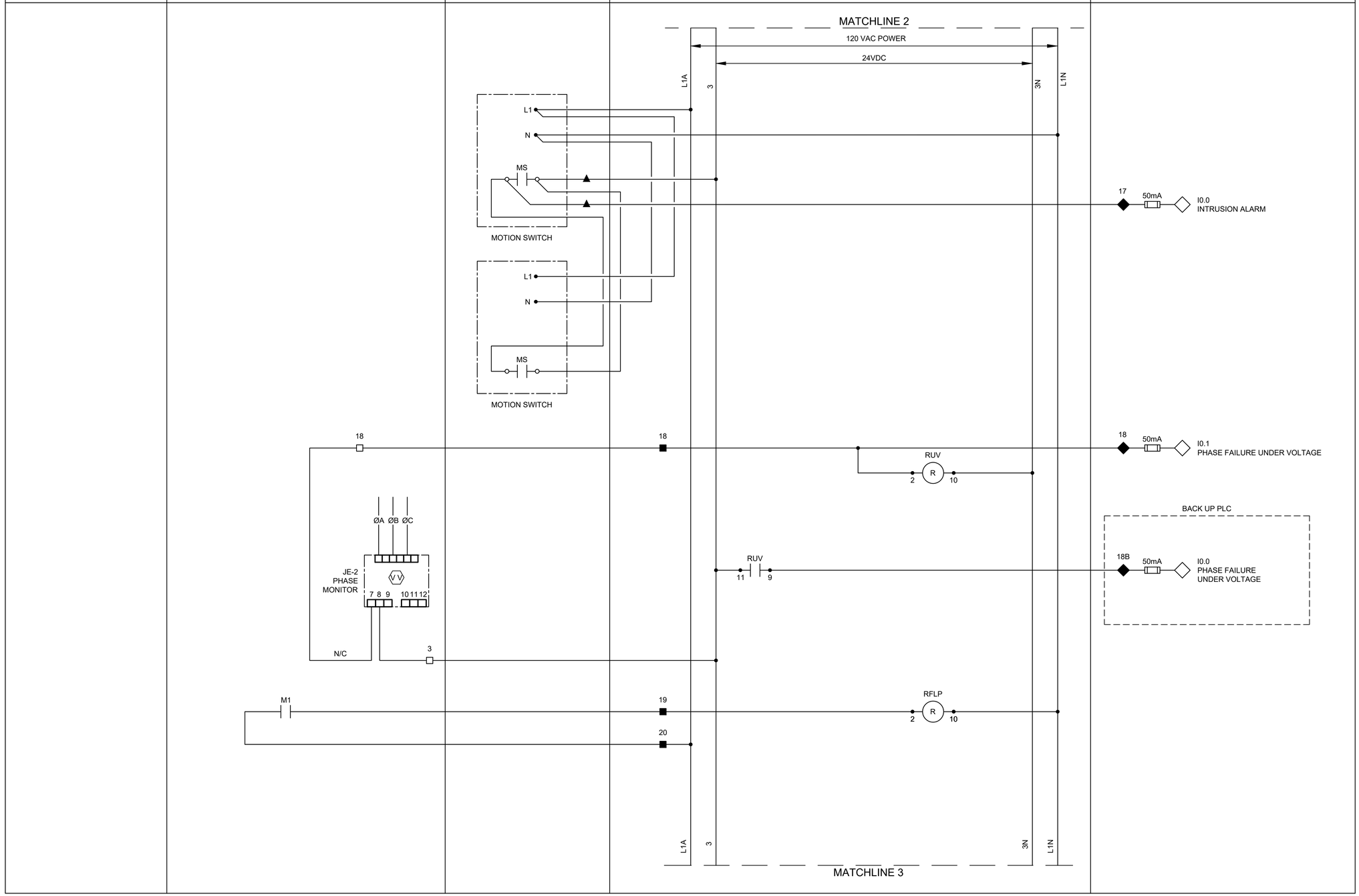
INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 2 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 83 OF 226	

I-095-608

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-608.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. PROVIDE ONE LIMIT SWITCH PER EXTERIOR CONTROL PANEL AND POWER PANEL DOOR, WIRED IN PARALLEL.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

12870 GREEN DOLPHIN ST

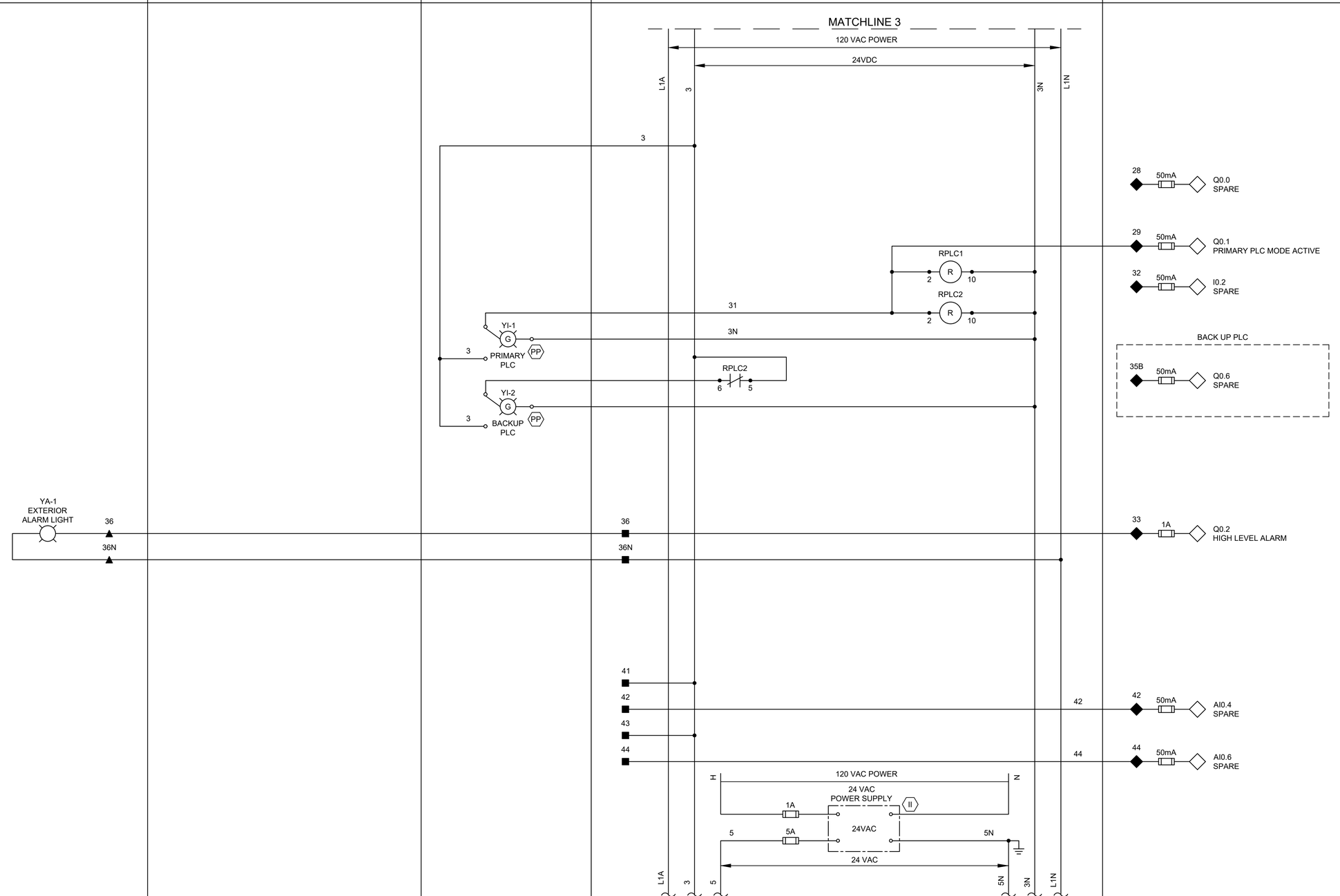
INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 3 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 84 OF 226	

I-095-609

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-609.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

GENERAL NOTES:

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 4 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 85 OF 226	

I-095-610

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-610.dwg

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-611.dwg

FIELD | POWER PANEL | CONTROL PANEL: DOOR | CONTROL PANEL: INTERIOR PANEL | PLC

120 VAC POWER
24 VDC
24 VAC
JE-2
TBP1 SEE NOTE 2
L1A
L1N
3N
5N
15
15N

TSH-1 MOTOR TEMP SWITCH
LSH-1 SEAL LEAK DETECTOR
HS-1A RESET
TO SHEET I-095-612
HS-1 H-O-A
PUMP NO.1
TERMINAL JUNCTION BOX
REFER TO SHEET E-095-703
4-20mA CURRENT TRANSDUCER
IE-1 MOTOR OVERLOAD RELAY (MOR) (SEE NOTE 1)
M1
MOR1
ZS-1
YI-1
RUN

PUMP NO. 1 PROTECTION MODULE
LAH-1 SL1
TAH-1 MTH1
RRST1
RMSL1
RMTH1
RFS1
TDFRM1
RMOR1
RPLC1
RBRM1
RPLM1
TO SHEET I-095-612

PLC		
103	1A	Q0.4 ALARM RESET
104	50mA	I0.6 ALARM RESET
109	50mA	I1.1 PUMP NO.1 HIGH TEMP ALARM
122	50mA	AI0.8 PUMP NO.1 MOTOR CURRENT
123	50mA	I3.3 PUMP NO.1 MOTOR OVERLOAD
115	50mA	I3.0 PUMP NO.1 IN HAND
121	50mA	I3.1 PUMP NO.1 IN AUTO
118	1A	Q0.7 PUMP NO.1 PLC START/STOP
120	50mA	I1.0 PUMP NO.1 RUN
110	50mA	I3.2 PUMP NO.1 SEAL FAILURE ALARM

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-095-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION PUMP NO.1 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 86 OF 226	

I-095-611

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Green Dolphin\Green Dolphin I-095-612.dwg

FIELD | POWER PANEL | CONTROL PANEL: DOOR | CONTROL PANEL: INTERIOR PANEL | PLC

120 VAC POWER
24 VDC
24 VAC
15
15N
L1A
3
TBP2 SEE NOTE 2
7
3N
5N
L1N

FROM SHEET I-095-611
HS-1A RESET (I)
201
202
RRST2
1
3
2
R
10
RRST2

M2
203
204
205
206
207
208
200

TSH-2 MOTOR TEMP SWITCH △
20
21
22
23
LSH-2 SEAL LEAK DETECTOR △

PUMP NO.2
M
T1
T2
T3
G
CT
M1
REFER TO SHEET E-095-703
TERMINAL JUNCTION BOX

PUMP NO. 2 PROTECTION MODULE
LAH-2 SL2
TAH-2 MTH2
5
XX
5N

3P2
RMSL2
RMTH2
221
TDFRM2
RFS2
TD

209 50mA I1.3 PUMP NO.2 HIGH TEMP ALARM
222 50mA AI.0 PUMP NO.2 MOTOR CURRENT

U
MOR2
215
216
210
RMOR2

4-20mA CURRENT TRANSDUCER
IE-2 MOTOR OVERLOAD RELAY (MOR) (SEE NOTE 1)

223 50mA I3.7 PUMP NO.2 MOTOR OVERLOAD ALARM

212
211
RMTH2
RMSL2
HS-2 H-O-A (F)
H O A
213
214
220
RPLC1
RBRM2
RPLM2
TDFRM2
RFLP

210 50mA I3.5 PUMP NO.2 IN HAND
211 50mA I3.4 PUMP NO.2 IN AUTO

B
M2
MOR2
ZS-2
213

218 1A Q1.0 PUMP NO.2 PLC START/STOP
RPLM2

15
M2
ZS-2
219

220 50mA I1.2 PUMP NO.2 RUN
YI-2 (R) (G)
RUN
3N

210 50mA I3.6 PUMP NO.2 SEAL FAILURE ALARM

LEGEND

△ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
□ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
■ FIELD TERMINAL LOCATED AT CONTROL PANEL
▲ REMOTE TERMINAL
● DEVICE TERMINAL NO.
◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-095-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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BLACK & VEATCH

BLACK & VEATCH CORPORATION
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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

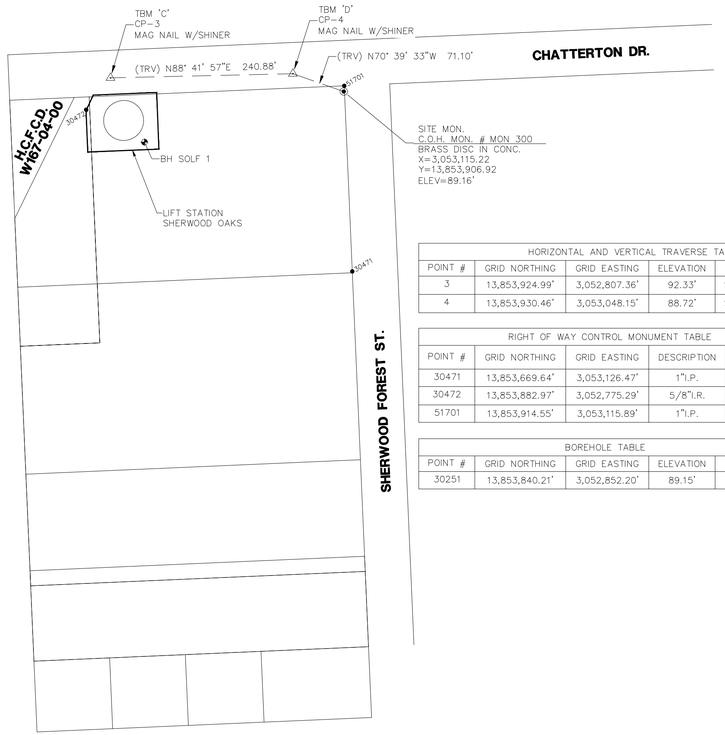
LIFT STATIONS RENEWAL AND REHABILITATION
12870 GREEN DOLPHIN ST

INSTRUMENTATION

GREEN DOLPHIN LIFT STATION PUMP NO.2 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 87 OF 226	

I-095-612



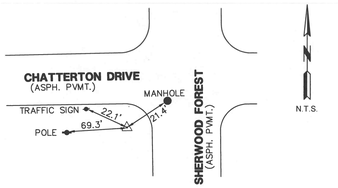
HORIZONTAL AND VERTICAL TRAVERSE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
3	13,853,924.99'	3,052,807.36'	92.33'	SET MAG NAIL W/SHINER
4	13,853,930.46'	3,053,048.15'	88.72'	SET MAG NAIL W/SHINER

RIGHT OF WAY CONTROL MONUMENT TABLE				
POINT #	GRID NORTHING	GRID EASTING	DESCRIPTION	CONTROL MONUMENT
30471	13,853,669.64'	3,053,126.47'	1"I.P.	
30472	13,853,882.97'	3,052,775.29'	5/8"I.R.	
51701	13,853,914.55'	3,053,115.89'	1"I.P.	

BOREHOLE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
30251	13,853,840.21'	3,052,852.20'	89.15'	BH SOLF 1

CITY OF HOUSTON

CITY SURVEY 4859-8401
SITE CONTROL MONUMENT



Project WBS# R-000020-0089-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,053,115.22
Y= 13,853,906.92

Lat.= N 29°47'56.23"
Lon.= W 95°34'47.00"

Keymap Page: 449T & 499X
Orthometric Elevation = 89.16
Ellipsoid Height= -0.84
Geoid: GEOID 12B
Datum Source & Adjustment:
NAD '83 (CORS '96)

Reference Frame Used: ITRF (EPOCH: 2010.0000)
Vertical Adjustment used: NAVD '88 (CORS '96)
General Location: ON SOUTH HEADWALL ON N. DAIRY ASHFORD OVER TURKEY CREEK

Date Set: 09-25-24 Type of Mark: BRASS DISK IN CONC.
3 Nearest project control points (bearings and distances stated below):
TO CP-3, MAG NAIL W/SHINER, N 86° 38' 24" W ~ 308.43'
TO CP-4, MAG NAIL W/SHINER, N 70° 39' 33" W ~ 71.10'

NOTE:
1. Bearings are grid bearings.
2. Scale Factor = 0.999870017
3. Surface= Grid
S.F.

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
10-24-24

United Engineers, Inc.
9301 SOUTHWEST FREEWAY, SUITE 500
HOUSTON, TEXAS 77074
ENGINEERING FIRM # F-00142
TEL: (713) 271-2900
FAX: (713) 271-2999
SURVEY FIRM # 10178-00

Date Observed: September 30, 2024
City of Houston, Harris County, Texas

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM No.:	210190	**Reference Mark Status**	
Stream Number:	W100-00-00	**Date:**	6/4/2013
		Condition:	Recovered
County: Harris	**State:** Texas	**Established By:**	CDS/Muery & Pate Eng.
Key Map No.:	488F	**Date Established:**	5/14/2003
NGS Classification(1):	Range VI	**Watershed:**	Buffalo Bayou
RM's Directly Tied:	210395,210415,210185	**Survey Method Horz:**	GPSOBS
Units of Measure:	US Survey Foot	**Survey Method Vert:**	GPSOBS
Horizontal Datum:	NAD83	**Vertical Datum:**	NAVD88
Horizontal Adj.(2):	2001 Adjustment	**Vertical Adj.(3):**	2001 Adjustment
Projection Zone:	Texas South Central 4204	**Geoid Model Used:**	GEOID99 (CONUS)
Station Name:	210190	**Contractor PID:**	8034
Marker:	ALUM ROD	**Rod Depth:**	24.00
Stamping:	210190	**Sleeve Depth:**	3.00
Mark Logo:	Floodplain Ref. Mark	**Geoid Height:**	-89.60
Latitude:	29° 46' 20.96712" N	**Northing:**	13843795.82
Longitude:	95° 37' 59.63796" W	**Easting:**	3036428.42
Ellipsoid Height:	3.57	**Elevation(4):**	93.43
Convergence:	1° 38' 58"	**Scale Factor:**	0.9998923
Satellite Observable:	YES	**Elevation Factor:**	0.99999983
NGS PID (if applic):	NA	**Combined Factor:**	0.99989214

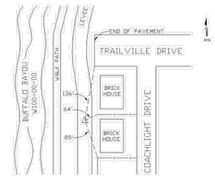
Notes:
1. This is NGS' new classification system. Range VI indicates that this position meets the 0.02m-0.05m Accuracy Standard for Horizontal Position, Ellipsoidal Height, and Orthometric Height (elevation) at the 95% confidence level (mmmeters).
2. Horizontal Adjustment - This survey is constrained to the NGS Published Horizontal positions of the geodetic stations adjusted by NGS in 2001.
3. Vertical Adjustment - This survey is constrained to the NGS Published Elevation for Northeast 2250 CORS ARP adjusted by NGS in 2001 and as published in PID AJ6430. Epoch Date 1997.00.
4. The elevation shown equals the Ellipsoid Height minus Geoid Height (from GEOID99) plus a constant of 0.253 feet.
5. The elevation is established by differential leveling techniques, utilizing the published elevations from nearby Reference Marks.

Station Recovery Data: Report an Issue with a Reference Mark - submit to Harris County Flood Control

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM Number: 210190
Stream Number: W100-00-00
Northing: 13843795.82 **Easting:** 3036428.42 **Elevation:** 93.43

Location:
Trailville Drive and Coachlight Drive



To Reach Description
From the intersection of Coachlight Drive and Trailville, take a left on Trailville to dead end. Monument located at top of levee.

Photo 1-Station Detail:	Photo 2-Station Area Picture:

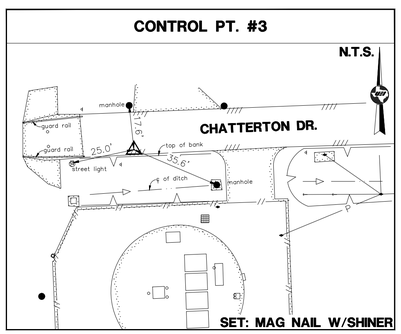
100 0 50 100 200
SCALE: 1" = 100'

LEGEND:
- HCAD PROPERTY LINE
- 10' U.E. EASEMENT
- RIGHT-OF-WAY PROPERTY LINE
- (TRV.) N 00° 00' 00" E. TRAVERSE LINE
- (BL.) N 00° 00' 00" E. BASELINE
- 69859 CONTROL MONUMENTS

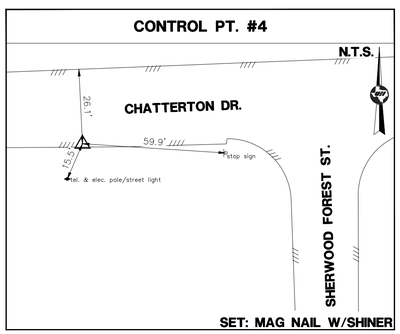
GENERAL NOTES:
CP= indicates Traverse Point
BP# indicates Baseline Point
(TRV.) indicates Traverse Line
(BL) indicates Baseline Line
CM indicates Control Monument
Fnd. indicates Found
RT indicates Right
LT indicates Left
XC indicates "X" Cut
I.P. indicates Iron Pipe
I.R. indicates Iron Rod
I.R.C. indicates Iron Rod w/Cap
P.I.P. indicates Pinch Iron Pipe
MAG indicates MAG Nail
U.T.S. indicates unable to set
PC indicates Point of Curve
PCC indicates Point of Compound Curvature
PT indicates Point of Tangent
TBM indicates Temporary Benchmark
#XXXX indicates Address
W.L.E. indicates Water Line Easement
U.E. indicates Utility Easement
S.S.E. indicates Sanitary Sewer Easement
S.E. indicates Storm Sewer Easement
B.L. indicates Building Line
M.R.H.C., TX. indicates Map Records Harris County, Texas
D.R.H.C., TX. indicates Deed Records Harris County, Texas
H.C.C.F. indicates Harris County Clerk's File
O.P.R.R.P.H.C., TX. indicates Official Public Records Real Property Harris County, Texas

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE TIED TO THE NSRS AND EXPRESSED IN THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, NAD 83 (2011), ITRF (EPOCH 2010.0000), NAVD '88 (GEOID 12B).
2. ALL DISTANCES SHOWN HEREON ARE SURFACE VALUES. ALL COORDINATES SHOWN HEREON ARE GRID VALUES UNLESS OTHERWISE NOTED. TO CONVERT SURFACE VALUES TO GRID VALUES MULTIPLY BY THE SCALE FACTOR OF 0.999870017.
3. THE RIGHT OF WAY SHOWN HEREON IS BASED ON THE BEST AVAILABLE EVIDENCE FOUND IN THE FIELD AT THE TIME OF THE SURVEY COUPLED WITH THE DOCUMENTS OF RECORD IN THE COUNTY CLERK'S OFFICE PROVIDED BY COURTHOUSE SPECIALIST.
4. TO CONVERT PROJECT TO TSARP DATUM (GD99) ADD 0.64 FEET TO ALL ELEVATIONS.

CONTROL PT. #3



CONTROL PT. #4



TSARP CONVERSION REFERENCE MONUMENT

(TSARP) HARRIS COUNTY FLOODPLAIN REFERENCE MARK NUMBER 210360
FLOOD PLAIN REFERENCE MARK, BRASS DISC, STAMPED 210360.
FROM THE INTERSECTION OF BRITMOORE ROAD AND SHADOW WOOD DRIVE, TRAVEL WEST ON SHADOW WOOD DRIVE APPROXIMATELY 0.2 MILE. MONUMENT IS LOCATED ON THE LEFT SIDE OF ROAD.
PUBLISHED ELEV= 91.40' (NAVD 1988, 2001 ADJUSTMENT)
OBSERVED ELEV= 90.76' (NAVD 1988, (CORS '96) COMPUTED USING GEOID 12B)

TBM LIST:

TBM 'C', CP-3, MAG NAIL W/SHINER. (SEE RECOVERY SKETCH)
ELEV=92.33'

TBM 'D', CP-4, MAG NAIL W/SHINER. (SEE RECOVERY SKETCH)
ELEV=88.72'

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
6-9-25

CERTIFICATION:

I HEREBY CERTIFY THAT: (1) THIS PLAT WAS PREPARED FROM AN ON THE GROUND SURVEY MADE UNDER MY SUPERVISION; (2) THAT THIS PLAT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF SURVEY; (3) THAT THIS PLAT AND THE SURVEY IT REPRESENTS, CONFORMS TO THE REQUIREMENTS OF THE LAND SURVEYING PRACTICES ACT IN EFFECT AT THE TIME OF THE SURVEY FOR THE TYPE OF PROFESSIONAL SERVICE SO STATED.

TYPE OF PROFESSIONAL SERVICE: TOPOGRAPHIC AND R.O.W. SURVEY

6-9-25
CHRISTIN M. NORRIS, R.P.L.S. 6207 DATE

C-181-101

United Engineers, Inc.
CIVIL ENGINEERING • LAND DEVELOPMENT
CONSTRUCTION MANAGEMENT
SURVEYING • UTILITY ENGINEERING
ENGINEERING FIRM # F-000142 SURVEY FIRM # 10178-00
10375 RICHMOND AVE., SUITE 1325 TEL: (713) 271-2900
HOUSTON, TEXAS 77042 FAX (713) 271-2999

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATION RENEWAL AND REHABILITATION

SHERWOOD OAKS LIFT STATION
SURVEY CONTROL MAP
SHEET 1 OF 1
SURVEY

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
H: 1"=100'	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 88 OF 226	

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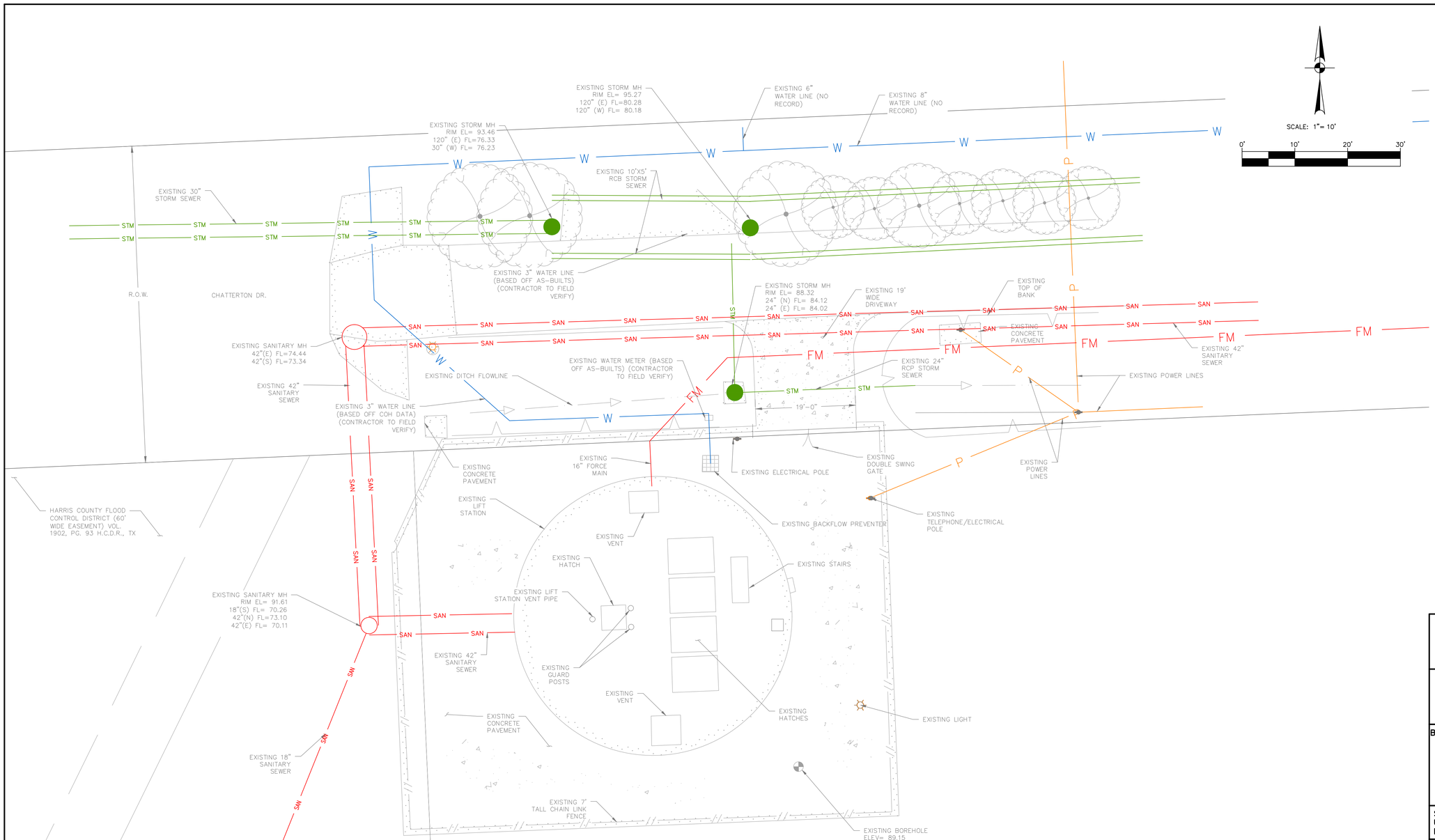

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PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
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SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
1/19/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

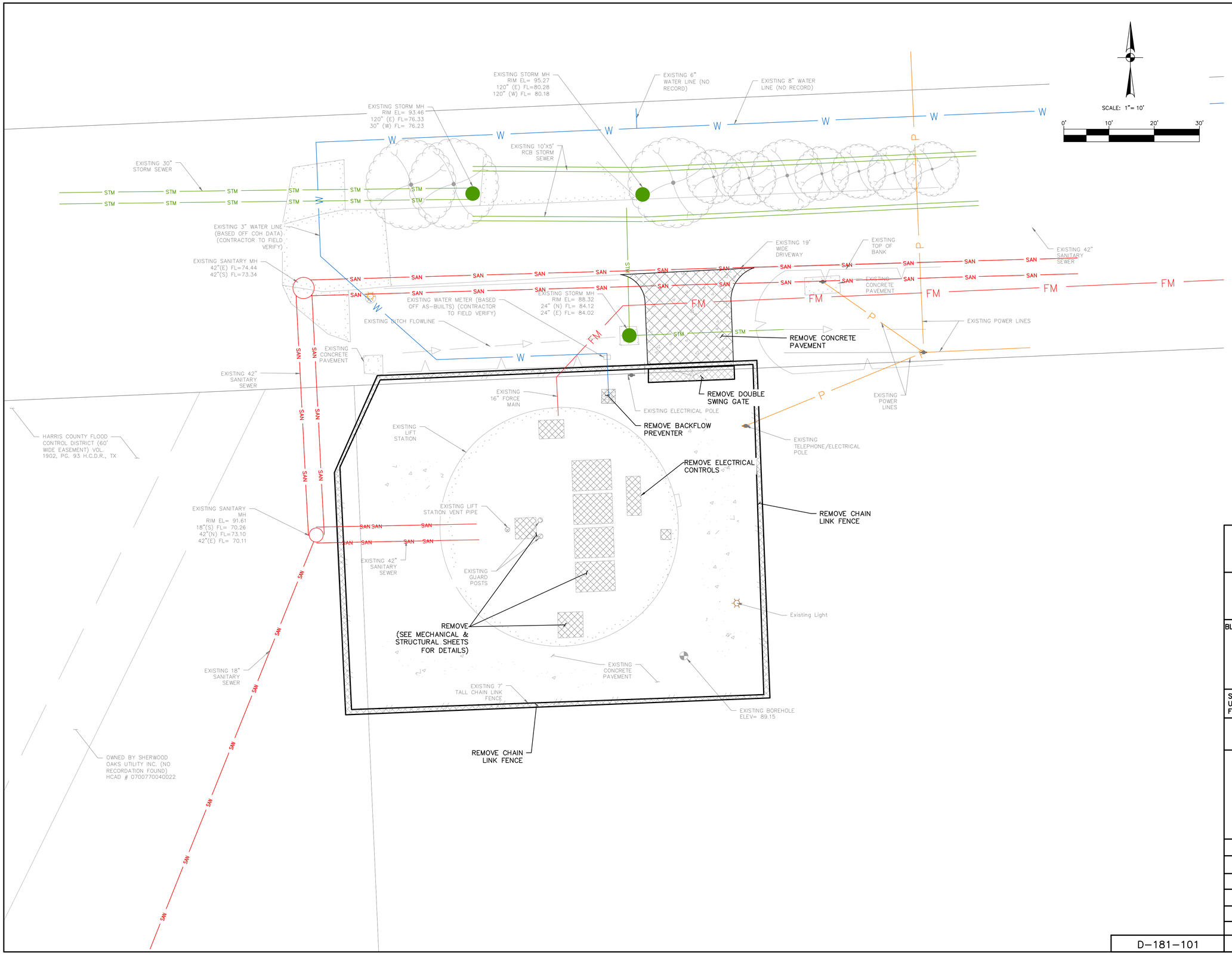
CIVIL

SHERWOOD OAKS LIFT STATION EXISTING SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

C-181-102

SHEET NO. 89 OF 226



NOTES:

1. THE SOUND PRODUCED BY THE ERECTION, EXCAVATION, CONSTRUCTION, OR DEMOLITION OF ANY BUILDING OR STRUCTURE, INCLUDING THE USE OF ANY NECESSARY TOOLS OR EQUIPMENT, CONDUCTED BETWEEN THE HOURS OF 7 A.M. AND 8 P.M., SHALL NOT PRODUCE A SOUND EXCEEDING 85 DB(A) WHEN MEASURED FROM THE PROPERTY LINE OF THE RESIDENTIAL PROPERTY WHERE THE SOUND IS BEING RECEIVED.
2. PER SECTION 01145S, THE CITY OF HOUSTON TO HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

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UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LAGY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

DEMOLITION

SHERWOOD OAKS LIFT STATION SITE DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 90 OF 226	

D-181-101

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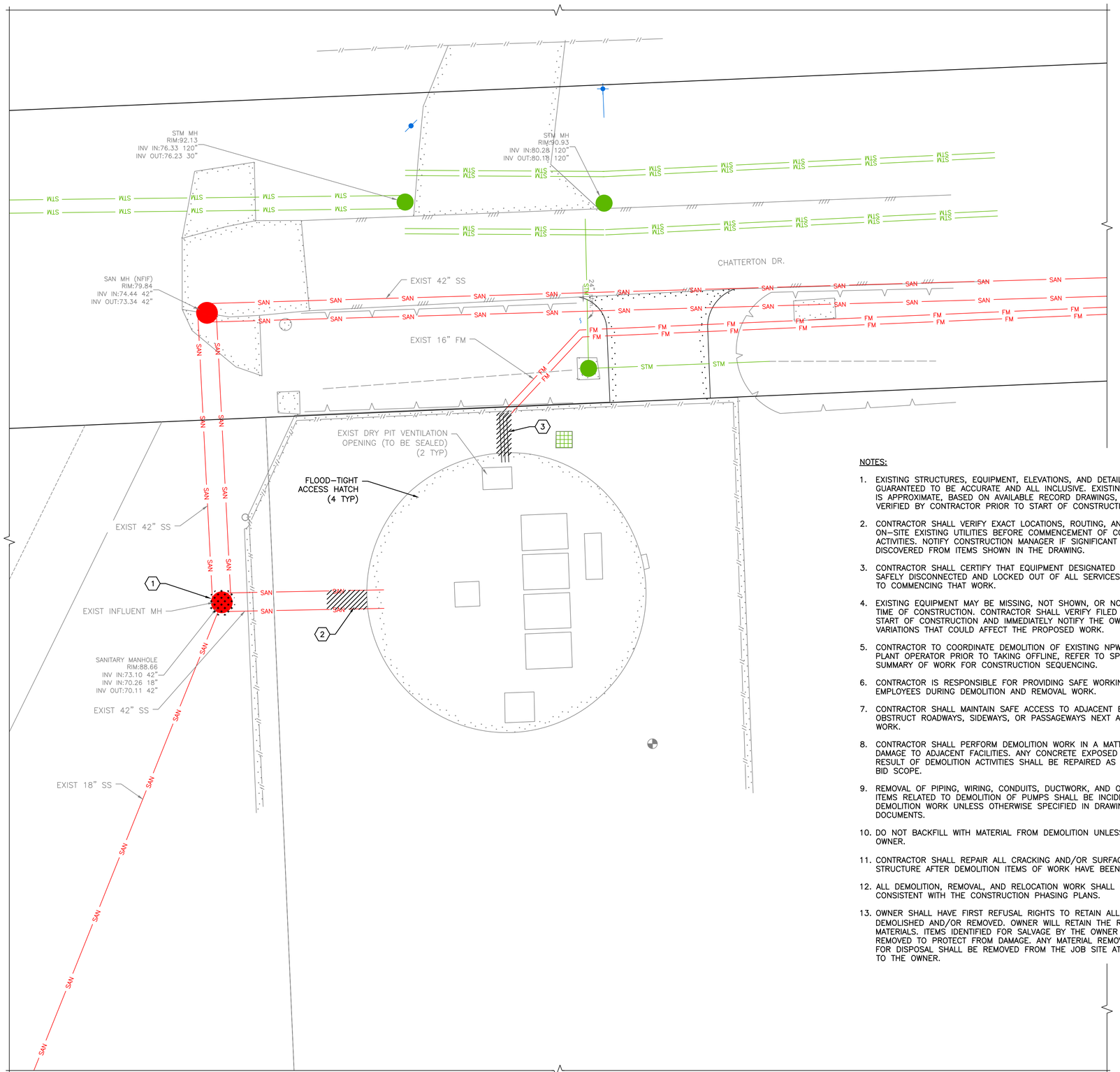
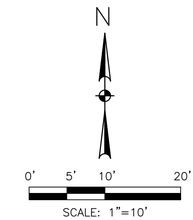




LEGEND

TO BE DEMOLISHED

TO BE REHABBED

ITEMS OF WORK	
NO.	DESCRIPTION
1	PRESSURE BLAST, REPAIR CONCRETE WALLS AS REQUIRED (ASSUME 1" REPAIR THICKNESS FOR BIDDING PURPOSES), AND APPLY 100% SOLIDS EPOXY COATING TO THE INTERIOR MANHOLE WALLS.
2	DEMOLISH THE EXISTING 42" SANITARY SEWER PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE FROM THE LOCATION OF THE PROPOSED 5' ONSITE INFLUENT MANHOLE TO THE LIFT STATION'S WET WELL.
3	DEMOLISH THE EXISTING 16" FORCE MAIN PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE FROM OUTSIDE THE LIFT STATION STRUCTURE TO THE LOCATION OF THE PROPOSED 4' ONSITE BYPASS MANHOLE.

NOTES:

1. EXISTING STRUCTURES, EQUIPMENT, ELEVATIONS, AND DETAILS SHOWN ARE NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE. EXISTING INFORMATION SHOWN IS APPROXIMATE, BASED ON AVAILABLE RECORD DRAWINGS, AND SHOULD BE VERIFIED BY CONTRACTOR PRIOR TO START OF CONSTRUCTION.
2. CONTRACTOR SHALL VERIFY EXACT LOCATIONS, ROUTING, AND DEPTH OF ALL ON-SITE EXISTING UTILITIES BEFORE COMMENCEMENT OF CONSTRUCTION ACTIVITIES. NOTIFY CONSTRUCTION MANAGER IF SIGNIFICANT DISCREPANCIES ARE DISCOVERED FROM ITEMS SHOWN IN THE DRAWING.
3. CONTRACTOR SHALL CERTIFY THAT EQUIPMENT DESIGNATED FOR DEMOLITION IS SAFELY DISCONNECTED AND LOCKED OUT OF ALL SERVICES AND UTILITIES PRIOR TO COMMENCING THAT WORK.
4. EXISTING EQUIPMENT MAY BE MISSING, NOT SHOWN, OR NOT FUNCTIONAL AT THE TIME OF CONSTRUCTION. CONTRACTOR SHALL VERIFY FILED CONDITIONS AT THE START OF CONSTRUCTION AND IMMEDIATELY NOTIFY THE OWNER OF ANY VARIATIONS THAT COULD AFFECT THE PROPOSED WORK.
5. CONTRACTOR TO COORDINATE DEMOLITION OF EXISTING NPW SYSTEM WITH THE PLANT OPERATOR PRIOR TO TAKING OFFLINE, REFER TO SPECIFICATION 0110-SUMMARY OF WORK FOR CONSTRUCTION SEQUENCING.
6. CONTRACTOR IS RESPONSIBLE FOR PROVIDING SAFE WORKING CONDITIONS FOR EMPLOYEES DURING DEMOLITION AND REMOVAL WORK.
7. CONTRACTOR SHALL MAINTAIN SAFE ACCESS TO ADJACENT BUILDINGS, DO NOT OBSTRUCT ROADWAYS, SIDEWAYS, OR PASSAGEWAYS NEXT ADJACENT TO THE WORK.
8. CONTRACTOR SHALL PERFORM DEMOLITION WORK IN A MATTER TO PREVENT DAMAGE TO ADJACENT FACILITIES. ANY CONCRETE EXPOSED OR DAMAGED AS A RESULT OF DEMOLITION ACTIVITIES SHALL BE REPAIRED AS PART OF THE BASE BID SCOPE.
9. REMOVAL OF PIPING, WIRING, CONDUITS, DUCTWORK, AND OTHER MISCELLANEOUS ITEMS RELATED TO DEMOLITION OF PUMPS SHALL BE INCIDENTAL TO THE DEMOLITION WORK UNLESS OTHERWISE SPECIFIED IN DRAWINGS AND CONTRACT DOCUMENTS.
10. DO NOT BACKFILL WITH MATERIAL FROM DEMOLITION UNLESS APPROVED BY OWNER.
11. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STRUCTURE AFTER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
12. ALL DEMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH THE CONSTRUCTION PHASING PLANS.
13. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOW TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

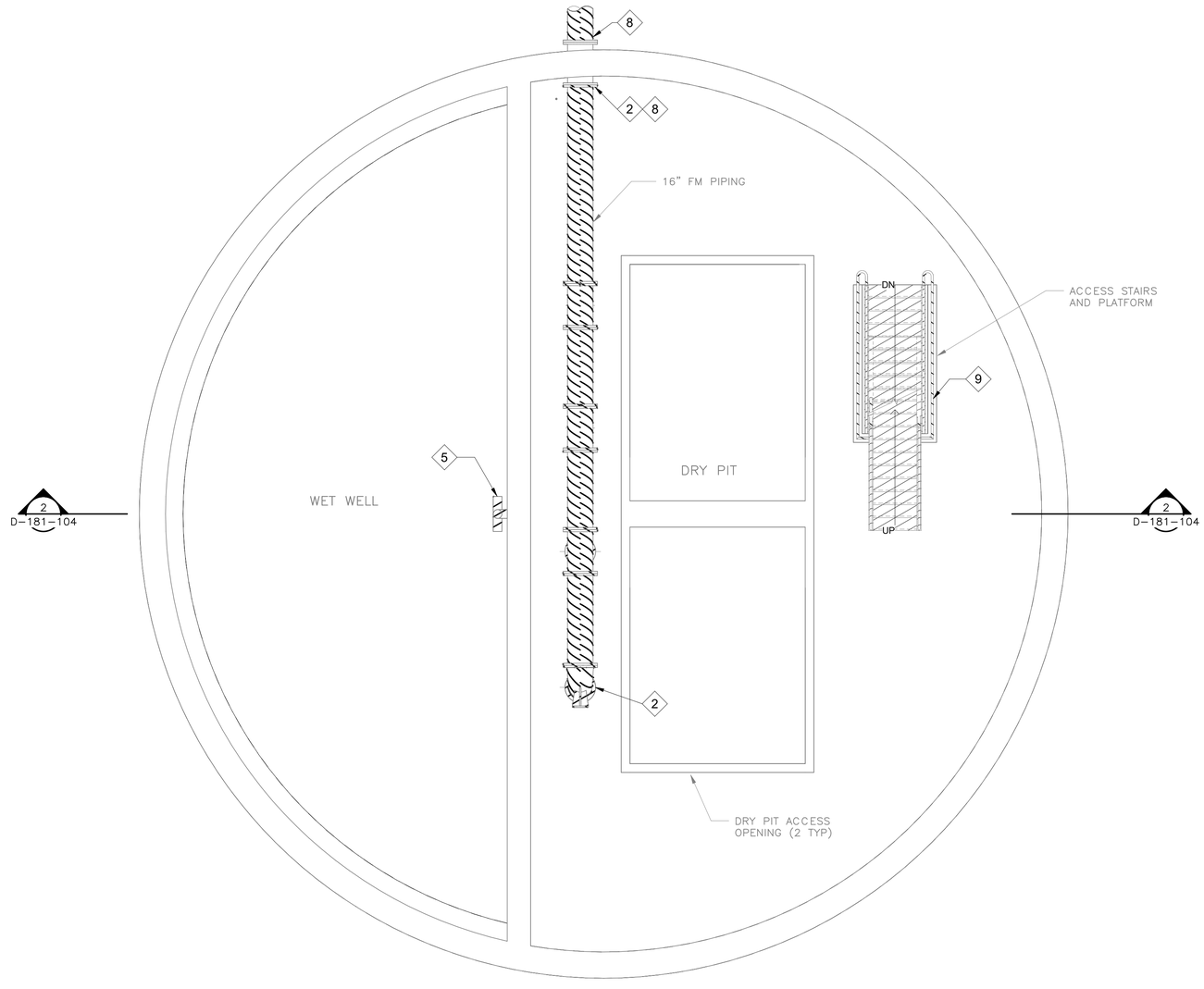
DEMOLITION

SHERWOOD OAKS LIFT STATION YARD PIPING DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 91 OF 226	

D-181-102

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 - COH Lift Station Renew-Replace\Project Files\5.0 Design Files - B&V\5.0.5 Civil 3D\D-181-102.dwg



UPPER LEVEL – DEMOLITION PLAN

1/4" = 1'-0"

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING DRY PIT SUBMERSIBLE PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE.
2	DEMOLISH ALL DISCHARGE PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE LOCATED INSIDE THE EXISTING DRY PIT.
3	DEMOLISH THE EXISTING SUMP PUMP, ASSOICATED PIPING, FITTINGS, VALVES, SUPPORTS AND HARDWARE.
4	DEMOLISH THE EXISTING GRATING PLATFORMS AND WALKWAYS LOCATED IN THE DRY PIT LOWER LEVEL. ALL ACCESS STAIRWAYS, LANDINGS, HANDRAILS AND ASSOCIATED HARDWARE SHALL REMAIN IN PLACE.
5	DEMOLISH THE EXISTING AIR CELL SYSTEM, ASSOCIATED SUPPORTS, GUIDES, ASSEMBLY ITEMS, AND HARDWARE.
6	DEMOLISH EXISTING DRY PIT PUMP AND EQUIPMENT ACCESS HATCHES, ASSOICATED SUPPORTS, HARDWARE AND CABLE HOLDER ASSEMBLY.
7	DEMOLISH EXISTING WET WELL EQUIPMENT ACCESS HATCHES, ASSOCIATED SUPPORTS, HARDWARE AND CABLE HOLDER ASSEMBLY.
8	DEMOLISH THE EXIST 16" DISCHARGE PIPING UP TO THE WALL PIPE SPOOL PIECE. INSTALL A PLUG ON THE WALL PIPE SPOOL PIECE AND ABANDON IN PLACE.
9	DEMOLISH THE EXISTING STAIRS, HANDRAIL, KICKPLATES, GRATING, SUPPORTS, ELEVATED PLATFORMS AND ALL ASSOCIATED HARDWARD.

4' 2' 0' 4' 8'

1/4" = 1'-0"

N

LEGEND:

TO BE DEMOLISHED

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON-SHRINK GROUT.
3. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STGRUCTURE AFER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
4. ALL EMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONTRUCTION PHASING PLANS.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
6. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.
7. REFER TO SPECIFICATIONS FOR DIVERSION PUMPING REQUIREMENTS.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

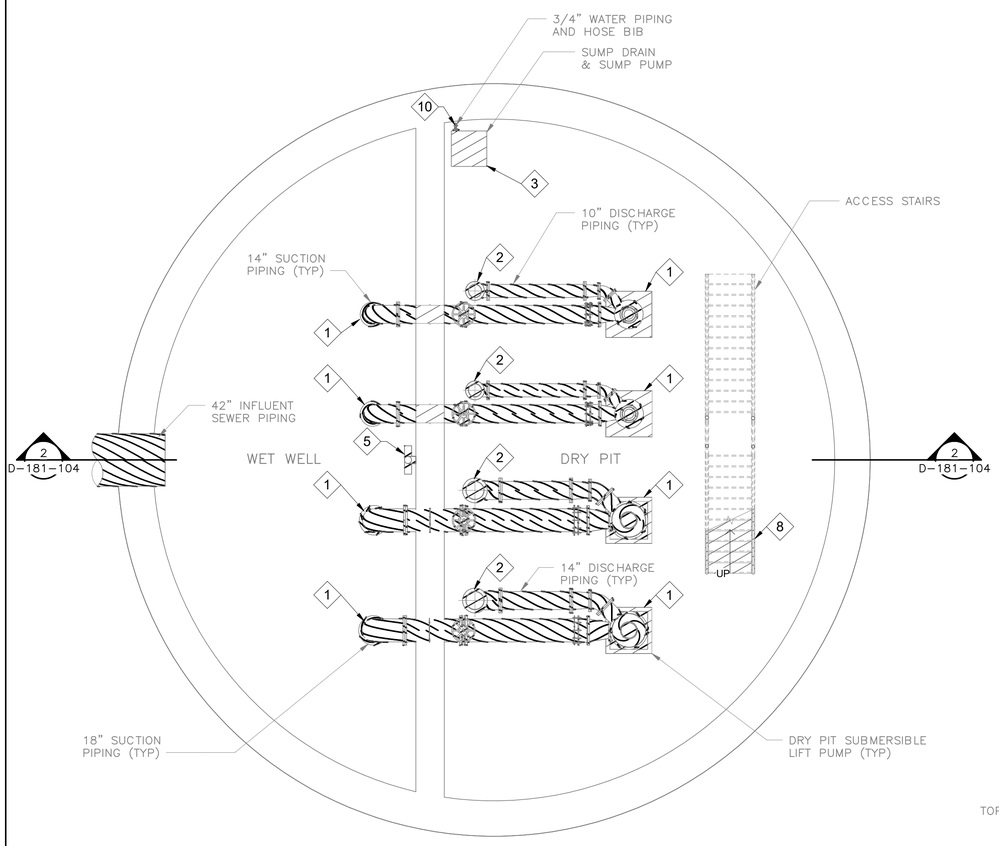
LIFT STATIONS RENEWAL
AND REHABILITATION
11333 CHATTERTON DR

DEMOLITION
SHERWOOD OAKS LIFT STATION
DEMOLITION PLAN – UPPER LEVEL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 92 OF 226	

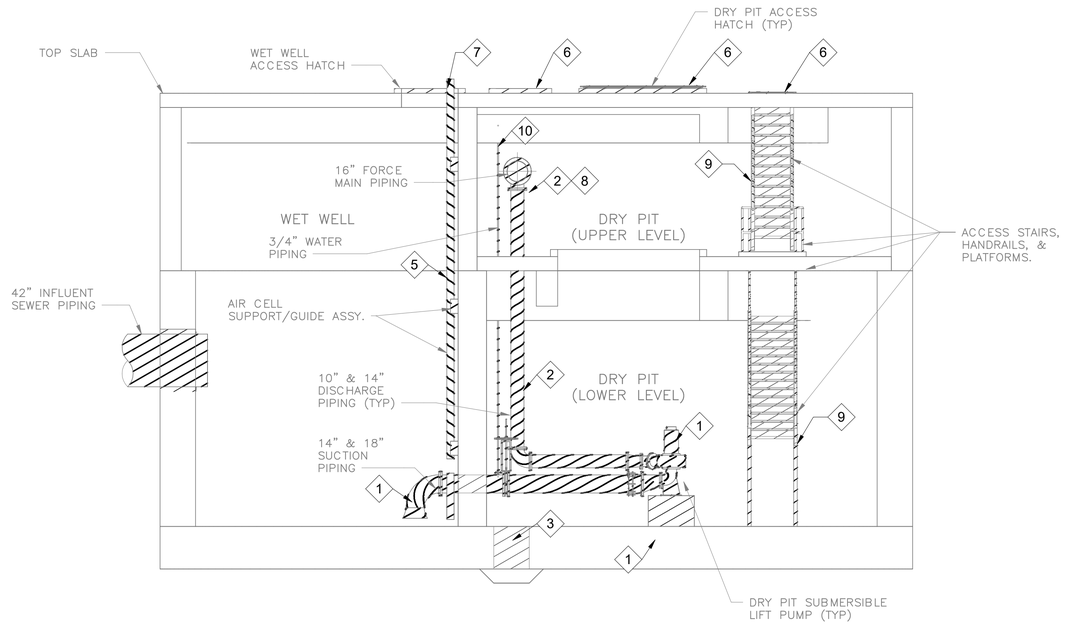
D-181-103

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-181-SHERWOOD_OAKS_LS-BV.rvt



LOWER LEVEL LIFT STATION DEMOLITION PLAN

3/16" = 1'-0"



2 SECTION

D-181-103 3/16" = 1'-0"

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING DRY PIT SUBMERSIBLE PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE.
2	DEMOLISH ALL DISCHARGE PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE LOCATED INSIDE THE EXISTING DRY PIT.
3	DEMOLISH THE EXISTING SUMP PUMP, ASSOICATED PIPING, FITTINGS, VALVES, SUPPORTS AND HARDWARE.
4	DEMOLISH THE EXISTING GRATING PLATFORMS AND WALKWAYS LOCATED IN THE DRY PIT LOWER LEVEL. ALL ACCESS STAIRWAYS, LANDINGS, HANDRAILS AND ASSOCIATED HARDWARE SHALL REMAIN IN PLACE.
5	DEMOLISH THE EXISTING AIR CELL SYSTEM, ASSOCIATED SUPPORTS, GUIDES, ASSEMBLY ITEMS, AND HARDWARE.
6	DEMOLISH EXISTING DRY PIT PUMP AND EQUIPMENT ACCESS HATCHES, ASSOICATED SUPPORTS, HARDWARE AND CABLE HOLDER ASSEMBLY.
7	DEMOLISH EXISTING WET WELL EQUIPMENT ACCESS HATCHES, ASSOCIATED SUPPORTS, HARDWARE AND CABLE HOLDER ASSEMBLY.
8	DEMOLISH THE EXIST 16" DISCHARGE PIPING UP TO THE WALL PIPE SPOOL PIECE. INSTALL A PLUG ON THE WALL PIPE SPOOL PIECE AND ABANDON IN PLACE.
9	DEMOLISH THE EXISTING STAIRS, HANDRAIL, KICKPLATES, GRATING, SUPPORTS, ELEVATED PLATFORMS AND ALL ASSOCIATED HARDWARD.
10	DEMOLISH HOSEBIB AND 3/4" WATER PIPE IN THE DRY PIT. DEMOLISH PIPE UP TO AND CAP AT THE BACKFLOW PREVENTER IN THE YARD.

4' 2' 0' 4' 8'

1/4" = 1'-0"

N

LEGEND:

TO BE DEMOLISHED

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON-SHRINK GROUT.
3. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STGRUCTURE AFER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
4. ALL EMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONTRUCTION PHASING PLANS.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
6. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.
7. REFER TO SPECIFICATIONS FOR DIVERSION PUMPING REQUIREMENTS.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

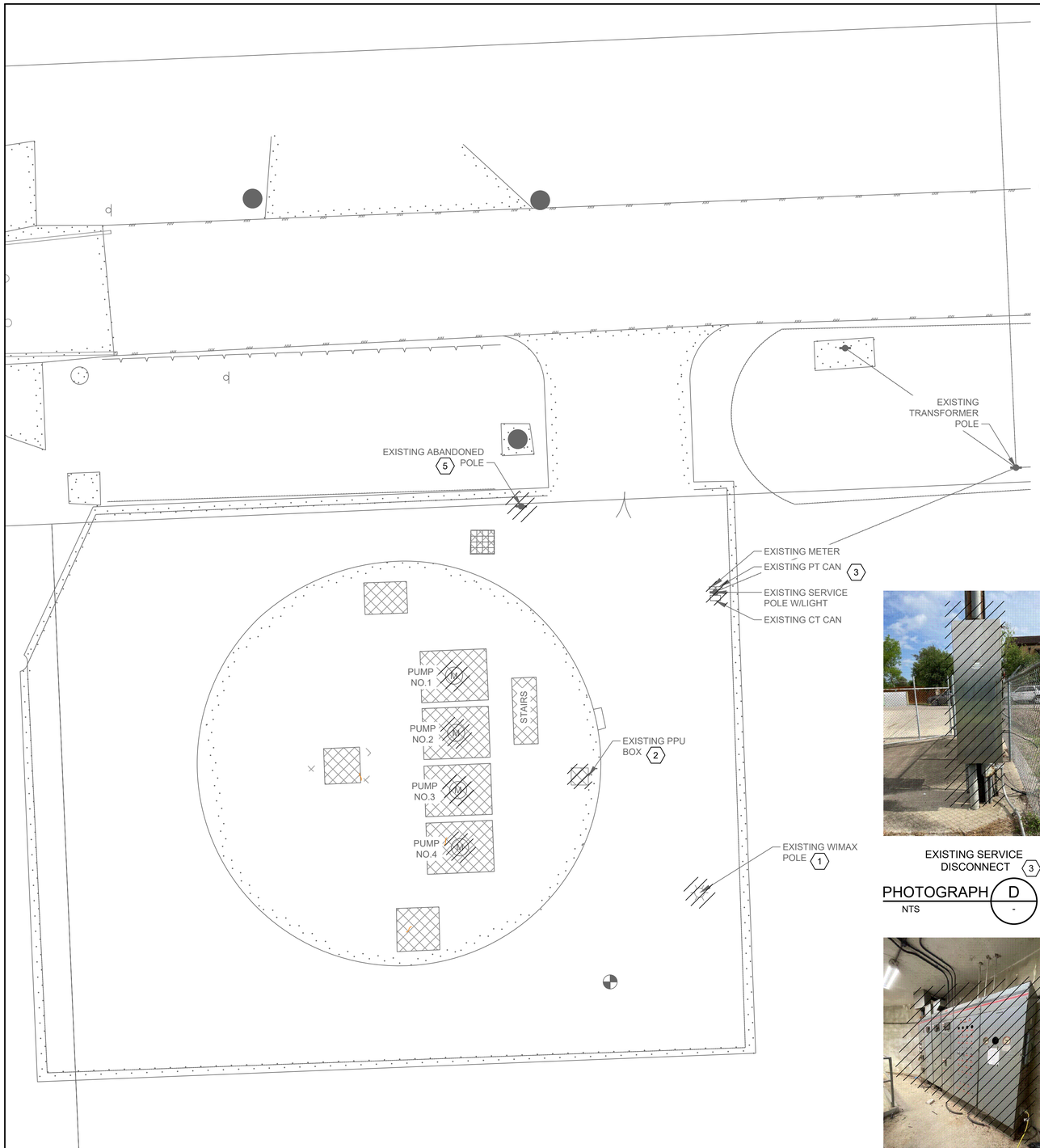
DEMOLITION

SHERWOOD OAKS LIFT STATION DEMOLITION PLAN AND SECTION – LOWER LEVEL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 93 OF 226	

D-181-104

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-181-SHERWOOD_OAKS_LS-BV.rvt



SHERWOOD OAK LIFT STATION
ELECTRICAL DEMOLITION SITE

PLAN

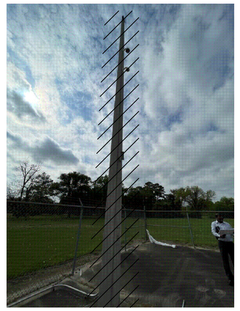
1" = 8'-0"

SCALE: 1"= 8'

0' 8' 16' 24'

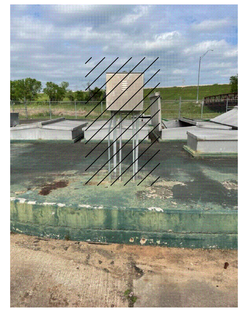
NOTES BY SYMBOL "⟨#⟩":

1. EXISTING WIMAX POLE TO BE DEMOLISHED AND REMOVED.
2. EXISTING PPU BOX TO BE DEMOLISHED AND REMOVED.
3. EXISTING SERVICE POLE, METER, AND SERVICE DISCONNECT TO BE DEMOLISHED AND REMOVED.
4. EXISTING LIFT STATION CONTROL CABINET TO BE DEMOLISHED AND REMOVED.
5. EXISTING ABANDONED POLE TO BE REMOVED.



EXISTING WIMAX POLE 1

PHOTOGRAPH A
NTS -



EXISTING PPU BOX 2

PHOTOGRAPH B
NTS -

EXISTING METERING POLE W/LIGHT 3

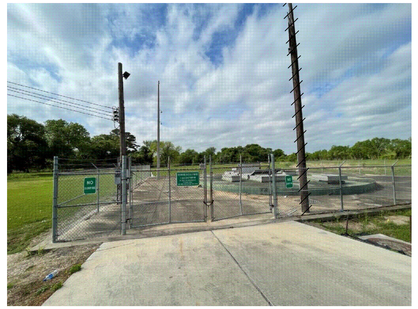
PHOTOGRAPH C
NTS -

EXISTING SERVICE DISCONNECT 3

PHOTOGRAPH D
NTS -

EXISTING METERING AND PT 3

PHOTOGRAPH E
NTS -

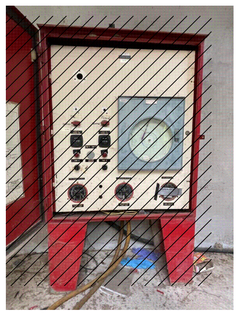


EXISTING ABANDONED POLE 5

PHOTOGRAPH G
NTS -

EXISTING MCC IN PIT 4

PHOTOGRAPH F
NTS -



EXISTING CONTROL PANEL IN PIT 4

PHOTOGRAPH G
NTS -

LEGEND:

ITEMS TO BE DEMOLISHED.

GAI
Gupta & Associates, Inc.
CONSULTING ENGINEERING
Registration No. F-2593
302 Dennis St.
Houston, Texas 77006
Tel: 713-636-2936
Fax: 713-636-2987
email: hforouzan@gaiconsulting.com

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

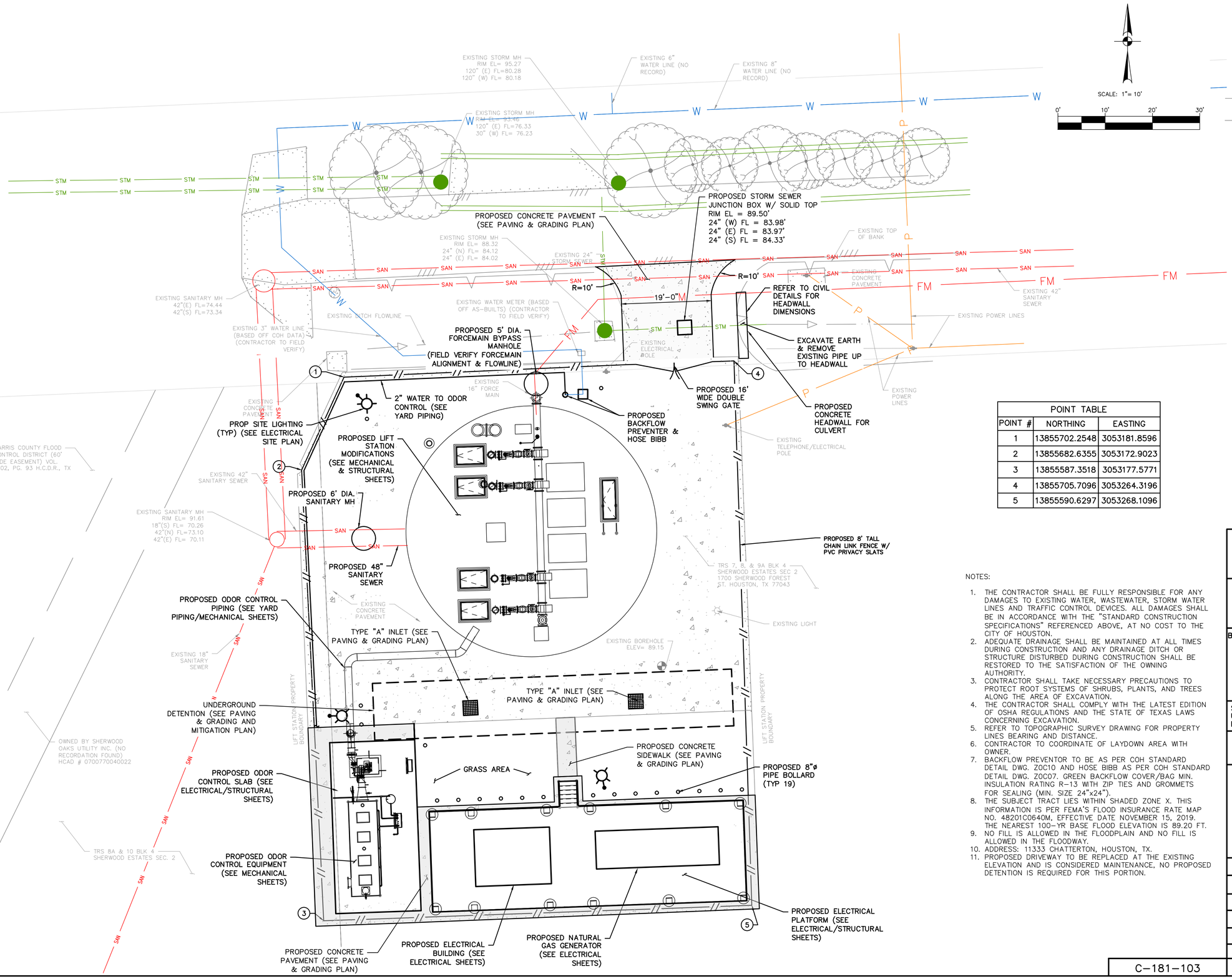
ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
DEMOLITION SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 94 OF 226	

D-181-105

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak D-181-105.dwg



POINT TABLE		
POINT #	NORTHING	EASTING
1	13855702.2548	3053181.8596
2	13855682.6355	3053172.9023
3	13855587.3518	3053177.5771
4	13855705.7096	3053264.3196
5	13855590.6297	3053268.1096

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. BACKFLOW PREVENTOR TO BE AS PER COH STANDARD DETAIL DWG. ZOC10 AND HOSE BIBB AS PER COH STANDARD DETAIL DWG. ZOC07. GREEN BACKFLOW COVER/BAG MIN. INSULATION RATING R-13 WITH ZIP TIES AND GROMMETS FOR SEALING (MIN. SIZE 24"x24").
8. THE SUBJECT TRACT LIES WITHIN SHADED ZONE X. THIS INFORMATION IS PER FEMA'S FLOOD INSURANCE RATE MAP NO. 48201C0640M, EFFECTIVE DATE NOVEMBER 15, 2019. THE NEAREST 100-YR BASE FLOOD ELEVATION IS 89.20 FT.
9. NO FILL IS ALLOWED IN THE FLOODPLAIN AND NO FILL IS ALLOWED IN THE FLOODWAY.
10. ADDRESS: 11333 CHATTERTON, HOUSTON, TX.
11. PROPOSED DRIVEWAY TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/13/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

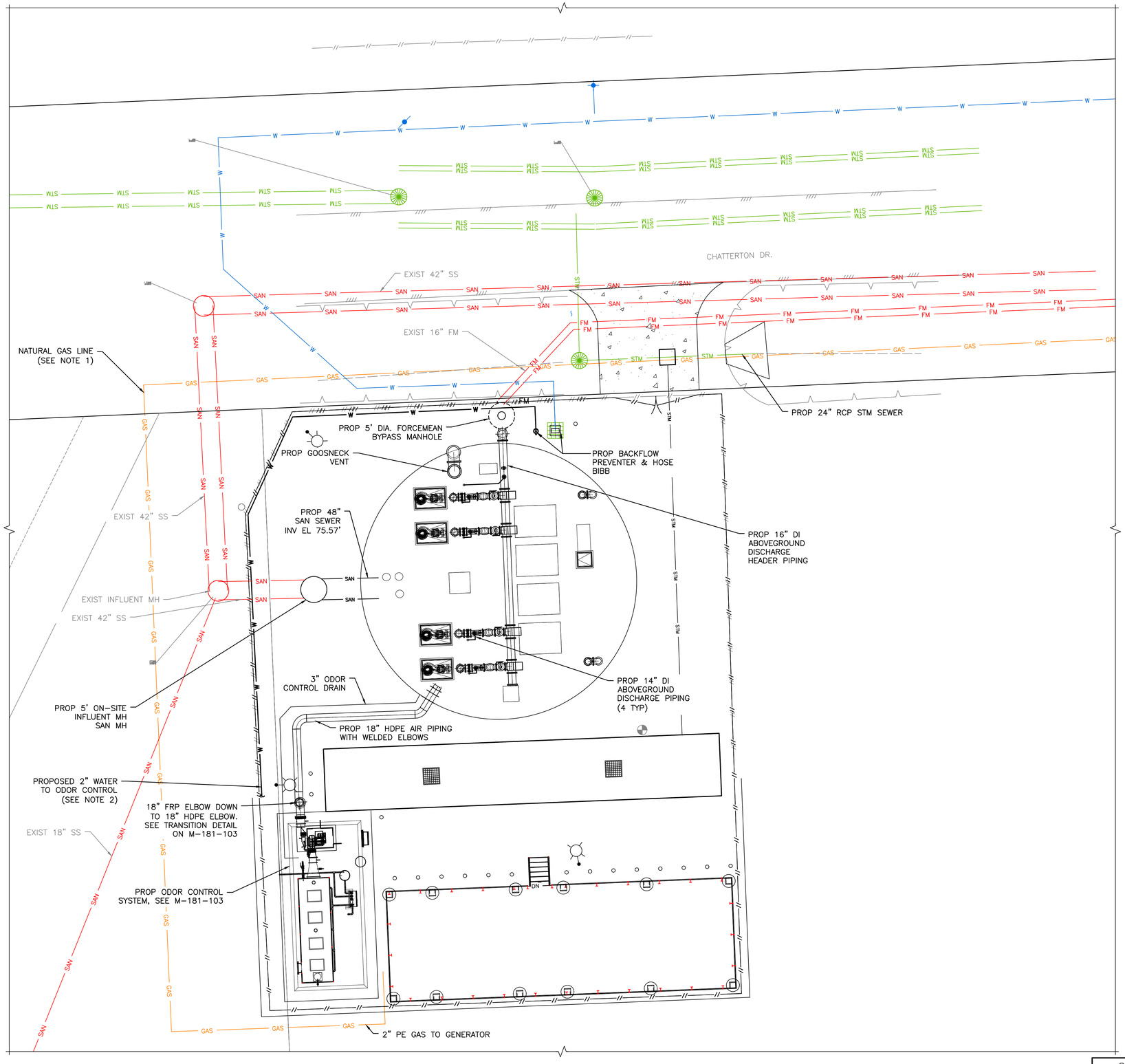
CIVIL

SHERWOOD OAKS LIFT STATION PROPOSED SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 95 OF 226	

C-181-103

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Sherwood\DWGS\PROPOSED SITE PLAN.dwg



N

0' 5' 10' 20'

SCALE: 1"=10'

NOTES:

1. LOCATION OF NATURAL GAS LINE TO BE DETERMINED AFTER COORDINATION WITH CENTERPOINT GAS. CONTRACTOR SHALL COORDINATE CONNECTION TO PROPOSED EQUIPMENT AS DETERMINED BY THE LOCATION OF THE NATURAL GAS.
2. CONTRACTOR SHALL FIELD ROUTE WATER LINE TO ODOR CONTROL CONNECTION.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

CIVIL

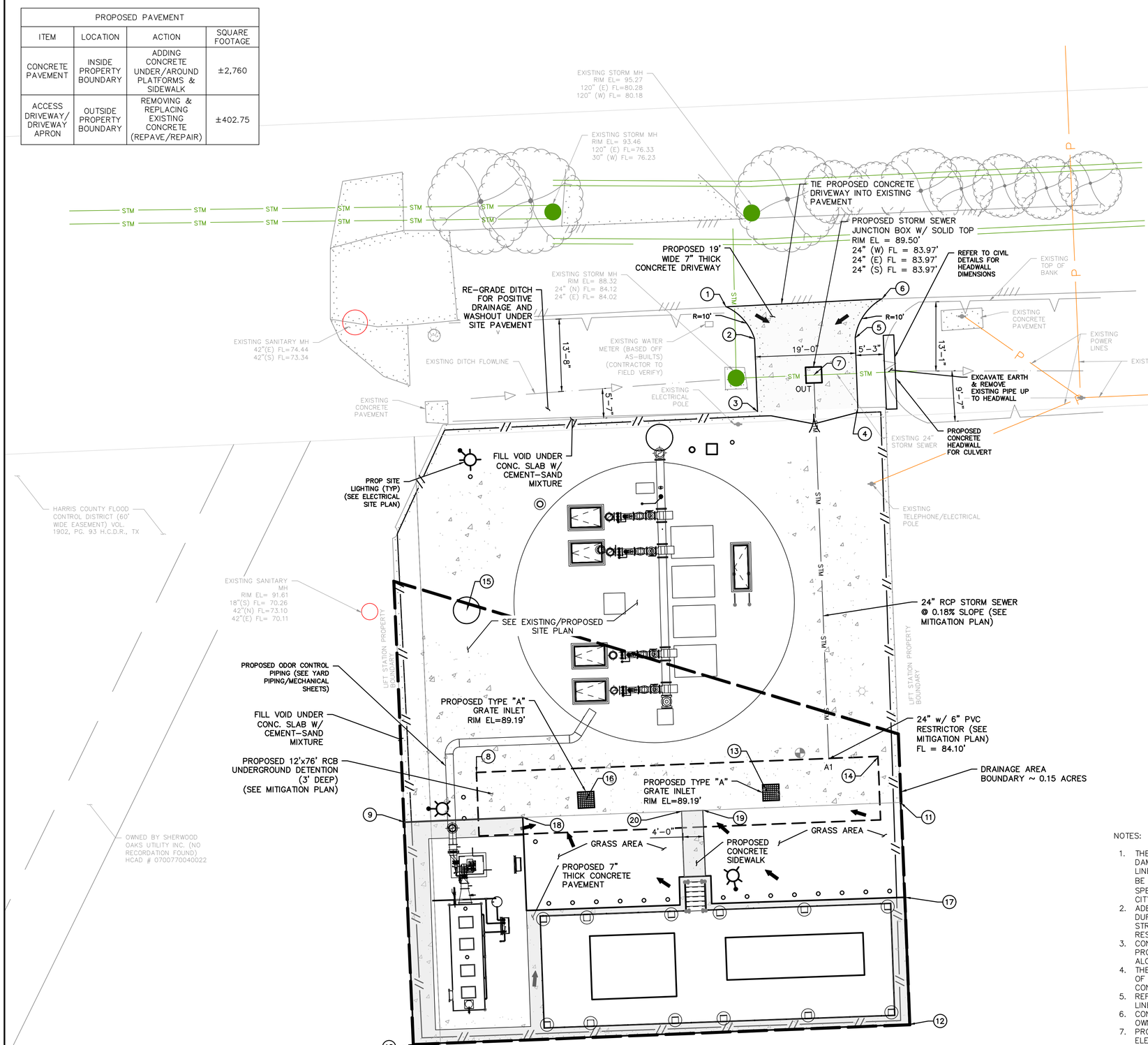
SHERWOOD OAKS LIFT STATION PROPOSED YARD PIPING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 96 OF 226	

C-181-104

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 - COH Lift Station Renew-Replace\Project Files\5.0 Design Files - B&V\5.0.5 Civil 3D\C-181-104.dwg

PROPOSED PAVEMENT			
ITEM	LOCATION	ACTION	SQUARE FOOTAGE
CONCRETE PAVEMENT	INSIDE PROPERTY BOUNDARY	ADDING CONCRETE UNDER/AROUND PLATFORMS & SIDEWALK	±2,760
ACCESS DRIVEWAY/ DRIVEWAY APRON	OUTSIDE PROPERTY BOUNDARY	REMOVING & REPLACING EXISTING CONCRETE (REPAVE/REPAIR)	±402.75



SCALE: 1"= 10'

0' 10' 20' 30'

LEGEND

- PROPOSED 7" THICK CONCRETE PAVEMENT
- EXISTING TREE
- EXISTING HIGH BANK
- EXISTING DITCH CENTERLINE
- DRAINAGE DIRECTION

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
1	13855725.5714	3053235.0555	91.4400
2	13855719.5422	3053240.4529	89.8800
3	13855705.7564	3053241.0221	88.6000
4	13855706.5005	3053259.9898	88.8100
5	13855719.6598	3053259.4961	89.8400
6	13855727.0743	3053264.5722	90.1800
7	13855712.6810	3053251.6662	
8	13855637.5351	3053187.8703	
9	13855628.1410	3053174.2132	89.2500
10	13855586.1700	3053175.9046	89.6500
11	13855631.8771	3053268.0662	89.4000
12	13855589.9061	3053269.7576	89.8000
13	13855633.6918	3053242.8845	
14	13855640.5581	3053263.8102	
15	13855668.1636	3053186.0408	
16	13855632.3553	3053208.5954	
17	13855613.9361	3053268.9487	89.6000
18	13855629.0181	3053196.6202	89.2300
19	13855630.3915	3053230.7474	89.2000
20	13855630.2141	3053226.6653	89.2000

NOTES:

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2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. PROPOSED DRIVEWAY TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.
8. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
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SURVEYED BY:
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FB NO. P-6182

STATE OF TEXAS
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10/13/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

CIVIL

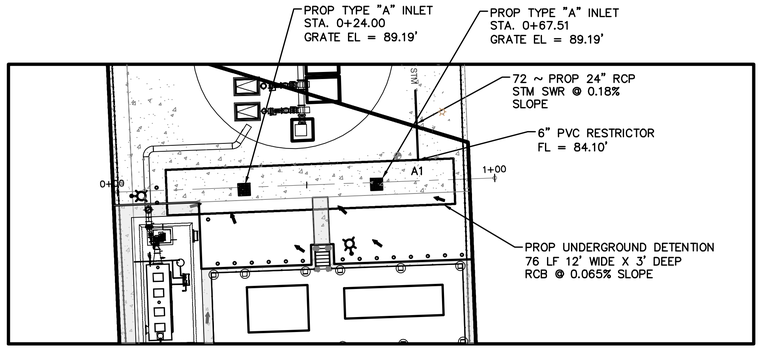
SHERWOOD OAKS LIFT STATION PROPOSED PAVING & GRADING PLAN

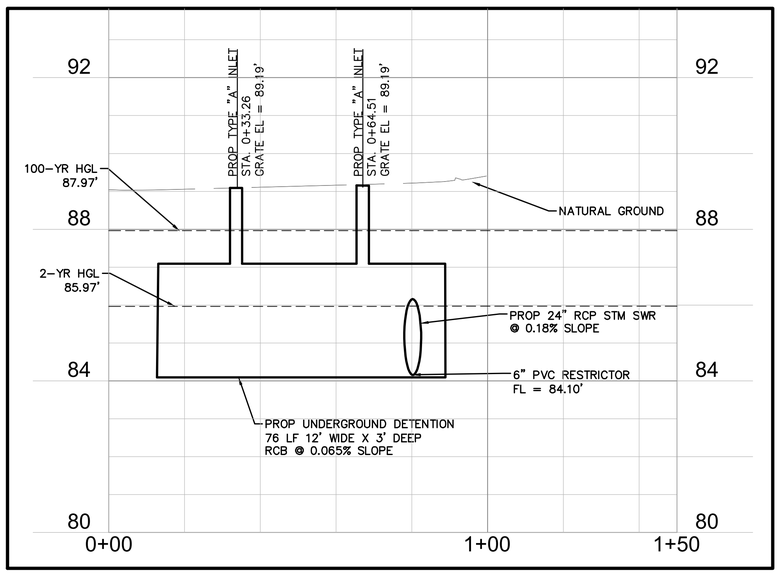
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

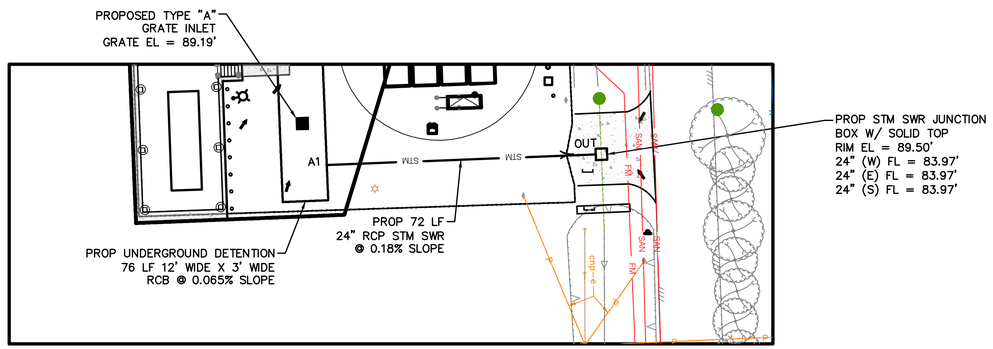
C-181-105

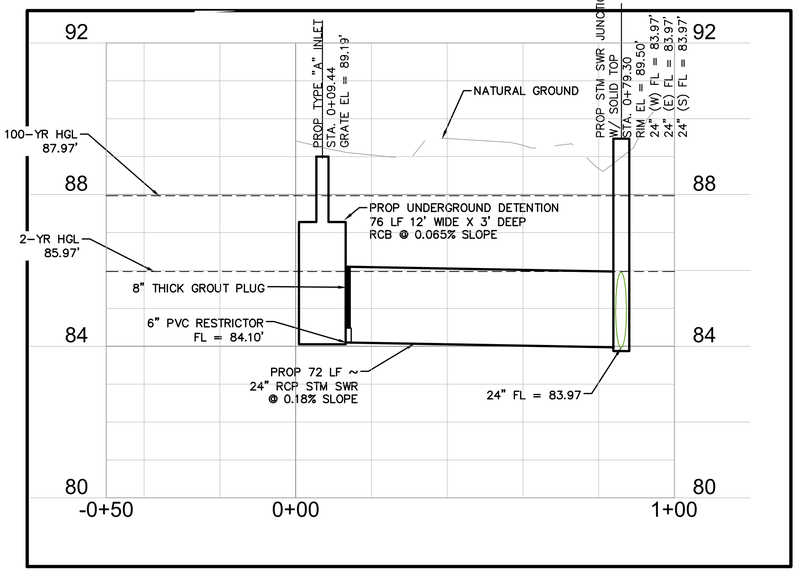
SHEET NO. 97 OF 226

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Sherwood\DWGS\PROPOSED PAVING & GRADING PLAN.dwg









NOTES:

1. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
2. CONTRACTOR TO REHABILITATE ALL DISTURBED SITE & LANDSCAPING TO PRE-CONSTRUCTION OR BETTER CONDITIONS.
3. STORMWATER DETENTION BOX TO BE MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.
4. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/ OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/ GEOTECHNICAL/ SAFETY/ EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/13/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

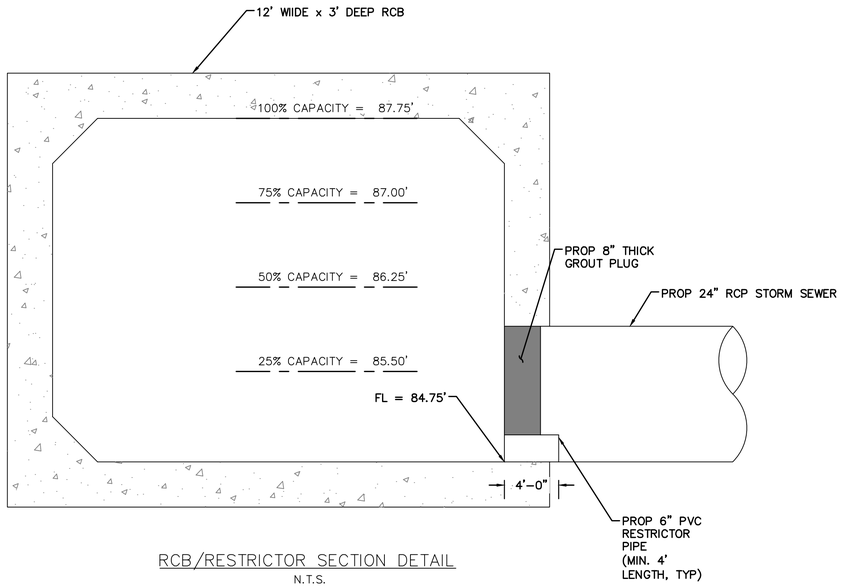
CIVIL

SHERWOOD OAKS LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS – SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 98 OF 226	

C-181-106

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Sherwood\DWGS\MITIGATION PLAN & DRAINAGE CALCULATIONS - SHEET 1 OF 2.dwg



RCB/RESTRICTOR SECTION DETAIL

N.T.S.

DETENTION:

Disturbed Area	0.0784	ac
Detention Rate (R_d)	0.80	ac-ft/ac
Proposed (final) Impervious Area (A_p) =	0.0784	ac
Existing Impervious Area To Be Removed (A_e) =	0.0150	ac

Required Detention Volume = (Ap * Rd) - (Ae * 0.40 ac-ft/ac)

Total Required Detention Volume =	0.0567	ac-ft	
Provided Detention Volume =	12' x 3' x 76' (W x D x L)	=	0.0628 ac-ft

RESTRICTORS:

Low Level Restrictor (25% Flow)

Total Drainage Area =	0.1500	ac
Outflow Rate Allowed for Low Flow QL1 =	0.0750	cfs
Head HL1 (water surface differential) for Low Flow =	0.5	ft
Calculated Low Level Restrictor Size DL =	1.74	in
Provided/Designed Low Level Restrictor Size DL1 =	6	in

High Level Restrictor (75% Flow)

Total Drainage Area =	0.1500	ac
Total Outflow Rate (100%) Q =	0.3000	cfs
Re-calculated Head HL2 (water surface differential) for Low Level Restrictor =	2	ft
Re-calculated Low Flow Q L2 for Low Level Restrictor =	1.783	cfs
Outflow Rate Allowed for High Flow Qh1 (75%) =	-1.4827	cfs
Head Hh2 (water surface differential) for High Level Restrictor =	0.5	ft
Calculated High Level Restrictor Size Dh =	#NUM!	in
Provided/Designed High Level Restrictor Size Dh1 (75%) =	N/A	in

No need for High Level Restrictor

NOTES:

1. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
2. CONTRACTOR TO REHABILITATE ALL DISTURBED SITE & LANDSCAPING TO PRE-CONSTRUCTION OR BETTER CONDITIONS.
3. STORMWATER DETENTION BOX TO BE MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.
4. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TRENCH EXCAVATION SAFETY PROTECTION

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CAUTION!!

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10/1/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

CIVIL

SHERWOOD OAKS LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS – SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 99 OF 226	

C-181-107

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DESIGN STORM SEWER CALCULATIONS (2-YEAR)

Project Name: SHERWOOD OAKS LS IMPROVEMENTS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 2 year
Design Multiplier: 1.00
Starting W.S. Elev.: 85.97 feet

Rainfall Coeff.
b = 75.0
d = 16.2
e = 0.832

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.15	0.15	0.90	0.14	22.2	22.2	3.62	0.49	0.49	RCP	72	24	1	0.180	0.013	9.6	3.1	0.13	N/A	84.10	83.97	0.16	0.000	0.00	85.97	85.97	85.97	85.97	89.19	No Curb	89.19	0.0 in.

EXTREME EVENT STORM SEWER CALCULATIONS (100-YEAR)

Project Name: SHERWOOD OAKS LS IMPROVEMENTS - EXTREME EVENT ANALYSIS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 100 year
Design Multiplier: 1.00
Starting W.S. Elev.: 87.97 feet

Rainfall Coeff.
b = 125.4
d = 21.8
e = 0.750

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.15	0.15	0.90	0.14	22.2	22.2	7.35	0.99	0.99	RCP	72	24	1	0.180	0.013	9.6	3.1	0.13	N/A	84.10	83.97	0.32	0.002	0.00	87.97	87.97	87.97	87.97	89.19	No Curb	89.19	0.0 in.

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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

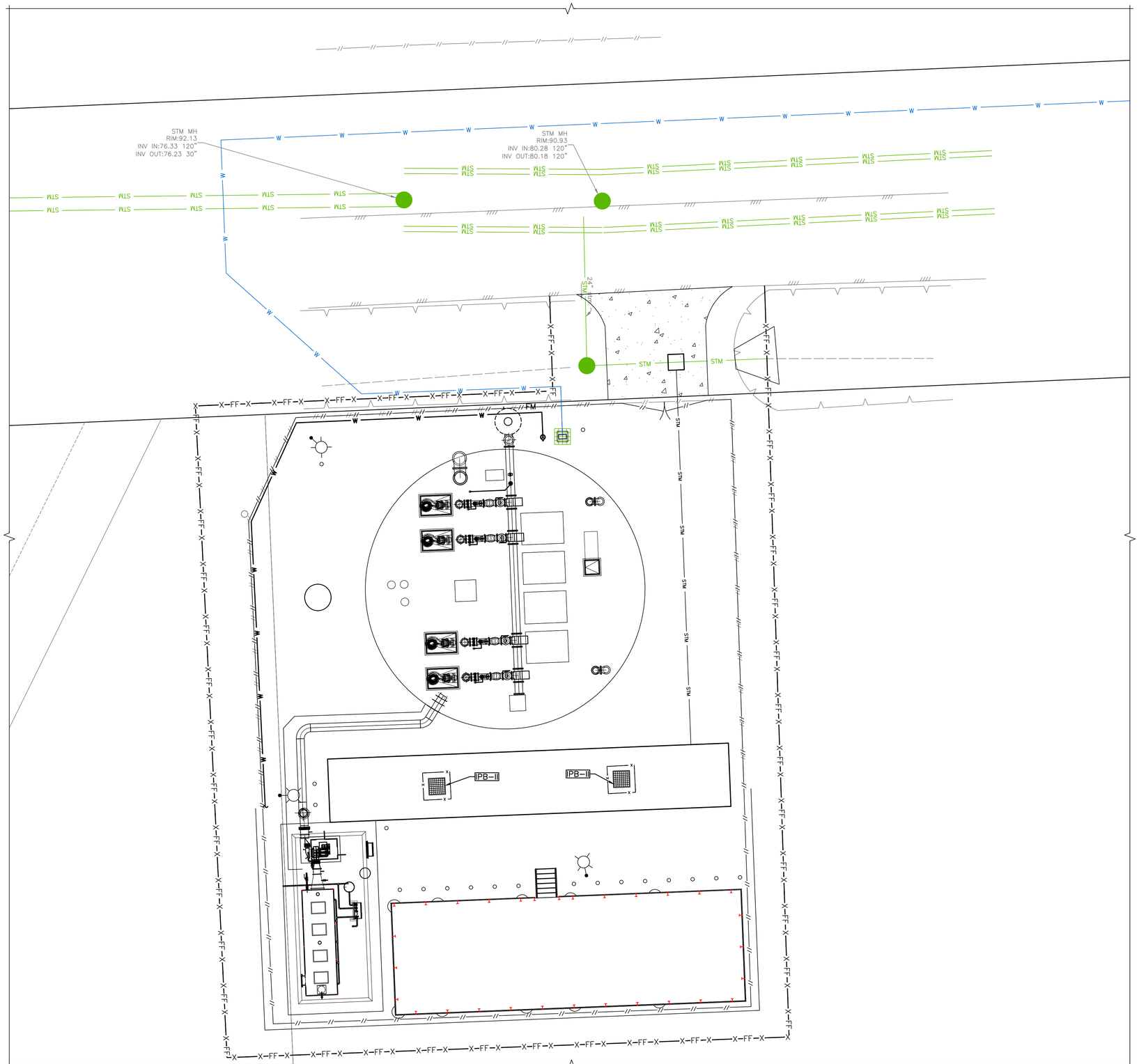
LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

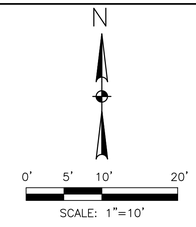
CIVIL
SHERWOOD OAKS LIFT STATION
STORM SEWER CALCULATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 100 OF 226	

C-181-108

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\Sherwood\DWGS\STORM SEWER CALCULATIONS.dwg





NOTES:

1. CONTRACTOR SHALL DECIDE WHICH AREA NEEDS TO HAVE POLLUTION PREVENTION ACCORDING TO CONSTRUCTION SEQUENCE.
2. FILTER FABRIC FENCE SHALL NOT BE PLACED ACROSS DRIVEWAYS OR SIDEWALKS ACCESSING PRIVATE PROPERTY.
3. CONTRACTOR SHALL PROTECT THE GRATE INLET ON THE DRIVEWAY ADJACENT TO THE LIFT STATION FROM ANY WATER ENCOUNTER DURING THE PROGRESS OF WORK.
4. CONTRACTOR SHALL REMOVE AND REPLACE INLET PROTECTION BARRIER PER REQUEST BY THE CITY RELATED TO SEVERE WEATHER EVENTS.

—X—FF—X— FILTER FABRIC FENCE

IPB—II TYPE 2 INLET PROTECTION BARRIER

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(713) 961-1100
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UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

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SHERWOOD OAKS LIFT STATION STORM WATER POLLUTION PREVENTION PLAN

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CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 101 OF 226	

C-181-109

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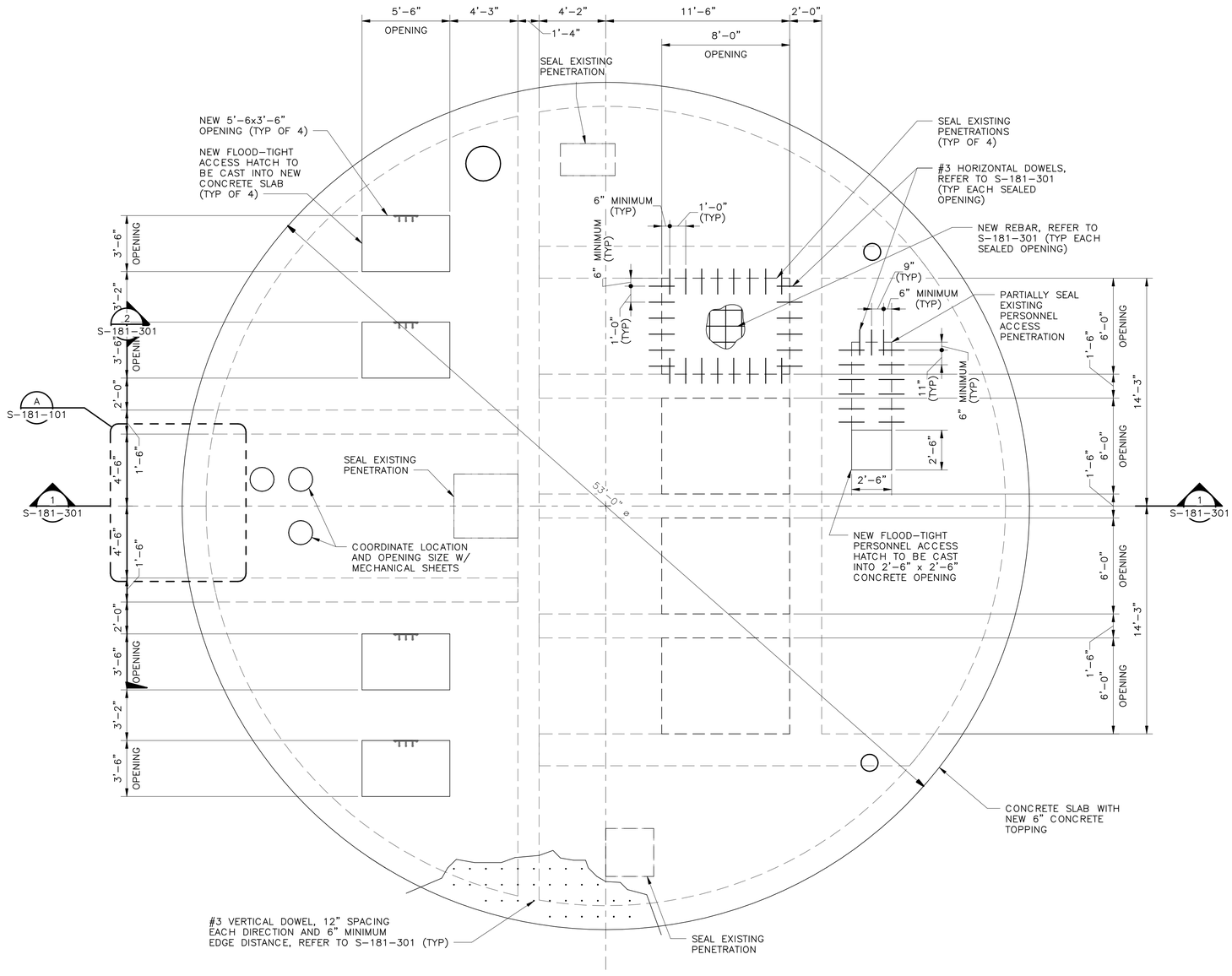
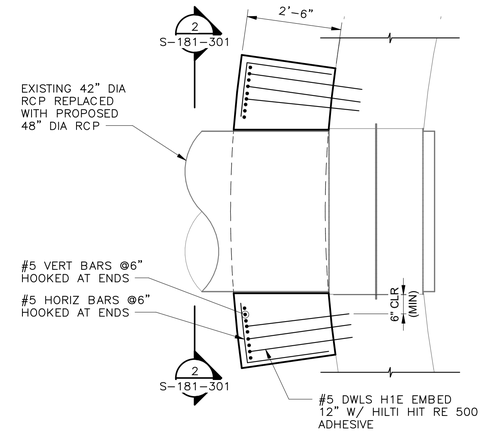


LIFT STATION PLAN @ GRADE
1/4" = 1'-0"



A ENLARGED DETAIL
S-181-101 1/2" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

N

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920 MEMORIAL CITY WAY
SUITE 600
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STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

STRUCTURAL
SHERWOOD OAKS LIFT STATION
LIFT STATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
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CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
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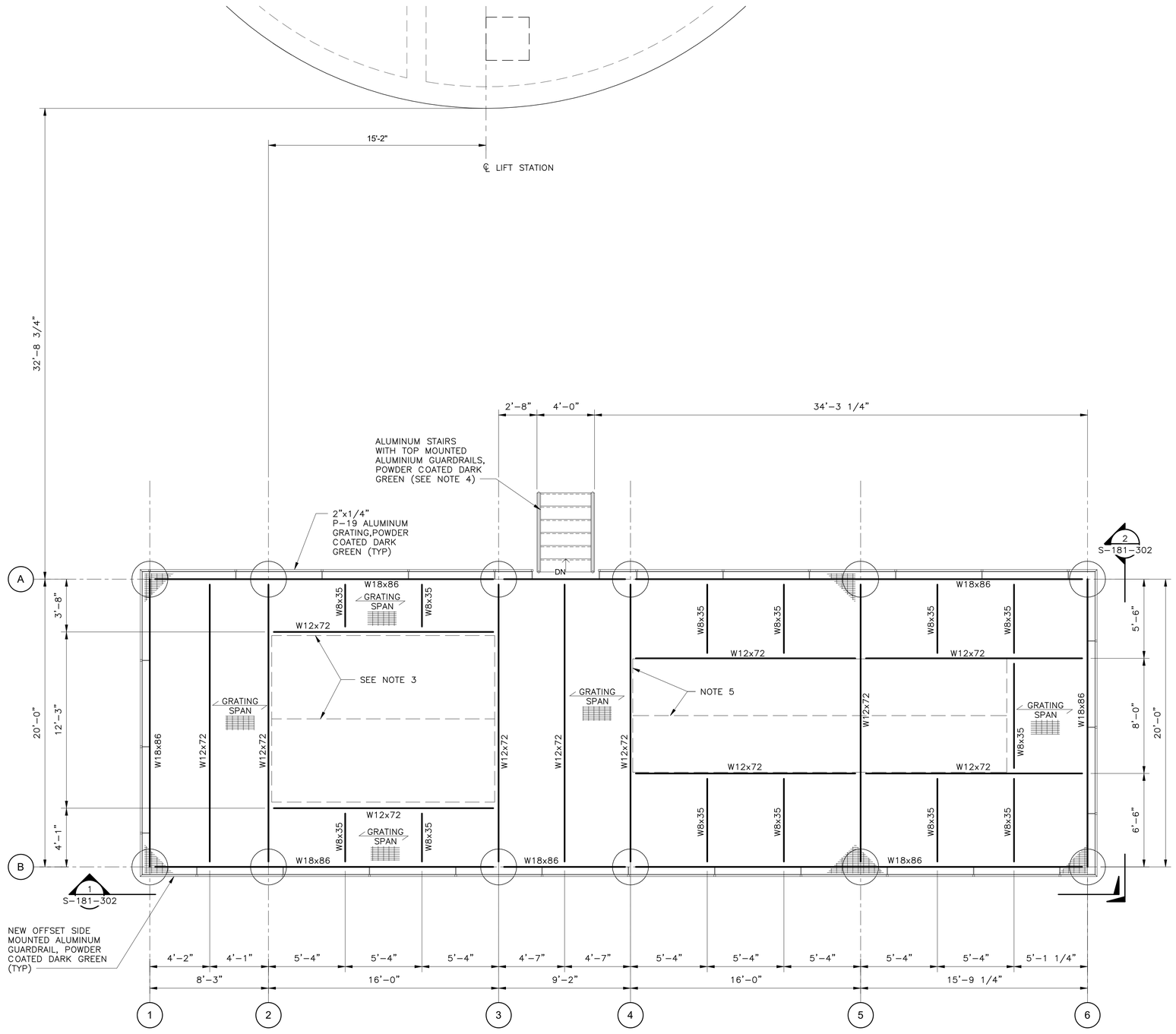

EQUIPMENT PLATFORM PLAN @ EL 98.00'

1/4" = 1'-0"

4' 2' 0' 4' 8'

1/4" = 1'-0"

N

NOTES:

1. COORDINATE STRUCTURAL SUPPORT MEMBERS AND ANCHORAGE WITH EQUIPMENT MANUFACTURER PRIOR TO FABRICATION. SEE ELECTRICAL AND MECHANICAL DRAWINGS FOR EQUIPMENT LAYOUT.
2. ALL PLATFORM BEAMS TO BE HDG STEEL.
3. PLATFORM FRAMING SHOWN HERE PROVIDES SUPPORT TO STANDARD CITY OF HOUSTON 12x16 EQUIPMENT BUILDING ALONG ALL FOUR SIDES. IF ADDITIONAL MID-SPAN SUPPORT IS REQUIRED BY BUILDING SUPPLIER, CONTRACTOR TO DESIGN AND DETAIL SUPPLEMENTAL FRAMING. FINAL CONFIGURATION TO BE REVIEWED AND APPROVED BY EOR.
4. THE RISER HEIGHTS SHALL NOT BE LESS THAN 4 INCHES OR GREATER THAN 7 INCHES. THE MINIMUM TREAD DEPTH IS 11 INCHES. STAIR TREADS AND RISERS SHALL BE OF UNIFORM SIZE AND SHAPE. THE TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTH SHALL NOT EXCEED 3/8 INCH IN A STAIRWAY FLIGHT.
5. GENERATOR FRAMING SHOWN PROVIDES SUPPORT ON SIDES FOR GENERATOR SKID. IF ADDITIONAL SUPPORT IS REQUIRED BY THE SUPPLIER, CONTRACTOR TO DESIGN AND DETAIL SUPPLEMENTAL FRAMING. FINAL CONFIGURATION TO BE REVIEWED AND APPROVED BY EOR.

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11333 CHATTERTON DR

STRUCTURAL

SHERWOOD OAKS LIFT STATION EQUIPMENT PLATFORM PLAN

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AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 103 OF 226	

S-181-102

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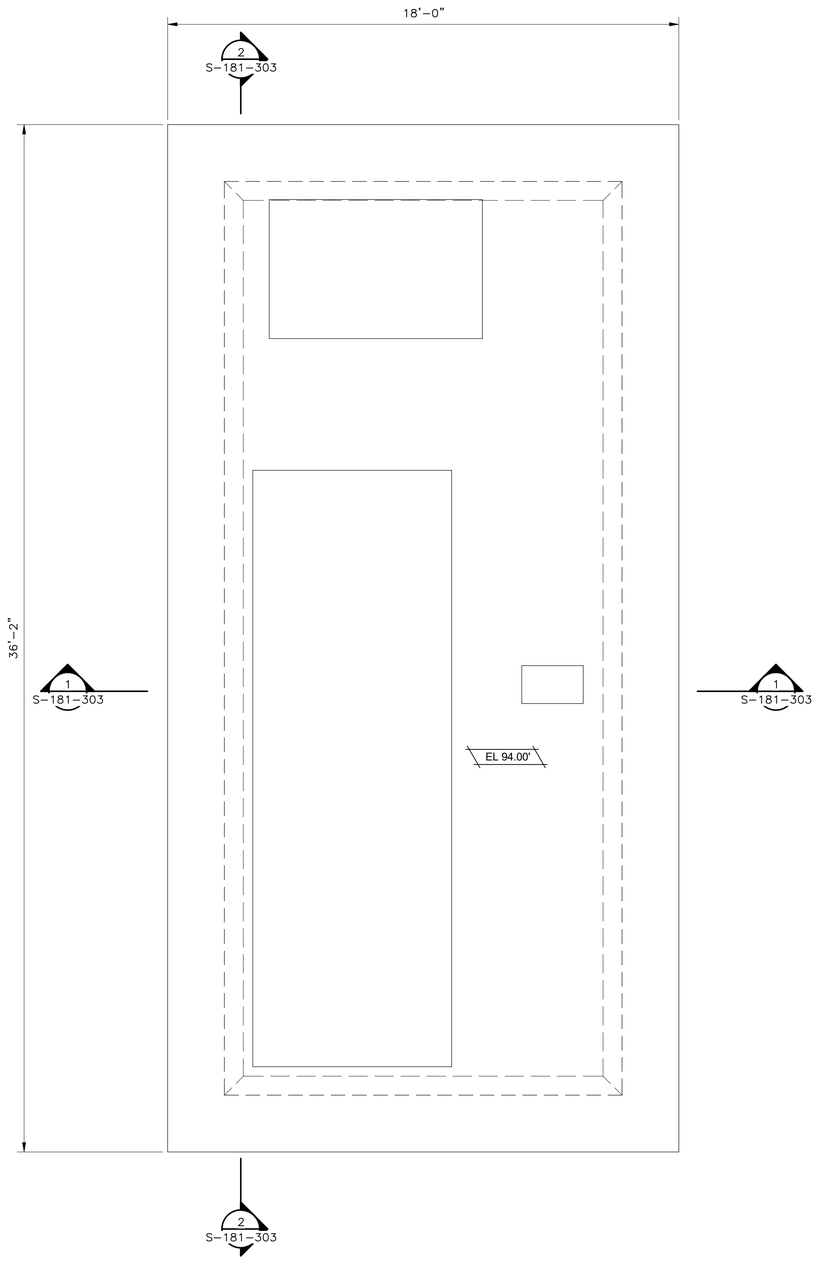

ODOR CONTROL FOUNDATION PLAN @ EL 94.00'

3/8" = 1'-0"

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

3/8" = 1'-0"

N

NOTES:

1. CONTRACTOR TO FIELD VERIFY EQUIPMENT BASE SIZES BASED ON THE EQUIPMENT FURNISHED. FOUNDATION PLAN DIMENSIONS SHOWN HERE ARE MINIMUM VALUES. FINAL CONFIGURATION TO BE REVIEWED AND APPROVED BY EOR.
2. FOR EQUIPMENT BASE DETAILS REFER TO DETAIL A ON SHEET S-000-506 AS REQUIRED.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
11333 CHATTERTON DR

STRUCTURAL

SHERWOOD OAKS LIFT STATION ODOR CONTROL FOUNDATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 104 OF 226	

S-181-103

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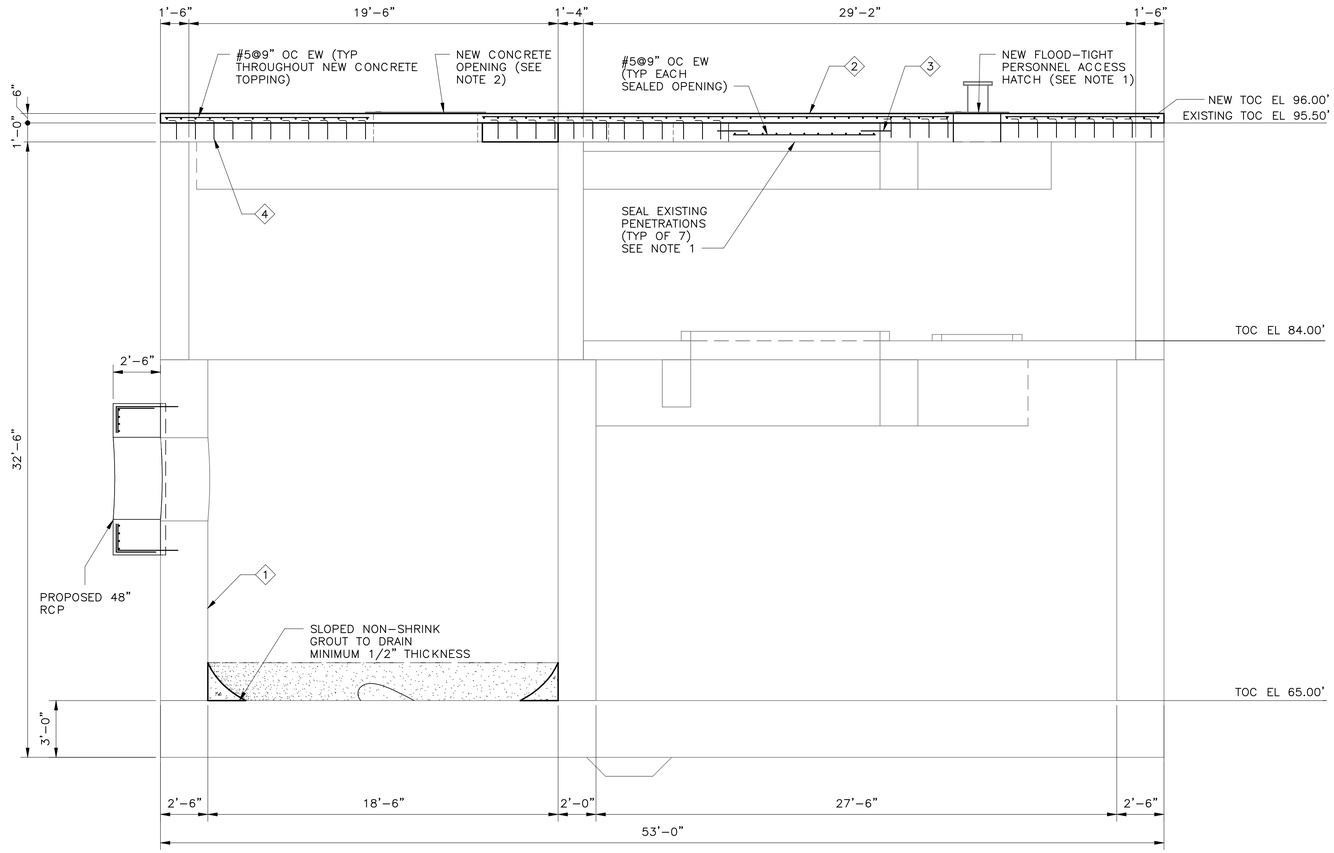
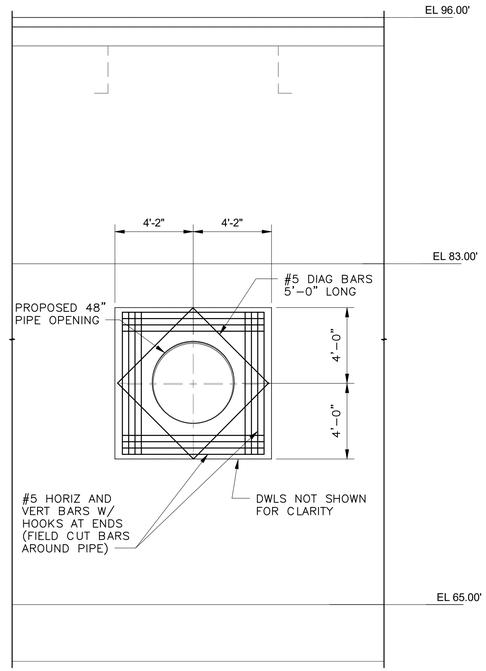


1 LIFT STATION SECTION
S–181–101 1/4" = 1'–0"



2 SECTION
S–181–101 1/4" = 1'–0"

NOTES:

1. EXISTING ANGLE FRAMING AROUND INSIDE PERIMETER OF EXISTING CONCRETE OPENINGS TO BE SAWCUT AND REMOVED PRIOR TO INSTALLATION OF WATERPROOFING, DOWELS, REBAR, NEW CONCRETE, AND/OR NEW FLOOD–TIGHT ACCESS HATCH. EXISTING CONCRETE STUDS ATTACHING TO ANGLE FRAMING TO BE CUT AND LEFT IN PLACE WHERE CONCRETE IS TO REMAIN. ANY EXISTING CONCRETE CURBS TO BE DEMOLISHED TO MAKE WAY FOR NEW CONCRETE TOPPING AND ANY NEWLY EXPOSED CONCRETE SURFACES TO BE REPAIRED AND SEALED PER SPECIFICATION SECTION 03920.
2. CONCRETE OPENING TO BE MADE PER DETAIL B ON SHEET S–000–506. AFTER OPENING IS CUT, EXPOSED CONCRETE SURFACES TO BE REPAIRED AND SEALED PER SPECIFICATION SECTION 03920.

ITEMS OF WORK	
NO.	DESCRIPTION
1	INTERIOR SURFACE OF WET WELL AND ACCESSIBLE PORTIONS OF INFLUENT MANHOLE TO BE CLEANED AND ALL SIGNS OF SURFACE DAMAGE AND/OR CRACKS TO BE REPAIRED. REFER TO SHEET S–000–513 AND SPECIFICATIONS SECTIONS 03920 AND 03930. SURFACES TO BE COATED PER COH STANDARDS.
2	ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE AND INSTALL ADDITIONAL 6 INCHES OF CONCRETE OVER LIFT STATION TOP SLAB.
3	#3 HORIZONTAL DOWEL, CENTERED WITHIN THICKNESS OF EXISTING CONCRETE SLAB, MINIMUM 7" EPOXIED EMBEDMENT INTO EXISTING CONCRETE AND CAST 12" INTO NEW CONCRETE (TYP EACH SEALED OPENING).
4	#3 VERTICAL DOWELS WITH STANDARD 90 DEGREE HOOK @12" OC EW, MINIMUM 7" EMBEDMENT INTO EXISTING CONCRETE WITH 6" MINIMUM CONCRETE EDGE DISTANCE (TYP).

4' 2' 0' 4' 8'
1/4" = 1'–0"

S–181–301

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961–1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

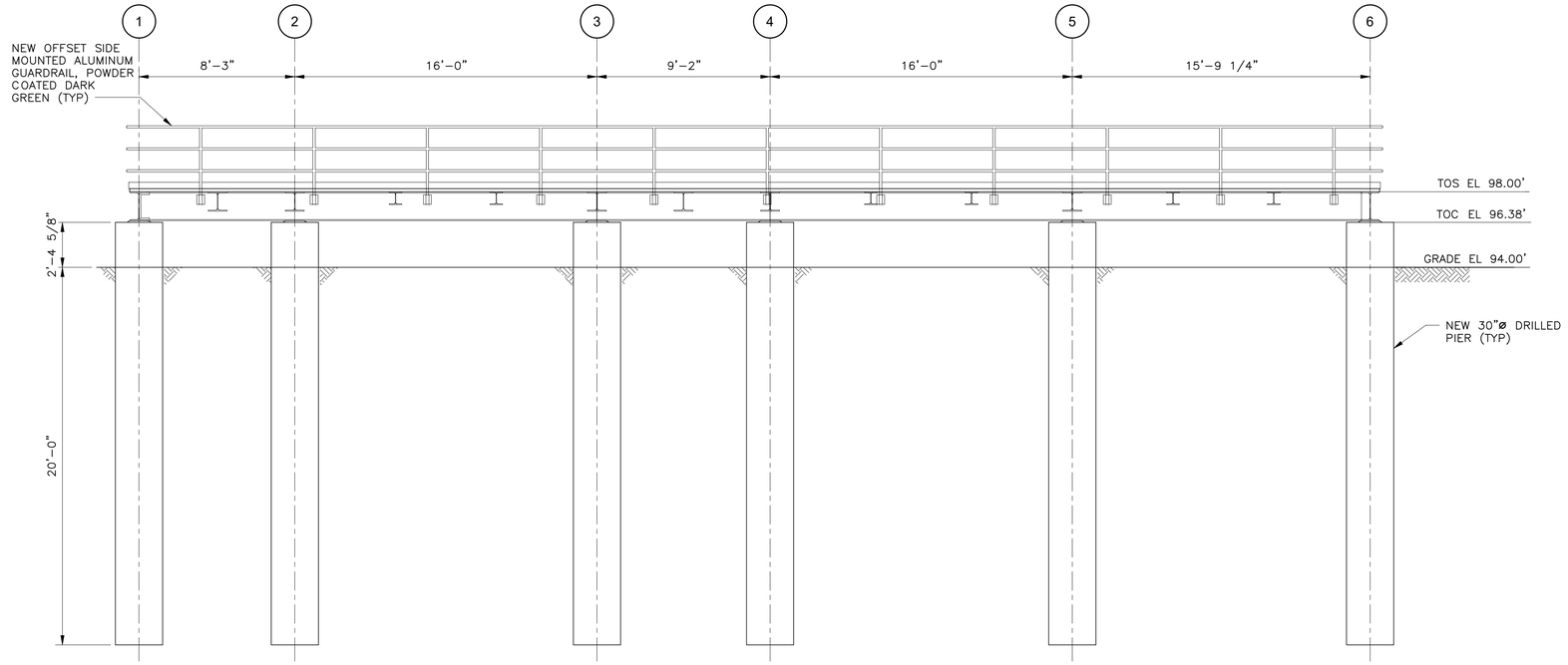
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

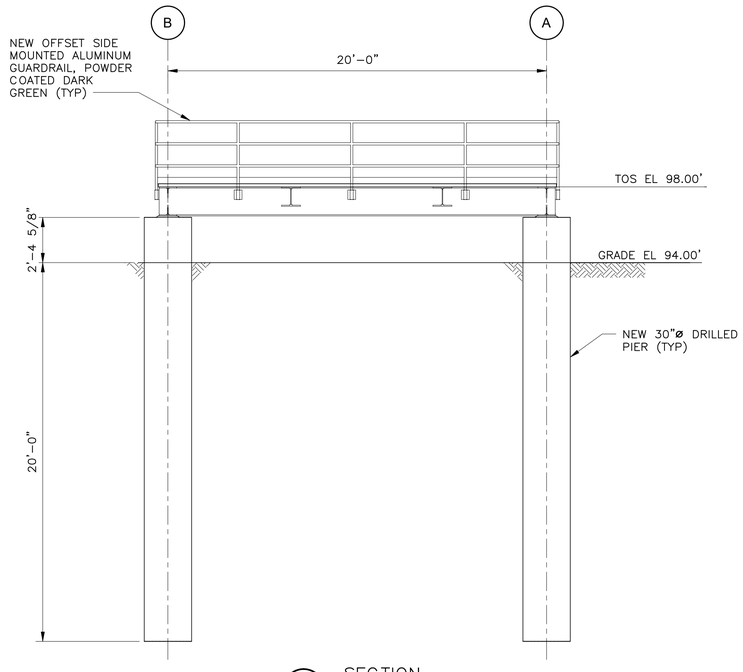
STRUCTURAL
SHERWOOD OAKS LIFT STATION
LIFT STATION SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 105 OF 226	

FILE PATH: Autodesk Docs://419473 – COH Lift Station Renew/419473–181–SHERWOOD_OAKS_LS–BV.rvt



1 SECTION
S-181-102 1/4" = 1'-0"



2 SECTION
S-181-102 1/4" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

S-181-302

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11333 CHATTERTON DR

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SHERWOOD OAKS LIFT STATION EQUIPMENT PLATFORM SECTIONS

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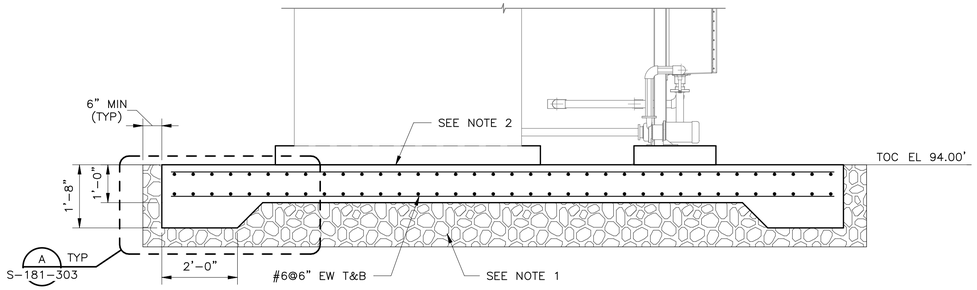
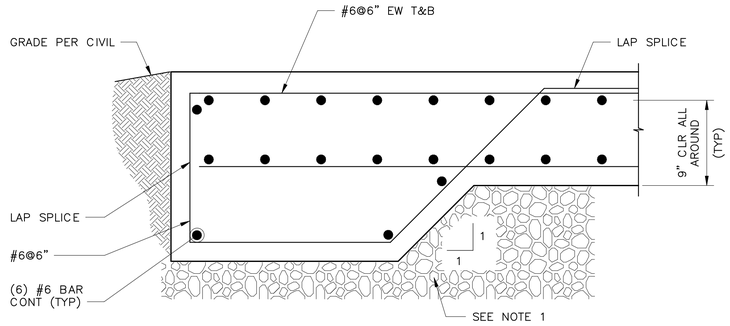
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 106 OF 226	

NOTES:

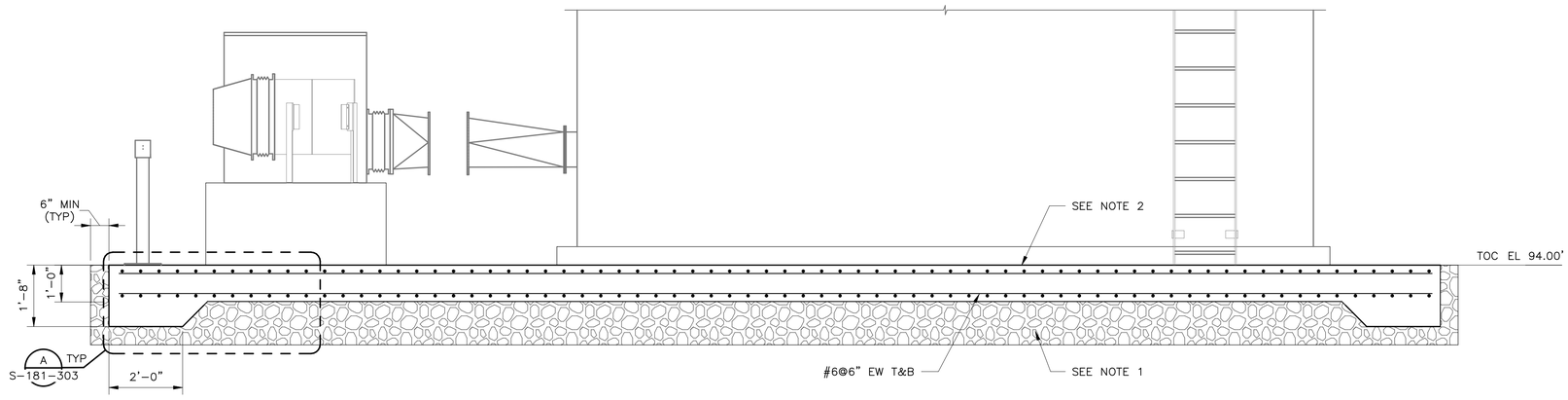
1. FOUNDATION SUBGRADE TO BE PREPARED ACCORDING TO SECTION 7.4 OF GEOTECHNICAL REPORT PREPARED BY HVJ ASSOCIATES, DATED JANUARY 10, 2025.
2. CONCRETE SURFACE PLANE TOLERANCES SHALL MEET EQUIPMENT MANUFACTURER REQUIREMENTS. ADDITIONAL CONCRETE EQUIPMENT BASES TO BE PROVIDED AS REQUIRED BY EQUIPMENT MANUFACTURER, REFER TO DETAIL A ON SHEET S-000-506.



1 SECTION
S-181-103 1/2" = 1'-0"



A DETAIL
S-181-303 1 1/2" = 1'-0"



2 SECTION
S-181-103 1/2" = 1'-0"

12" 9" 6" 3" 0" 1'
1 1/2" = 1'-0"

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

S-181-303

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LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

STRUCTURAL

SHERWOOD OAKS LIFT STATION
ODOR CONTROL FOUNDATION SECTIONS

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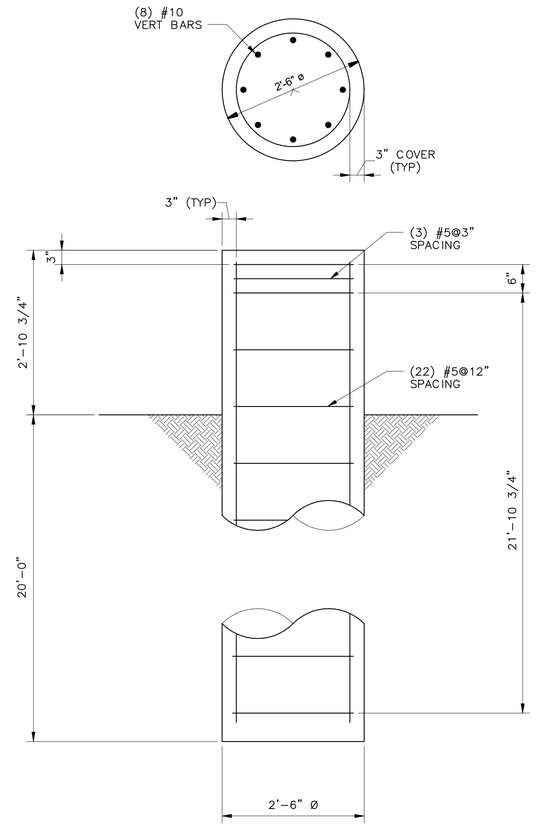

A DRILLED PIER DETAIL
3/4" = 1'-0"

12" 6" 0' 1' 2' 3'
3/4" = 1'-0"

S-181-501

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11333 CHATTERTON DR

STRUCTURAL
SHERWOOD OAKS LIFT STATION
EQUIPMENT PLATFORM DETAILS

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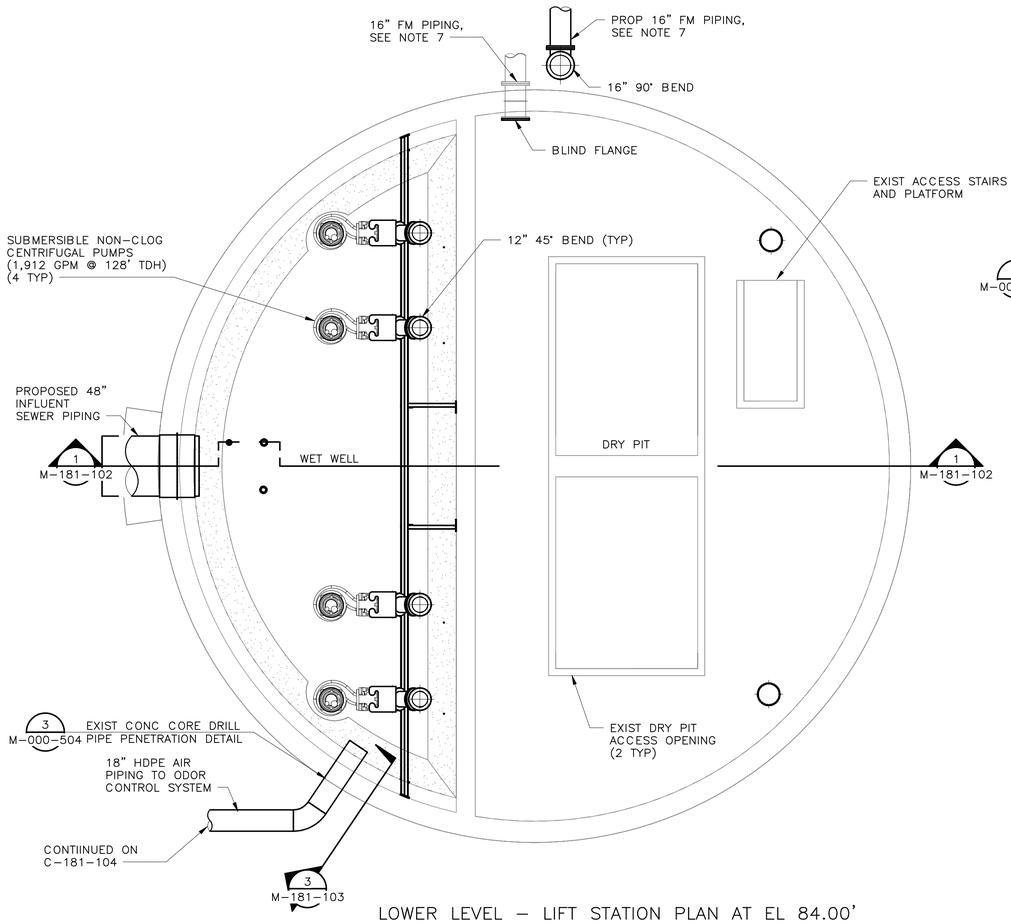
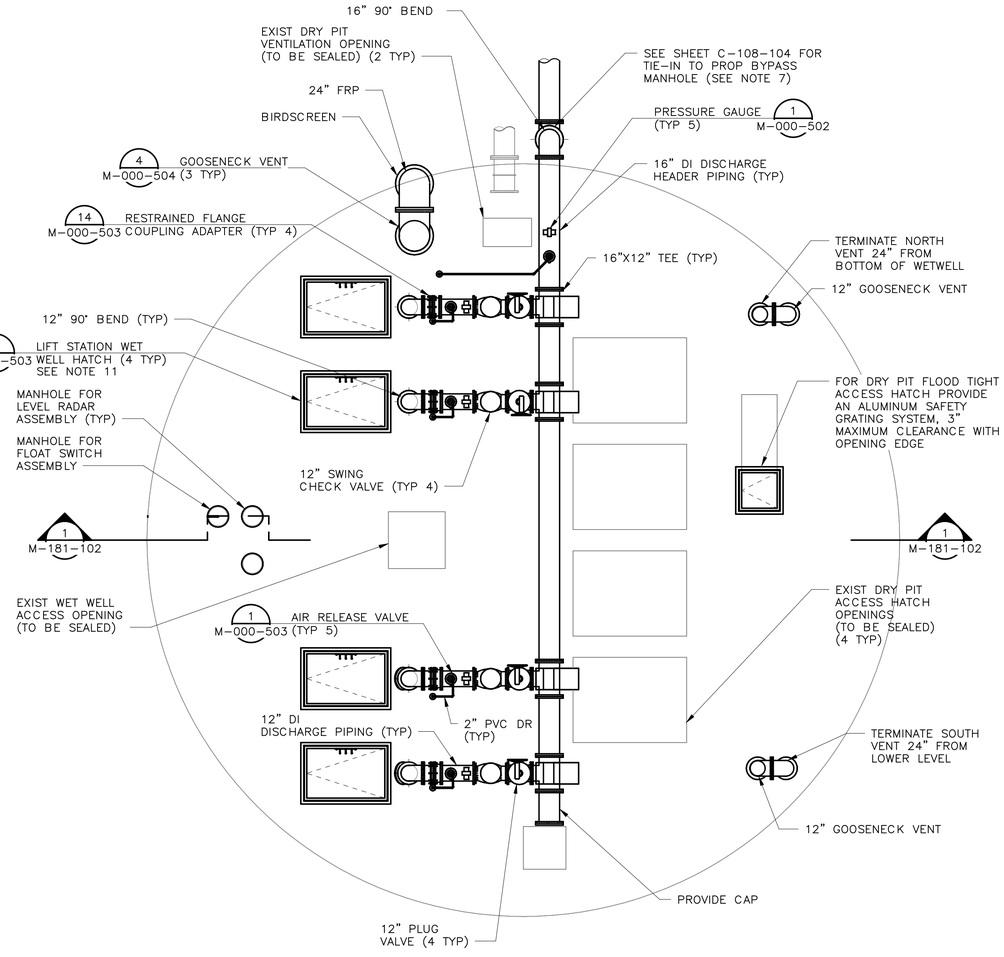


LOWER LEVEL – LIFT STATION PLAN AT EL 84.00'

3/16" = 1'-0"



OPERATING LEVEL – LIFT STATION PLAN AT EL 96.00'

3/16" = 1'-0"

6" 4' 2' 0' 5' 10'

3/16" = 1'-0"

N

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. INSTALL PLUG VALVES TO OPEN UPWARD AND TO CLOSE TO A SEATING POSITION.
4. INSTALL CHECK VALVES SO THAT THE WEIGHT LEVEL IS APPROXIMATELY 45° ABOVE THE VALVE HORIZONTAL CENTER LINE IN THE FULL OPEN POSITION.
5. SLEEVED OR CORED DISCHARGE PIPE OPENINGS SEALED WITH LINK-SEAL (OR APPROVED EQUAL), MAY BE SUBSTITUTED FOR POURED IN PLACE WALL PIPES TO ACCOMODATE CONSTRUCTION METHOD.
6. LABEL HATCHES WITH THE CORRESPONDING PUMP NUMBER USING A 12-INCH BY 12" 316SS PLATE ENGRAVED WITH 6-INCH LETTERING WELDED TO THE HATCH. LABEL VALVE NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING ADHERED TO THE TOP OF THE CHECK VALVE.
7. CONTRACTOR SHALL CONFIRM THE LOCATION, ALIGNMENT, AND DEPTH OF THE EXISTING 16" FORCE MAIN AT THE LIFT STATION STRUCTURE PRIOR TO INSTALLING THE PROPOSED ABOVEGROUND DISCHARGE PIPING.
8. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
9. ODOR CONTROL AIR PIPING SHALL BE SLOPED 2 TOWARDS THE WET WELL TO ENSURE CONDENSATE IS DRAINED AWAY FROM THE FAN.
10. GOOSENECK VENT SHALL BE FURNISHED WITH A STAINLESS STEEL BIRDSCREEN.
11. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.
12. PASSIVE VENTILATION TO FORMER DRY PIT, ONE AT EACH LEVEL.

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LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

PROCESS MECHANICAL

SHERWOOD OAKS LIFT STATION
LIFT STATION PLANS

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STATION OPERATION TABLES

RISING LEVEL CYCLE			
WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
2'–2"	67.15'	PUMPS OFF LEVEL – NO ACTION	ALL PUMPS ARE OFF
3'–2"	68.15'	LEAD PUMP TURNS ON	LEAD PUMP ON
4'–2"	69.15'	SECOND PUMP TURNS ON	LEAD & SECOND PUMPS ON
5'–2"	70.15'	THIRD PUMP TURNS ON	LEAD, SECOND, & THIRD PUMPS ON
5'–8"	70.65'	HIGH WATER ALARM ON	HIGH WATER ALARM SOUNDS
6'–2"	71.15'	HIGH HIGH LEVEL ALARM (FLOAT ON LEVEL)	DUTY PUMPS ON (FLOAT)

FALL LEVEL CYCLE			
WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
–	–	FLOAT OFF LEVEL	ALL PUMPS OFF (FLOATS)
5'–2"	70.15'	HIGH WATER LEVEL ALARM OFF	LEAD, SECOND, & THIRD PUMPS ON
4'–2"	69.15'	LEAD PUMP TURNS OFF	SECOND & THIRD PUMPS ON
3'–2"	68.15'	SECOND PUMP TURNS OFF	THIRD PUMP ON
2'–2"	67.15'	THIRD PUMP TURNS OFF	ALL PUMPS OFF – STANDBY PUMP SWITCHES TO LEAD PUMP
2'–0"	67.00'	LOW LEVEL ALARM	–

PUMP OPERATION CURVES

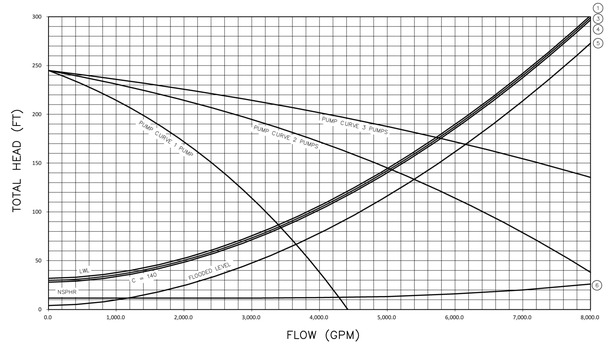
PUMP CURVE NOTES:

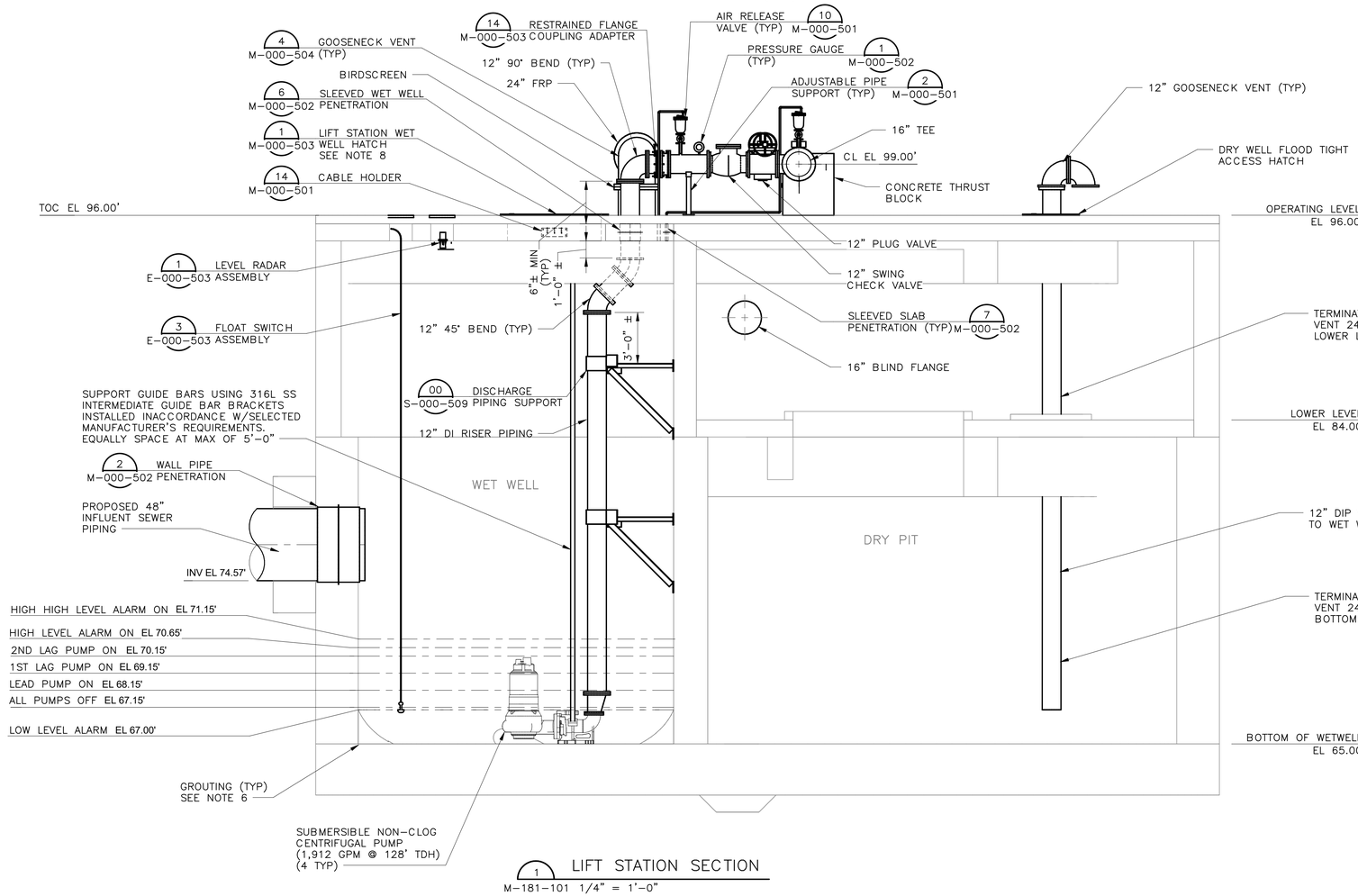
1. LOW NORMAL OPERATING LEVEL C=120 – DESIGN.
2. HIGH NORMAL OPERATING LEVEL C=100 – INFORMATION ONLY (TNRCC).
3. HIGH NORMAL OPERATING LEVEL C=120 – DESIGN.
4. HIGH NORMAL OPERATING LEVEL C=140 – INFORMATION ONLY
5. EMERGERNCY FLOODED OPERATING LEVEL C=140 – MAXIMUM DISCHARGE
6. NET POSITIVE SUCTION HEAD REQUIRED (NPSHR) BASED ON NORMAL OPERATING WATER LEVELS.
7. PUMP CURVES ARE MODIFIED FOR STATION LOSSES.

PUMP DATA TABLE

PUMP CHARACTERISTICS	PUMP NO. 1	PUMP NO. 2	PUMP NO. 3	PUMP NO. 4
MOTOR DATA NOMINAL SIZE (HP) MAX SPEED (RPM)	138.0 1,780	138.0 1,780	138.0 1,780	138.0 1,780
SOLIDS PASSAGE MIN SPHERE (IN)	3.0	3.0	3.0	3.0
CAPACITY (GPM) DESIGN	1,912	1,912	1,912	1,912
DISCHARGE HEAD (FT) DESIGN	85	143	178	178
EFFICIENCY (%) DESIGN	69	69	69	69
NPSHR (FT) DESIGN	11.7	11.7	11.7	11.7
PUMP CYCLE TIME (MIN)	15	15	15	15
CUMULATIVE CAPACITY (GPM)	3,415	5,042	5,757	NA*

*NOTE: CUMULATIVE CAPACITY PROVIDED FOR PUMP FIRM CAPACITY (N–1)





1 LIFT STATION SECTION
M-181-101 1/4" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. PUMP ANCHOR BOLTS ARE TO BE ADHESIVE TYPE, AND EMBEDDED IN CONCRETE SLAB. CONTRACTOR TO SUBMIT DESIGN OF PUMP ANCHOR BOLTS AND PATTERN INCLUDING CALCULATIONS, DURING SHOP DRAWING SUBMISSION.
4. CONTRACTOR TO PROVIDE ADHESIVE ANCHORS IN LIEU OF WEDGE ANCHORS FOR ALL SUBMERGED CONDITIONS AND SUBMIT DESIGN OF ANCHORS DURING SHOP DRAWING SUBMISSION.
5. ALL PIPING IN THE WET WELL SHALL BE FLANGED. NO FLANGED COUPLING ADAPTORS, OR VICTAULIC STYLE COUPLINGS SHALL BE PERMITTED INSIDE THE WET WELL.
6. CONTRACTOR SHALL COORDINATE WITH SUPPLIED PUMPS TO ENSURE GROUT IN WET WELL IS OUTSIDE THE MINIMUM REQUIRED CLEARANCE AREA FOR PUMPS IF THE EXISTING GROUT COINCIDES WITH THE MANUFACTURER'S MINIMUM CLEAR AREA REQUIRED AROUND THE PROPOSED PUMPS. THE EXISTING GROUT SHALL BE DEMOLISHED AND REPLACED SUCH THAT THE GROUT IS OUTSIDE THE MINIMUM CLEAR AREA AT NO ADDITIONAL COST TO THE OWNER.
7. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
8. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.

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11333 CHATTERTON DR

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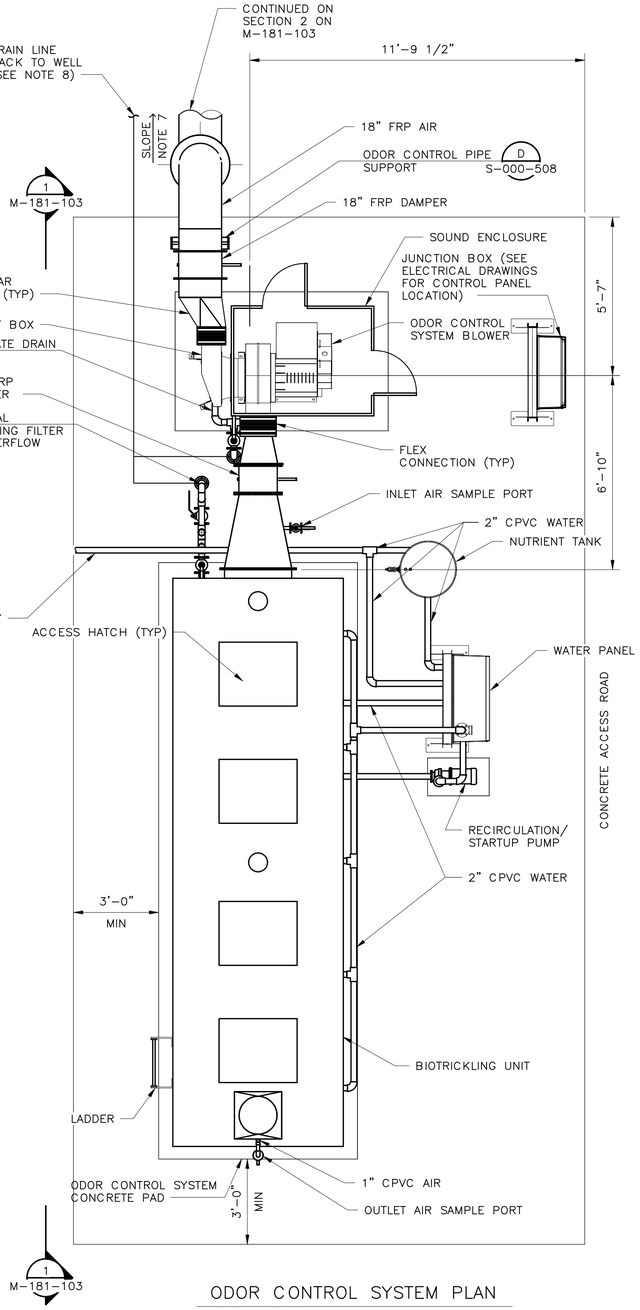
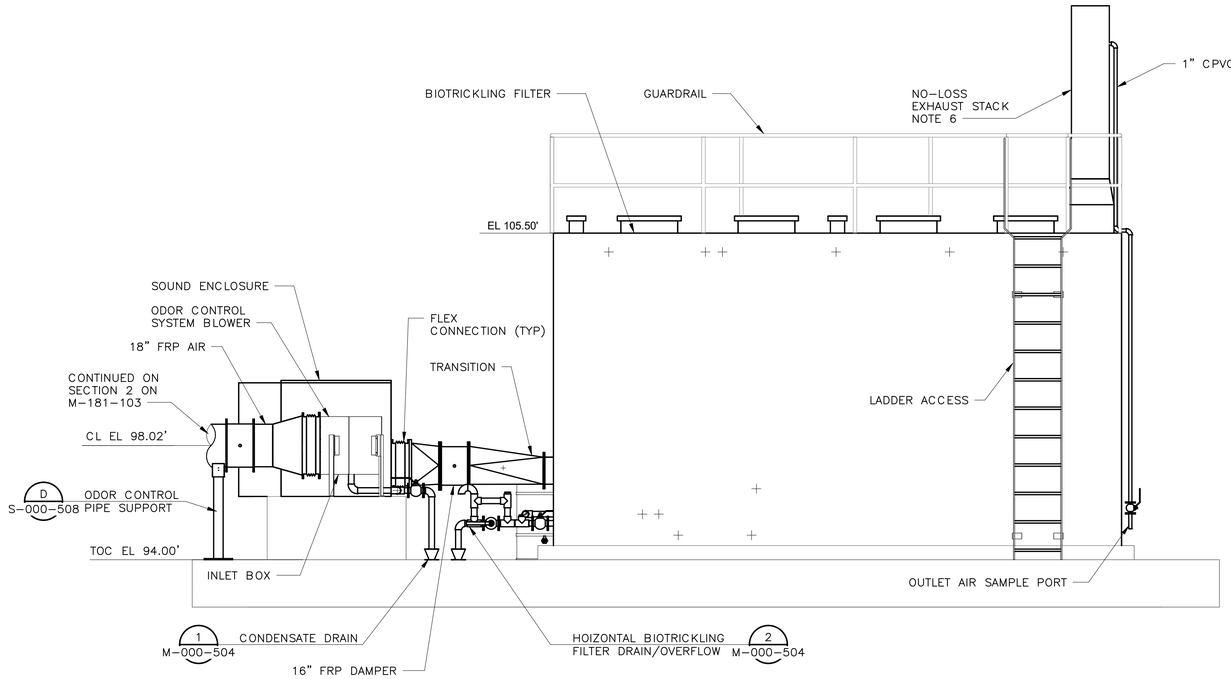


ODOR CONTROL SYSTEM PLAN
3/8" = 1'-0"



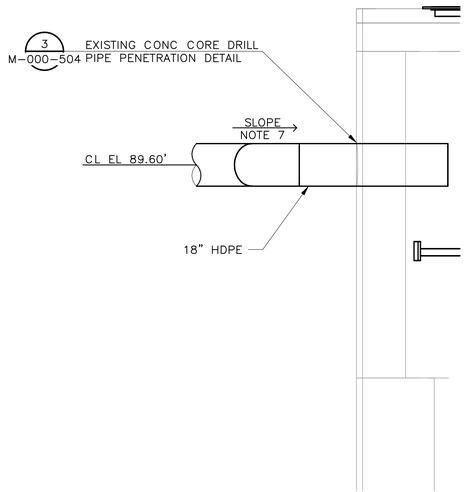
1 M-181-103 ODOR CONTROL SYSTEM SECTION
3/8" = 1'-0"

N

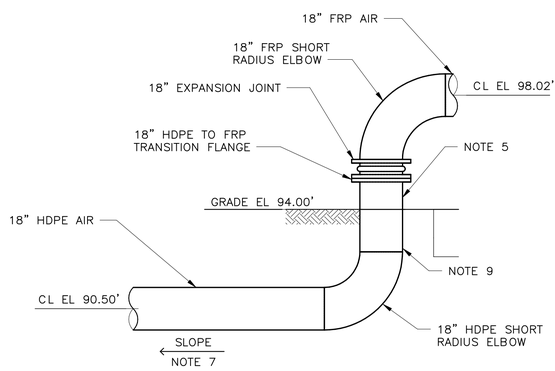
12" 0' 1' 2' 3' 4' 5' 6' 7'
3/8" = 1'-0"

NOTES:

1. FOUNDATION PAD SHALL BE FABRICATED UNIFORM IN TEXTURE AND APPEARANCE AND MEET A SURFACE OF 1/8" IN 10'.
2. REACTOR TO BE SET ON A MINIMUM 1/4" THICK, 60 DUROMETER NEOPRENE RUBBER SHEET PROVIDED BY THE CONTRACTOR.
3. THE LAYOUT SHOWN IS BASED ON ONE ODOR CONTROL SYSTEM MANUFACTURER. CONTRACTOR SHALL ADJUST THE FOUNDATION, PIPING, SUPPORTS, AND ALL THE ASSOCIATED ITEMS AS NEEDED PER THE SELECTED ODOR CONTROL SYSTEM MANUFACTURER AND PROVIDE SUBMITTALS FOR THE EQUIPMENT AT NO ADDITIONAL COST.
4. FASTEN AND SUPPORT ALL PIPING 4" DIA AND SMALLER USING STAINLESS STEEL STRUTS WITH STAINLESS STEEL HARDWARE MOUNTED TO THE CONCRETE FLOORS, PADS, DECKS, AND WALLS.
5. ALL BELOW GRADE ODOR CONTROL PIPING SHALL BE HDPE. ALL ABOVE GRADE ODOR CONTROL PIPING SHALL BE FRP.
6. THE NO-LOSS EXHAUST STACK CAP SHALL EXTEND A MINIMUM OF EIGHT FEET ABOVE THE DISCHARGE OF THE STACK.
7. ODOR CONTROL AIR PIPING SHALL BE SLOPED 2 PERCENT TOWARDS THE WET WELL TO ENSURE CONDENSATE IS DRAINED AWAY FROM THE FAN.
8. CONTRACTOR SHALL FIELD ROUTE DRAIN LINE BACK TO LIFT STATION WET WELL. PIPE SHALL BE SLOPED BACK TO THE WET WELL AT A CONSTANT ANGLE.
9. UNDERGROUND PIPING TO HAVE AT LEAST 18" CLEARANCE BETWEEN THE EDGE OF PIPE AND THE EDGE OF PLATFORM.



3 M-181-101 ODOR CONTROL PIPING PENETRATION THROUGH WETWELL
3/8" = 1'-0"



2 C-181-103 ODOR CONTROL PIPE GROUND PENETRATION
3/8" = 1'-0"

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AIR DEVICE SCHEDULE

SYMBOL	MANUFACTURER	MODEL	FRAME/BORDER	MODULE SIZE	MATERIAL	FINISH	DAMPER TYPE	NOTES
SG-1	BARD	SGR-3W	SURFACE MOUNT	28 X 14	STEEL	POWDER WHITE	---	
RG-1	BARD	RGR-3W	SURFACE MOUNT	28 X 8	STEEL	POWDER WHITE	---	

LOUVER AND DAMPER SCHEDULE

UNIT NUMBER	LOCATION	MANUFACTURER	MODEL	TYPE	NOMINAL SIZE (WIDTH x HEIGHT)	OPERATOR	APPROX WEIGHT (LBS)	NOTES
L-1	CONTROL BUILDING	RUSKIN	EME3625MD	HURRICANE PRONE LOUVER	32 X 32	---	---	1,2,3,4
L-2	CONTROL BUILDING	RUSKIN	EME3625MD	HURRICANE PRONE LOUVER	28 X 28	---	---	1,2,3,4
D-1	CONTROL BUILDING	RUSKIN	CBD4	BACKDRAFT	32 X 32	---	---	5
D-2	CONTROL BUILDING	RUSKIN	CBD4	BACKDRAFT	20 X 20	---	---	5

SCHEDULE NOTES:

WALL MOUNTED AIR CONDITIONING UNIT:

CAPACITY NOTE: CAPACITIES LISTED IN PARENTHESES ARE IN UNITS OF "KW". CAPACITIES LISTED WITHOUT PARENTHESES ARE IN UNITS OF "BTUH".

OUTDOOR COIL ENTERING AIR TEMPERATURE:
COOLING - 109°F DESIGN/ O°F MIN
HEATING - 27°F DESIGN

NOTES:
1. SINGLE ZONE WALL PACKAGE A/C UNIT.
2. ECM INDOOR FAN MOTOR TO ALLOW BALANCING OF CONSTANT SPEED DIRECT DRIVE FAN.
3. INTEGRAL DEHUMIDIFICATION MODE.
4. FILTER VELOCITY SHALL NOT EXCEED 350 FEET PER MINUTE.
5. MERV-8 2" PLEATED FILTERS.
6. INTEGRAL FREE COOLING ECONOMIZER
7. LOW AMBIENT KIT AND CONTROLS
8. LC6000 CONTROLLER
9. R-454B LOW GWP A2L REFRIGERANT.

AIR DEVICE SCHEDULE:

NOTE: NONE

FAN SCHEDULE:

FAN TYPE ABBREVIATIONS:
WF - WALL FAN

WHEEL TYPE ABBREVIATIONS:
P - PROPELLER

NOTES:
1. BACKDRAFT DAMPER, SEE DAMPER SCHEDULE.
2. VARI-GREEN MOTOR WITH WALL-MOUNTED ON/OFF SWITCH.
3. ALUMINUM WHEEL.

LOUVER AND DAMPER SCHEDULE:

NOTES:
1. COMPLIANT WITH AMCA 550 SECTION 315.1.1, 2021 UMC; SECTION 1604.5, 2021 IBC WITH HOUSTON AMENDMENTS FOR WIND AND RISK CATEGORIES.
2. 316 SS BIRD SCREEN 1/2" SIZE.
3. 53% MIN. FREE AREA.
4. WIND-DRIVEN RAIN RESISTANT STATIONARY LOUVER.
5. COUNTERBALANCED EXTRUDED ALUMINUM BACKDRAFT DAMPER. SET AT 0.1" W.C.

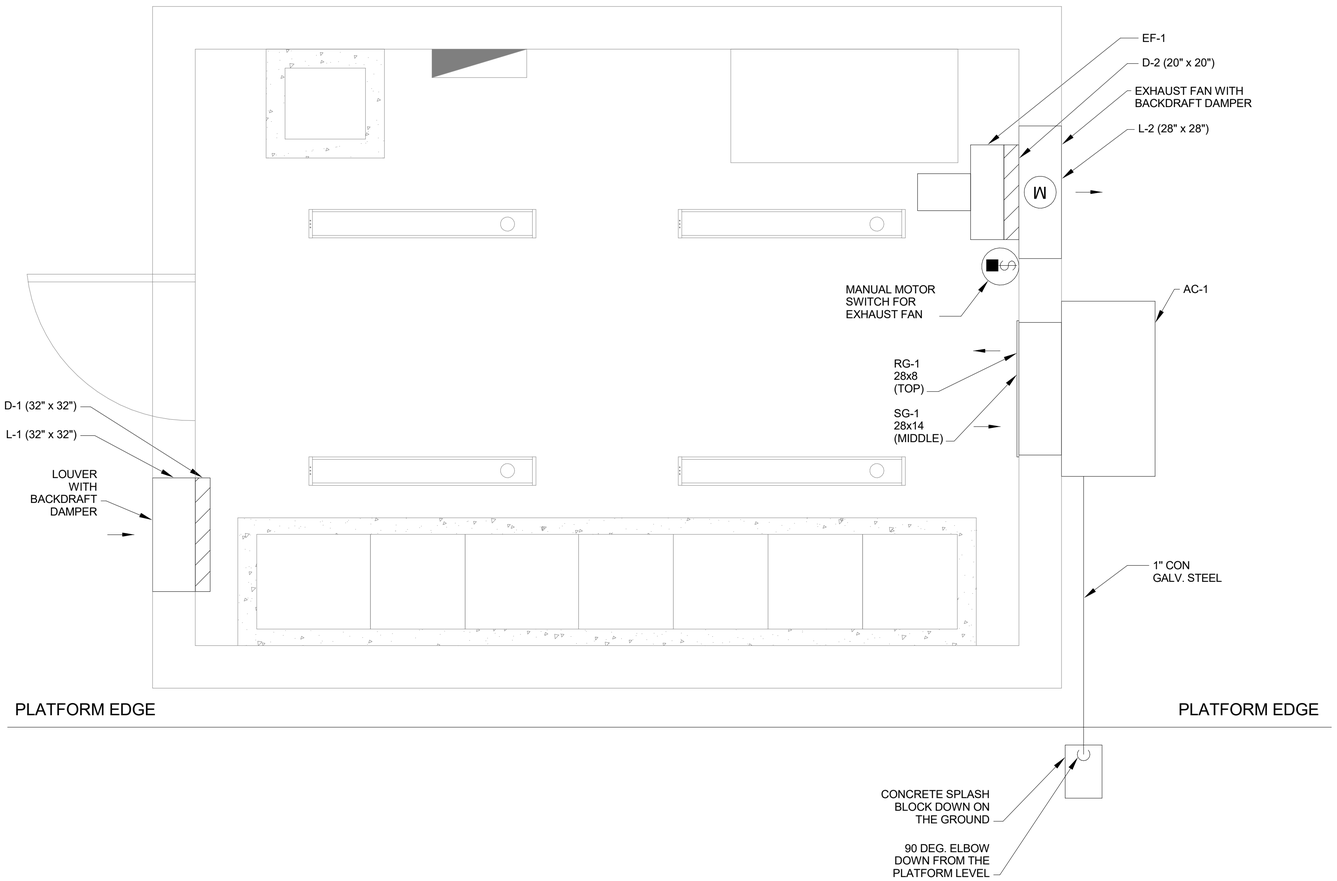
N

WALL MOUNTED AIR CONDITIONING UNIT

UNIT NUMBER	LOCATION	MANUFACTURER	MODEL	INDOOR FAN				POWER SUPPLY		MINIMUM CIRCUIT AMPACITY	COOLING					HEATING				DISCHARGE DIRECTION	ARI MINIMUM EFFICIENCY	OA (CFM)	FILTER DATA		ECONOMIZER DATA		APPROX WEIGHT (LBS)	NOTES
				AIRFLOW (CFM)	ESP (IN WG)	MOTOR HP	DRIVE	VOLTS	PHASE		EAT (FDB)	EAT (FWB)	CAPACITY (BTUH) SENSIBLE	CAPACITY (BTUH) TOTAL	MIN CAPACITY STAGES	EAT	TYPE	CAPACITY (BTUH OR (KW))	MINIMUM HEAT STAGES				TYPE	THICKNESS (IN)	TYPE	CONTROLS		
AC-1	CONTROL BUILDING	BARD	WR35F-A05EPXX3X	900	0.5	1/2	DIRECT	240	1	29	80	68	22000	26000	2	60	ELECTRIC	5	1	HORIZONTAL	11	1200	PLEATED	2	POWER EXHAUST	DIFFERENTIAL ENTHALPY	500	1,2,3,4,5,6,7,8,9

FAN SCHEDULE

UNIT NUMBER	LOCATION	MANUFACTURER	MODEL	FAN TYPE	AIRFLOW (CFM)	ESP (IN WC)	BRAKE HP	MOTOR HP	POWER SUPPLY VOLTS	POWER SUPPLY PHASE	MINIMUM WHEEL DIA (IN)	WHEEL TYPE	DRIVE	VIBRATION ISOLATION	APPROX WEIGHT(LBS)	NOTES
EF-1	CONTROL BUILDING	GREENHECK	SE1-14-436-VG	WF	2000	0.375	0.3	1/2	240	1	14	P	DIRECT	INTERNAL	40	1,2,3



HVAC PLAN
3/4"=1'-0"

BLACK & VEATCH

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(713) 961-1100
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FB NO. P-6182

STATE OF TEXAS
SERGEY S. PETROV
147847
LICENSED PROFESSIONAL ENGINEER
10.20.2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

HVAC
SHERWOOD OAKS LIFT STATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 112 OF 226	

H-181-501

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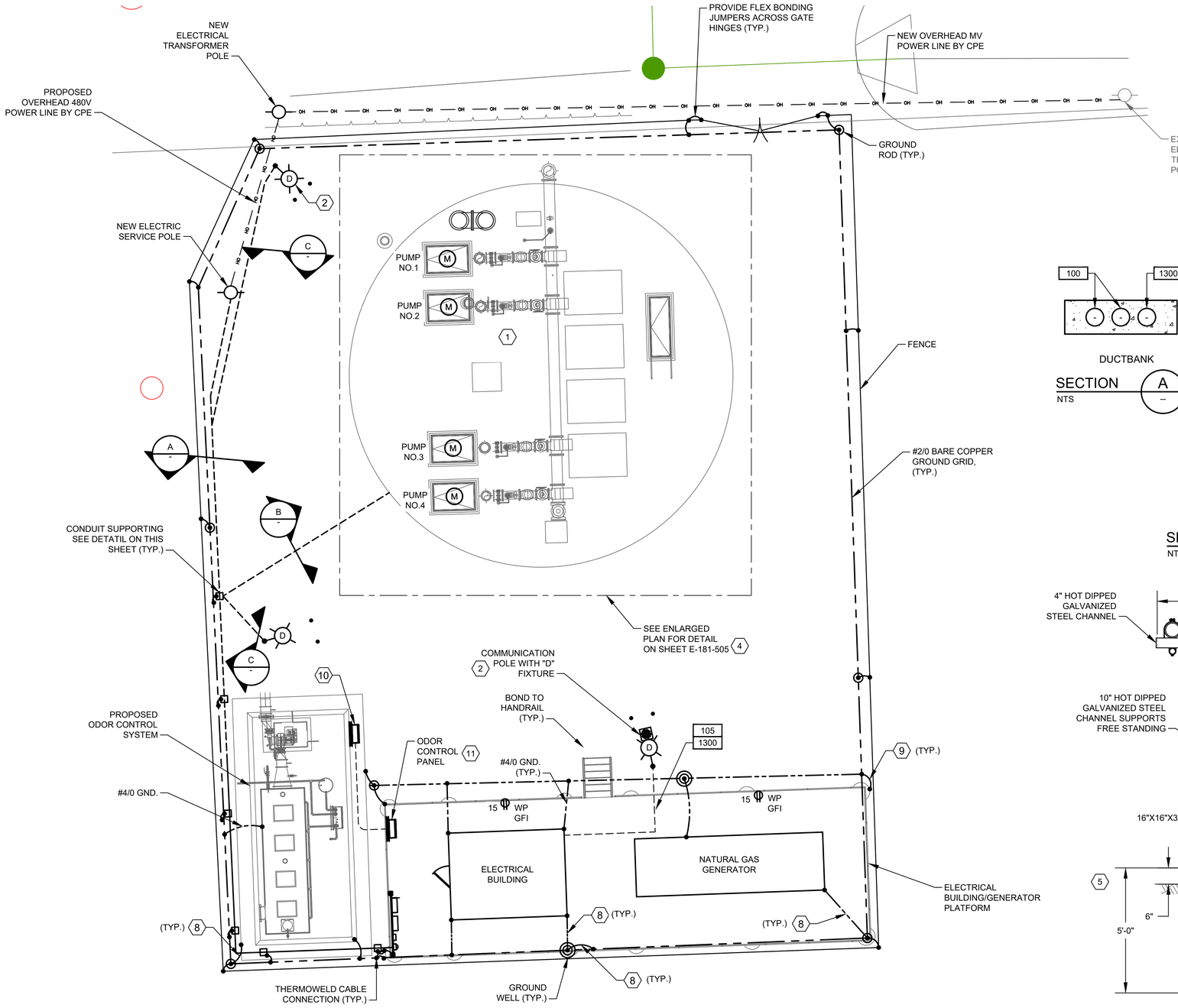
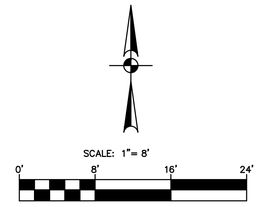
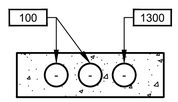


SHERWOOD OAK LIFT STATION
ELECTRICAL PROPOSED SITE

PLAN

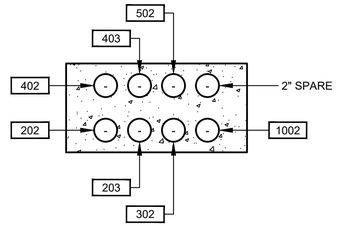
1" = 8'-0"





DUCTBANK

SECTION A
NTS



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SECTION B
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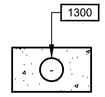

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SECTION C
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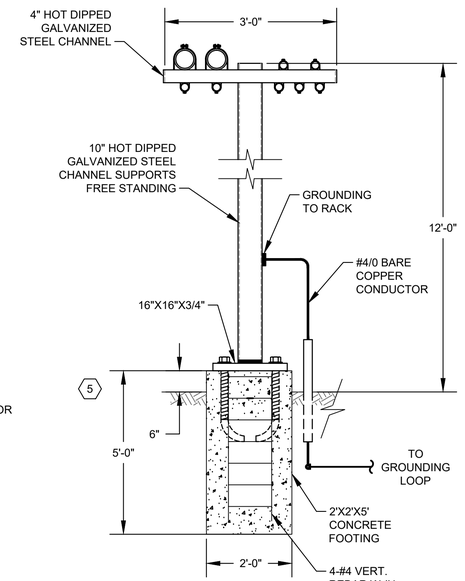

CONDUIT SUPPORTING

DETAIL 1
NTS

NOTES BY SYMBOL "⟨#⟩":

1. THE ELECTRICAL INSTALLATION IN THE WET WELL SHALL BE EXPLOSION PROOF, IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR CLASS I, DIVISION 1 LOCATIONS.
2. YARD LIGHT CONTROLLED BY LIGHTING SWITCH.
3. DUSK TO DAWN PHOTOCELL CONTROL.
4. INSIDE WETWELL RATED NEMA CLASS 1, DIV. 1. OUTSIDE ABOVE GROUND, AROUND WETWELL RATED CLASS 1, DIV. 2 ACCORDING TO NFPA 820.
5. GROUNDING LOOP SHALL BE BURIED 30" BELOW FINISHED GRADE.
6. AREA LIGHTING MOUNTED ON PLATFORM. REFER TO SHEET E-281-504 FOR ELECTRICAL EQUIPMENT LAYOUT DETAIL.
7. CONDUIT TO BE INSTALLED BELOW PLATFORM.
8. #4/0 BARE COPPER GROUNDING CONDUCTOR.
9. BOND REBAR IN CONCRETE FOOTER OR GROUND LOOP.
10. NEMA 6P 16"X16"X8"JUNCTION BOX FOR WIRE EXTENSION TO NEW LOCATION OF ODOR CONTROL PANEL.
11. RELOCATE ODOR CONTROL PANEL ON THE PLATFORM. CONTRACTOR SHALL BE RESPONSIBLE FOR THE WIRE EXTENSION OF BOTH POWER AND CONTROL.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

ELECTRICAL

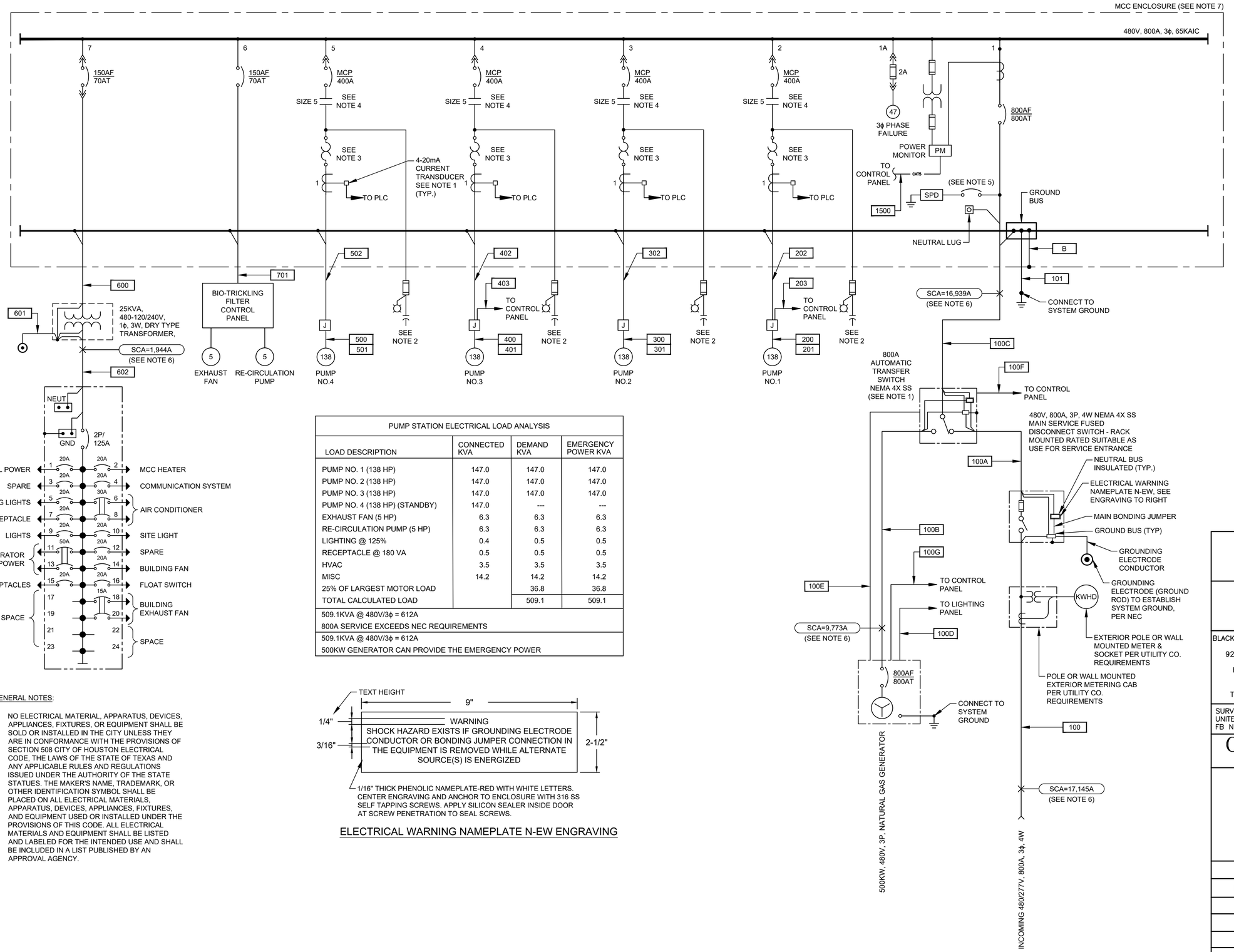
SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
PROPOSED SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-181-101

SHEET NO. 113 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak E-181-101.dwg



PUMP STATION ELECTRICAL LOAD ANALYSIS			
LOAD DESCRIPTION	CONNECTED KVA	DEMAND KVA	EMERGENCY POWER KVA
PUMP NO. 1 (138 HP)	147.0	147.0	147.0
PUMP NO. 2 (138 HP)	147.0	147.0	147.0
PUMP NO. 3 (138 HP)	147.0	147.0	147.0
PUMP NO. 4 (138 HP) (STANDBY)	147.0	---	---
EXHAUST FAN (5 HP)	6.3	6.3	6.3
RE-CIRCULATION PUMP (5 HP)	6.3	6.3	6.3
LIGHTING @ 125%	0.4	0.5	0.5
RECEPTACLE @ 180 VA	0.5	0.5	0.5
HVAC	3.5	3.5	3.5
MISC	14.2	14.2	14.2
25% OF LARGEST MOTOR LOAD		36.8	36.8
TOTAL CALCULATED LOAD		509.1	509.1
509.1KVA @ 480V/3ϕ = 612A			
800A SERVICE EXCEEDS NEC REQUIREMENTS			
509.1KVA @ 480V/3ϕ = 612A			
500KW GENERATOR CAN PROVIDE THE EMERGENCY POWER			

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ELECTRICAL WARNING NAMEPLATE N-EW ENGRAVING

NOTES:

1. PROVIDE 5A PRIMARY TO 4-20mA CURRENT TRANSDUCER.
2. CONTRACTOR TO COORDINATE POWER FACTOR CORRECTION CAPACITOR SIZE WITH PUMP MANUFACTURER. MINIMUM 95% POWER FACTOR CORRECTION AT FULL LOAD. MOUNT CAPACITORS EXTERNAL ABOVE MCC ON THE APPROPRIATE SECTION.
3. COMBINATION OF CT AND OVERLOAD RELAY AS REQUIRED.
4. STARTER NEMA SIZE 3 OR GREATER SHALL BE VACUUM TYPE.
5. PROVIDE BREAKER ACCORDING TO MANUFACTURER'S REQUIREMENTS.
6. POINT TO POINT METHOD IS USED FOR SHORT CIRCUIT CURRENT CALCULATION.
7. CONTRACTOR SHALL PROVIDE A PERMANENTLY AFFIXED LABEL (2" X 3") SHOWING THE AVAILABLE FAULT CURRENT AND CALCULATION DATE. THE LABEL SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND.
8. THE INSULATION TYPES OF ALL ELECTRICAL CONDUCTOS USED IN THE PROJECT HAVE BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS (16120, 16121, AND 16122). THE TYPES OF CONDUITS USED IN THE PROJECT HAS BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS 16111.
9. THE INFORMATION IS PROVIDED BY GENERATOR MANUFACTURER (CUMMINS).
10. REFER TO INSTRUMENTATION DRAWINGS I-181-609, I-181-610, I-181-611, I-181-621, FOR PUMP CONTROL SCHEMATIC.

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
ONE-LINE DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-181-701

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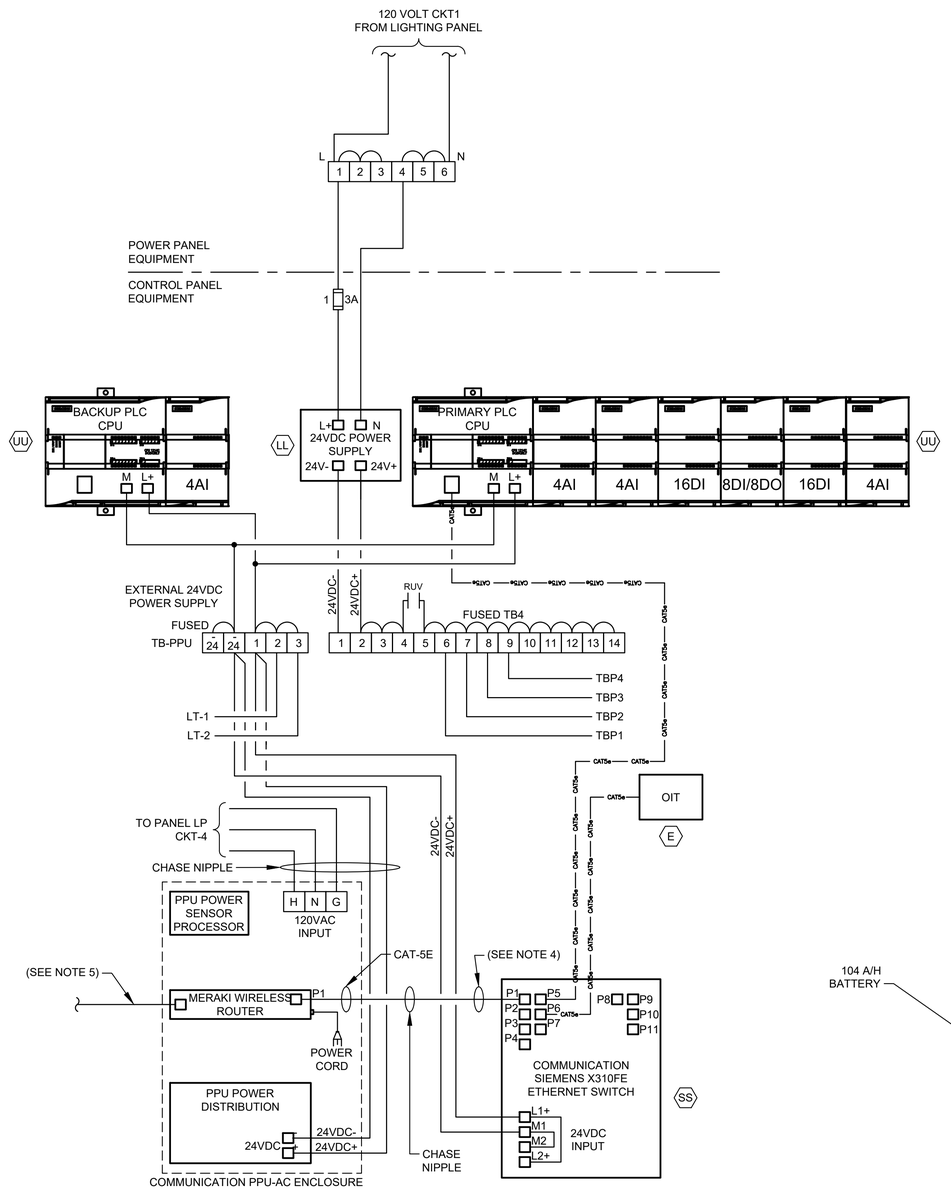
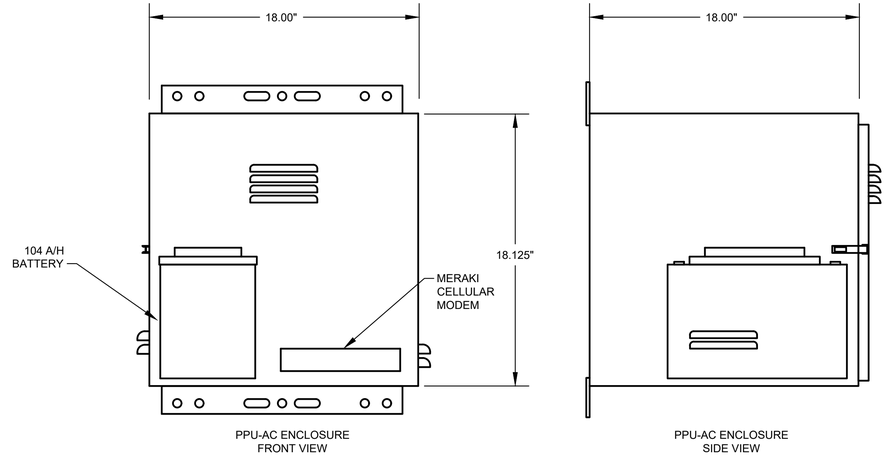


CONTROL POWER &
COMMUNICATIONS WIRING

DIAGRAM

NTS

(SEE NOTE 2 & 6)



PPU-AC ENCLOSURE
FRONT VIEW

PPU-AC ENCLOSURE
SIDE VIEW

PPU-AC
CONTROL ENCLOSURE

ELEVATION

NTS

(SEE NOTE 6 & 7)

NOTES:

1. FOR DESCRIPTION AND RATINGS OF ITEMS INDICATED WITH ITEM TAG, SEE DEVICE RATINGS SCHEDULE.
2. REFER TO SPEC SECTION 16120 FOR CONDUCTOR COLOR CODE.
3. THE PLC POWER SUPPLY SHALL FEED THE 24VDC I/O.
4. ETHERNET CABLE FOR MERAKI CELLULAR ROUTER (P1)
5. POE CABLE TO RADIO.
6. COMMUNICATION PPU-AC & SCADA SHALL BE PROVIDED BY CONTRACTOR INCLUDING TO RUN CONDUITS & WIRES.
7. COORDINATE WITH VENDOR TO PROVIDE PROPER VENTILATION WHERE APPLICABLE.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

ELECTRICAL

SHERWOOD OAKS LIFT STATION 11333 CHATTERTON DR. COMMUNICATION DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-181-702

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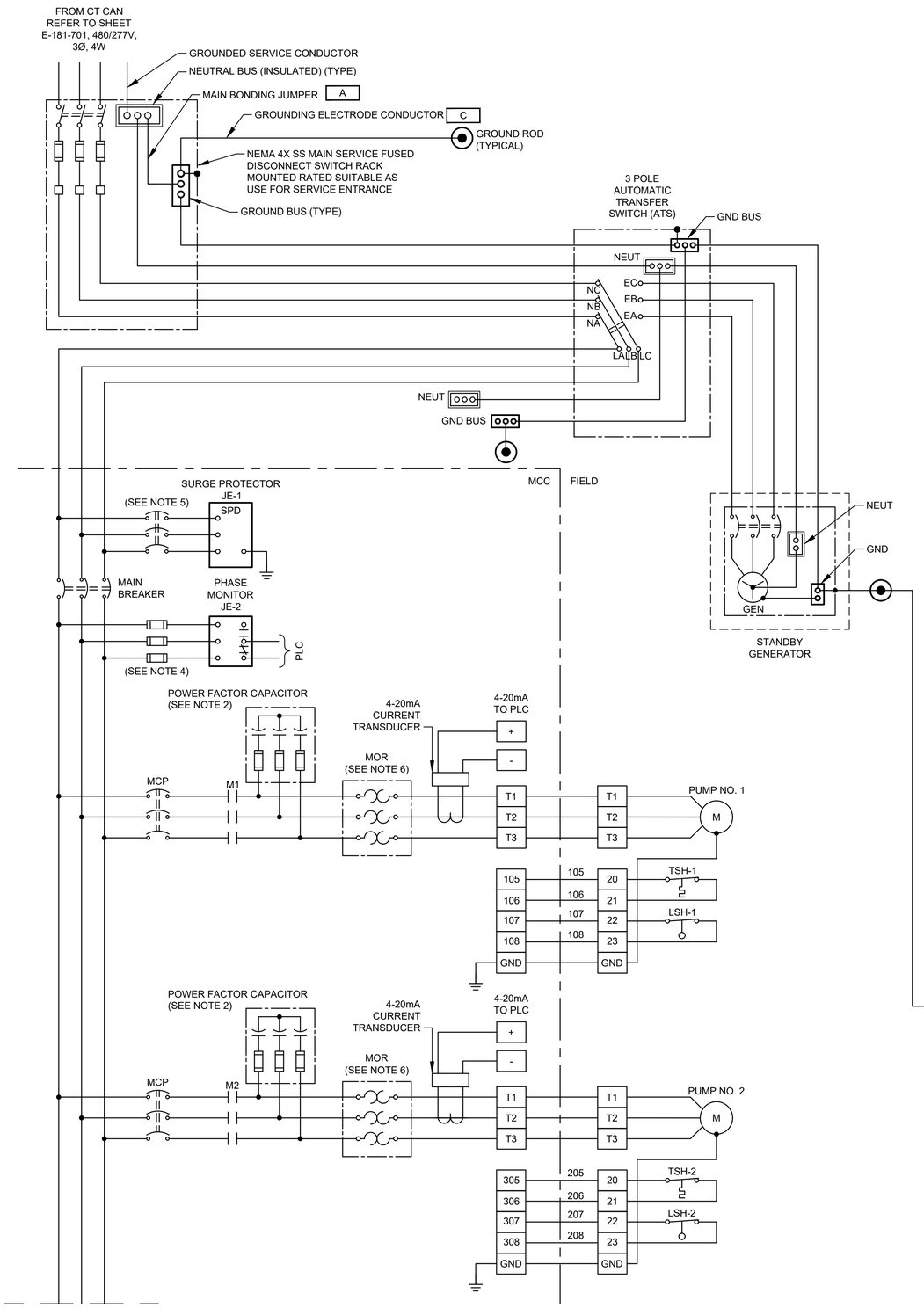

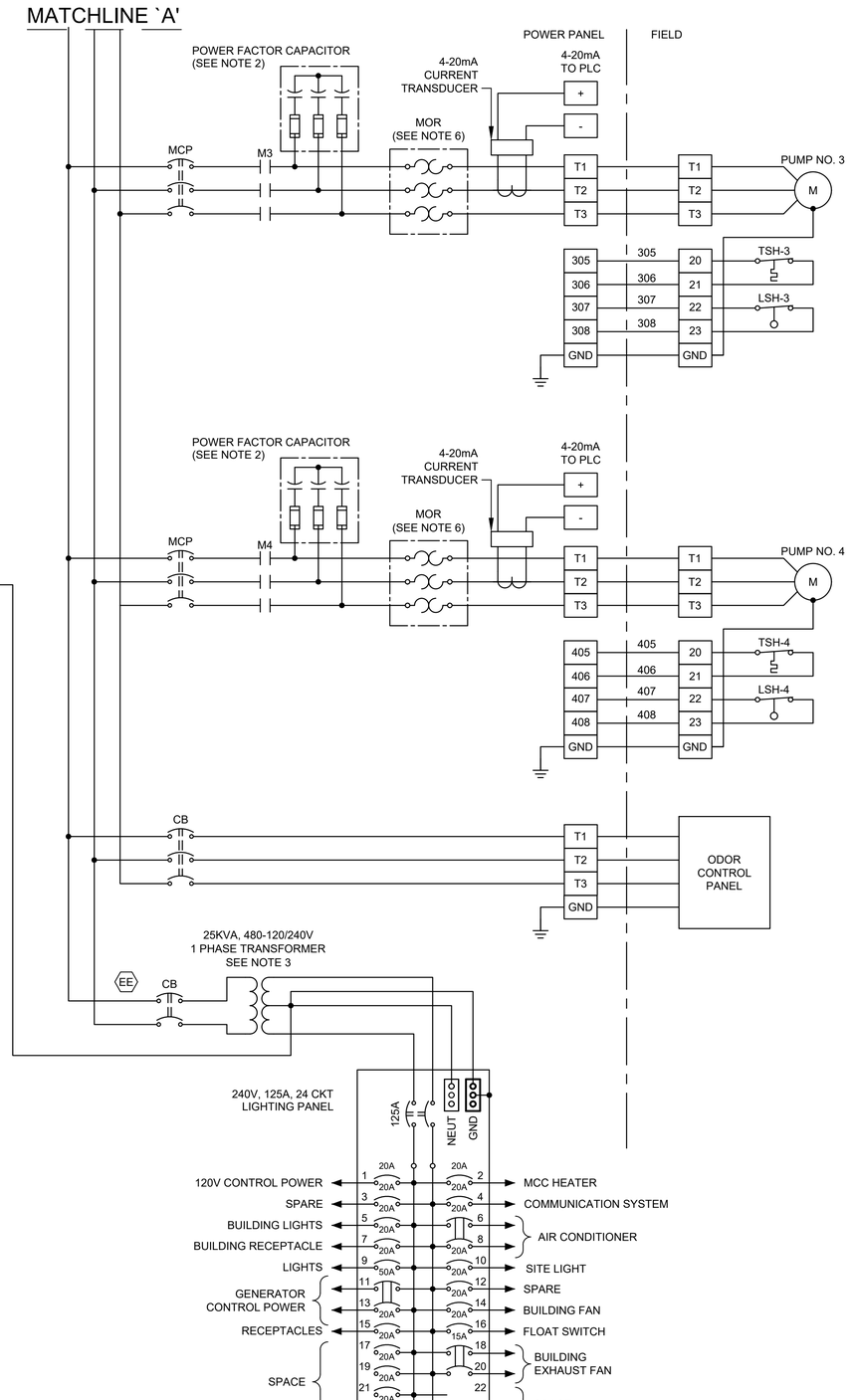

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PC INTERFACE TERMINAL

NOTES:

1. UNLESS OTHERWISE INDICATE, ALL DEVICES WITHOUT FURTHER DESIGNATION ARE LOCATED AT THE CONTROL PANEL.
2. CONTRACTOR TO COORDINATE POWER FACTOR CORRECTION CAPACITOR SIZE WITH PUMP MANUFACTURER.
3. CONTRACTOR SHALL TERMINATE POWER & CONTROL WIRES PER MANUFACTURER'S REQUIREMENTS.
4. PROVIDE FUSE SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
5. PROVIDE BREAKER SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
6. THE COMBINATION OF CT AND MOTOR OVERLOAD RELAY IF REQUIRED.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

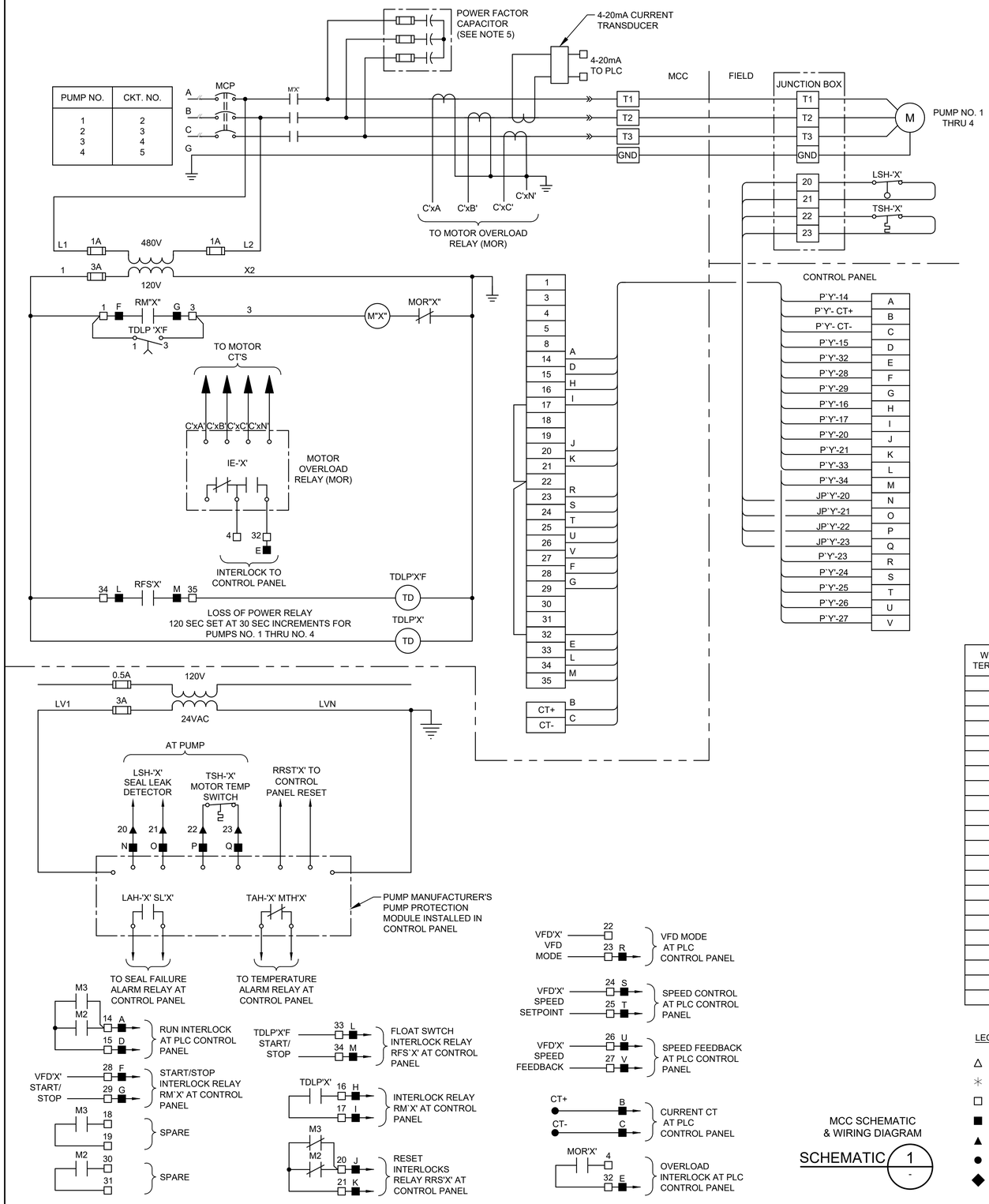
ELECTRICAL

SHERWOOD OAKS LIFT STATION 11333 CHATTERTON DR. THREE-LINE DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 116 OF 226	

E-181-703

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-703.dwg



PUMP NO.	CKT. NO.
1	2
2	3
3	4
4	5

WIRE TAG OR TERMINAL LABEL	PUMP NO. 1	PUMP NO. 2	PUMP NO. 3	PUMP NO. 4	FUNCTION
A	3P1	3P2	3P3	3P4	24VDC CONTROL
B	124	224	324	424	4-20mA CURRENT TRANSDUCER
C	125	225	325	425	4-20mA CURRENT TRANSDUCER
D	116	216	316	416	M CONTACT
E	117	217	317	417	OVERLOAD ALARM
F	114	214	314	414	RUN INTERLOCK
G	115	215	315	415	RUN INTERLOCK
H	102	202	302	402	LOSS OF POWER TIMER
I	103	203	303	403	LOSS OF POWER TIMER
J	118	218	318	418	ALARM RESET INTERLOCK
K	119	219	319	419	ALARM RESET INTERLOCK
L	126	226	326	426	FLOAT SWITCH RUN INTERLOCK
M	127	227	327	427	FLOAT SWITCH RUN INTERLOCK
N	120	220	320	420	SEAL LEAK DETECTOR
O	121	221	321	421	SEAL LEAK DETECTOR
P	122	222	322	422	MOTOR TEMPERATURE SWITCH
Q	123	223	323	423	MOTOR TEMPERATURE SWITCH
R	109	209	309	409	VFD MODE
S	110	210	310	410	4-20mA VFD SPEED CONTROL
T	111	211	311	411	4-20mA VFD SPEED CONTROL
U	112	212	312	412	4-20mA VFD SPEED INDICATION
V	113	213	313	413	4-20mA VFD SPEED INDICATION

LEGEND

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- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PC INTERFACE TERMINAL

MCC SCHEMATIC & WIRING DIAGRAM

SCHEMATIC 1 / -

NOTES:

1. THE 'X' NOTATION IN SCHEMATIC DESIGNATIONS REPRESENTS APPLICABLE PUMP NO. 1, 2, 3, 4.
2. THE 'Y' NOTATION INDICATES MCC CIRCUIT NUMBER.
3. UNLESS OTHERWISE INDICATED, ALL DEVICES WITHOUT FURTHER DESIGNATION ARE LOCATED AT THE MOTOR CONTROL CENTER (MCC).
4. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED. OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. (VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.)

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SURVEYED BY:
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STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

ELECTRICAL

SHERWOOD OAKS LIFT STATION 11333 CHATTERTON DR. MCC SCHEMATIC AND WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 117 OF 226	

E-181-704

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-704.dwg

CONDUIT AND CABLE SCHEDULE

ITEM NO.	CONDUIT TAG.	CONDUIT QUANTITY	CONDUIT SIZE	# CONDS PAIRS/TRIADS	CONDUCTOR SIZE	AMPS OR HP	VOLTAGE LEVEL	FROM	TO	DESCRIPTION
1	A	1	-	-	#4/0 GND.	-	-	MCC NEUTRAL BAR	MCC GROUND BAR	MAIN BONDING JUMPER
2	B	1	-	-	#4/0 GND.	-	-	MCC GROUND BUS	MCC ENCLOSURE	EQUIPMENT BONDING JUMPER
3	C	1	-	-	#4/0 GND.	-	-	GROUNDING ELECTRODE	MCC GROUND BUS	GROUNDED ELECTRODE CONDUCTOR
4	100	1	3-1/2"	1/C	2 SETS, 500 MCM, #1/0 GND.,	800A	480V	SERVICE POLE	CT CAN ON SERVICE RACK	UTILITY MV SERVICE
5	100A	3	3-1/2"	1/C	2 SETS, 500 MCM, #1/0 GND.,	800A	480V	SERVICE DISCONNECT	ATS	UTILITY POWER ENTRANCE
6	100B	3	3-1/2"	1/C	2 SETS, 500 MCM, #1/0 GND.,	800A	480V	STANDBY GENERATOR	ATS	GENERATOR POWER ENTRANCE
7	100C	1	3-1/2"	1/C	2 SETS, 500 MCM, #1/0 GND.,	800A	480V	ATC	MCC	MCC INCOMING POWER
8	100D	1	1-1/2"	1/C	3#4 AWG., #8 GND.,	50A	120/240V	STANDBY GENERATOR	LIGHTING PANEL	GENERATOR CONTROL POWER
9	100E	1	3/4"	1/C	6#14 AWG., #14 GND.,	-	24VDC	STANDBY GENERATOR	ATS	GENERATOR CONTROLS
10	100F	1	1"	1/C	12#14 AWG., #14 GND.	-	24VDC	STANDBY GENERATOR	CONTROL PANEL	GENERATOR ALARM SIGNALS
11	100G	1	1"	1/C	12#14 AWG., #14 GND.	-	24VDC	STANDBY GENERATOR	CONTROL PANEL	GENERATOR ALARM SIGNALS
12	101	1	1"	-	#4/0 GND.	-	-	MCC ENCLOSURE	GROUND FIELD	GROUND ELECTRODE CONDUCTOR
13	102	1	1"	-	#4/0 GND.	-	-	BUILDING STEEL	GROUND FIELD	GROUND ELECTRODE CONDUCTOR
14	103	1	1"	-	#4/0 GND.	-	-	BUILDING REBAR	LIGHTNING GROUND ROD	BUILDING GROUNDING
15	104	1	1"	-	#2 GND.	-	-	CONTROL PANEL	GROUND FIELD	GROUND ELECTRODE CONDUCTOR
16	105	1	1"	1/C	POE CABLE	-	-	COMMUNICATION POLE	PPU-AC ENCLOSURE	COMMUNICATION
17	200	2	3"	-	MANUFACTURER CABLE	138HP	480V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 POWER
18	201	1	3"	1/C	MANUFACTURER CABLE	-	120V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 CONTROLS
19	202	1	2-1/2"	1/C	3#4/0 AWG., #4 GND.	138HP	480V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	PUMP NO.1 POWER
20	203	1	2"	1/C	8#14 AWG., #14 GND.	-	120V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	COMBINED PUMP CONTROLS
21	205	1	1"	1/C	16#14 AWG., #14 GND.	-	120V	STARTER IN MOTOR CONTROL CENTER	CONTROL PANEL	PUMP NO.1 CONTROLS
22	206	1	1"	1/C	3#4 AWG., #8 GND.,	-	480V	PUMP NO.1 MOTOR STARTER	POWER FACTOR CORRECTION CAPACITOR	PUMP NO.1 CAPACITOR
23	300	2	3"	-	MANUFACTURER CABLE	138HP	480V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 POWER
24	301	1	3"	1/C	MANUFACTURER CABLE	-	120V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 CONTROLS
25	302	1	2-1/2"	1/C	3#4/0 AWG., #4 GND.	138HP	480V	PUMP NO.2 JUNCTION BOX	PUMP STARTER	PUMP NO.2 POWER
26	305	1	1"	1/C	16#14 AWG., #14 GND.	-	120V	STARTER IN MOTOR CONTROL CENTER	CONTROL PANEL	PUMP NO.2 CONTROLS
27	306	1	1"	1/C	3#4 AWG., #8 GND.,	-	480V	PUMP NO.2 MOTOR STARTER	POWER FACTOR CORRECTION CAPACITOR	PUMP NO.2 CAPACITOR
28	400	2	3"	-	MANUFACTURER CABLE	138HP	480V	PUMP NO.3	PUMP NO.3 JUNCTION BOX	PUMP NO.3 POWER
29	401	1	3"	1/C	MANUFACTURER CABLE	-	120V	PUMP NO.3	PUMP NO.3 JUNCTION BOX	PUMP NO.3 CONTROLS
30	402	1	2-1/2"	1/C	3#4/0 AWG., #4 GND.	138HP	480V	PUMP NO.3 JUNCTION BOX	PUMP STARTER	PUMP NO.3 POWER
31	403	1	1"	1/C	8#14 AWG., #14 GND.	-	120V	PUMP NO.3 JUNCTION BOX	PUMP STARTER	COMBINED PUMP CONTROLS
32	405	1	1"	1/C	16#14 AWG., #14 GND.	-	120V	STARTER IN MOTOR CONTROL CENTER	CONTROL PANEL	PUMP NO.3 CONTROLS
33	406	1	1"	1/C	3#4 AWG., #8 GND.,	-	480V	PUMP NO.3 MOTOR STARTER	POWER FACTOR CORRECTION CAPACITOR	PUMP NO.3 CAPACITOR
34	500	2	3"	-	MANUFACTURER CABLE	138HP	480V	PUMP NO.4	PUMP NO.4 JUNCTION BOX	PUMP NO.4 POWER
35	501	1	3"	1/C	MANUFACTURER CABLE	-	120V	PUMP NO.4	PUMP NO.4 JUNCTION BOX	PUMP NO.4 CONTROLS
36	502	1	2-1/2"	1/C	3#4/0 AWG., #4 GND.	138HP	480V	PUMP NO.4 JUNCTION BOX	PUMP STARTER	PUMP NO.4 POWER
37	505	1	1"	1/C	16#14 AWG., #14 GND.	-	120V	STARTER IN MOTOR CONTROL CENTER	CONTROL PANEL	PUMP NO.4 CONTROLS
38	506	1	1"	1/C	3#4 AWG., #8 GND.,	-	480V	PUMP NO.4 MOTOR STARTER	POWER FACTOR CORRECTION CAPACITOR	PUMP NO.4 CAPACITOR
39	600	1	1"	1/C	2#4 AWG., #8 GND.,	70A	480V	MOTOR CONTROL CENTER	LIGHTING TRANSFORMER	LIGHTING PANEL FEEDER
40	601	1	2-1/2"	1/C	#6 GND.	-	-	LIGHTING PANEL	GROUND FIELD	LIGHTING PANEL GROUND
41	602	1	1-1/2"	1/C	3#1 AWG., #6 GND.,	125A	120/240V	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	LIGHTING PANEL FEEDER
42	701	1	1"	1/C	3#4 AWG., #8 GND.,	60A	480V	BREAKER IN MOTOR CONTROL CENTER	ODOR CONTROL PANEL	ODOR CONTROL SYSTEM
43	900	1	3/4"	1/C	4#14 AWG., #14 GND.,	-	24VDC	MOTION SWITCH	CONTROL PANEL	INTRUSION ALARM
44	1000	1	3"	1/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
45	1001	1	3"	1/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
46	1002	1	2"	1/C	2-TRIAD #16, 6#14,	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	COMBINED LEVEL TRANSMITTERS & FLOAT SWITCH
47	1003	1	2-1/2"	-	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	WELL FLOAT SWITCHES
48	1100	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
49	1300	1	2"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	SITE LIGHTS	SITE LIGHTING
50	1400	1	1"	1-TRIAD	1-TRIAD #16,	-	24VDC	CONTROL PANEL	ODOR CONTROL PANEL	CONTROL WIRES
51	1500	1	3/4"	-	CAT .5E	-	24VDC	CONTROL PANEL	MCC	CONTROL WIRES

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
CONDUIT SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
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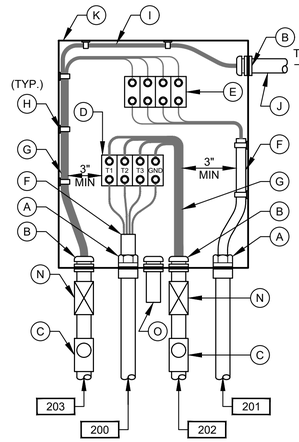
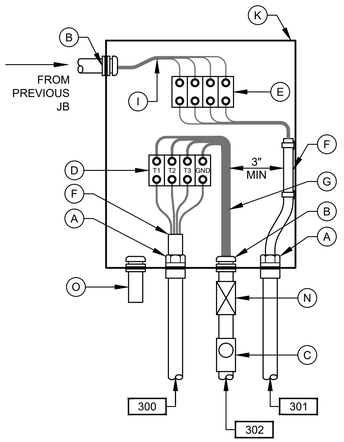
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-601.dwg



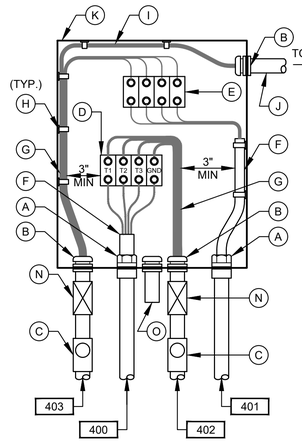
PUMP NO.1
JUNCTION BOX

DETAIL 3
NTS
(SEE NOTE 7)



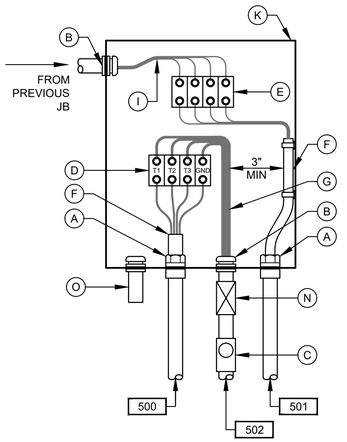
PUMP NO.2
JUNCTION BOX

DETAIL 4
NTS
(SEE NOTE 7)



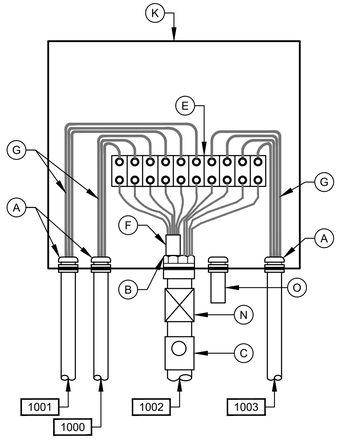
PUMP NO.3
JUNCTION BOX

DETAIL 5
NTS
(SEE NOTE 7)



PUMP NO.4
JUNCTION BOX

DETAIL 6
NTS
(SEE NOTE 7)



LEVEL TRANSMITTER
JUNCTION BOX

DETAIL 7
NTS
(SEE NOTE 7)

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO JUNCTION BOXES USING 316 STAINLESS STEEL HARDWARE.
2. MAINTAIN MINIMUM SEPARATION REQUIRED UNDER NEC ARTICLE 504, BETWEEN INTRINSICALLY SAFE CONTROL WIRING AND NONINTRINSICALLY SAFE MOTOR FEEDER WIRING.
3. UNLESS OTHERWISE NOTED, ALL EXPOSED CONDUITS SHALL BE PVC COATED RIGID GALVANIZED STEEL.
4. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, SCREWS WASHERS, ETC SHALL BE TYPE 316 STAINLESS STEEL.
5. ALL UNDERGROUND CONDUITS TO BE ENCASED IN REINFORCED CONCRETE DUCTBANK.
6. PROVIDE ANTI-CORROSIVE SPRAY ON ANY BARE METAL PARTS OR EXPOSED WIRE.
7. SEE WIRING SCHEMATICS FOR TERMINALS AND WIRE NUMBERS.
8. ANY CONDUIT REQUIRING A CSBE SEAL, SHALL BE A MINIMUM SIZE OF 2 1/2" PER CABLE.
9. DETAIL SHOWN MAY BE MODIFIED PER SITE SITUATION.

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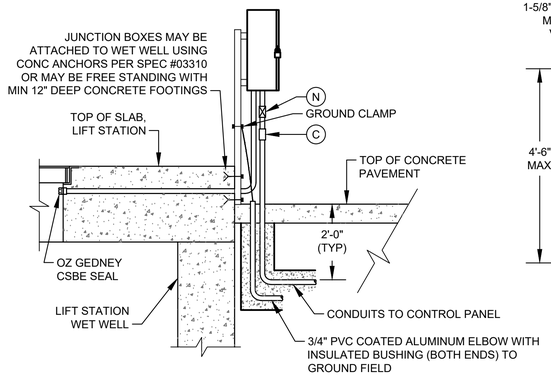
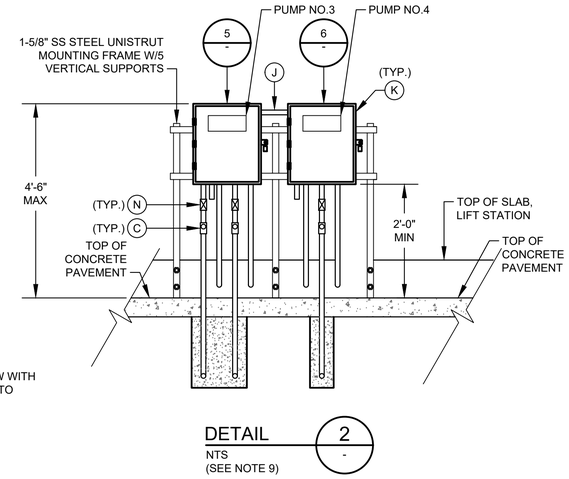
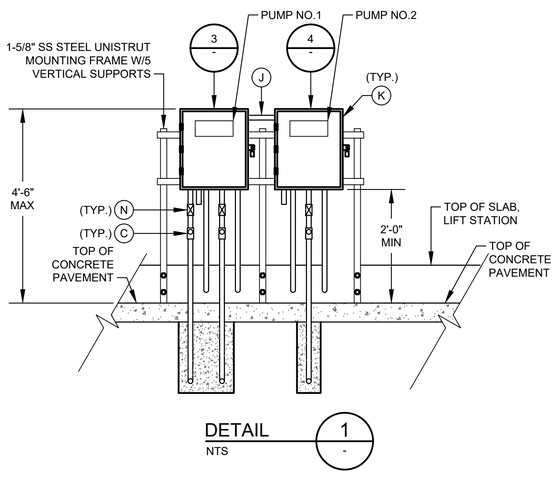


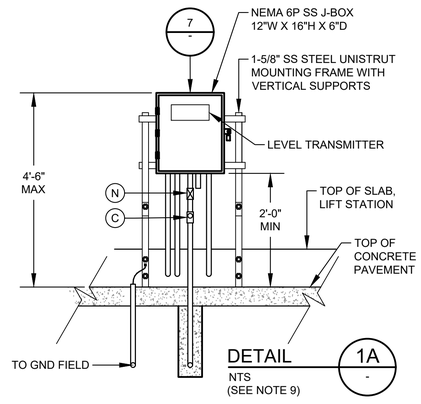
TYP SIDE VIEW FOR DETAIL 1, 1A, 2 & 7



DETAIL 2
NTS
(SEE NOTE 9)



DETAIL 1
NTS



DETAIL 1A
NTS
(SEE NOTE 9)

JUNCTION BOX EQUIPMENT SCHEDULE

A - OZ GEDNEY CSBE SEAL
B - WATERTIGHT CONDUIT HUB WITH INSULATED BUSHING
C - CLASS I, DIV 1, EXPLOSION PROOF SEAL INSTALLED PER NEC DIV 501
D - POWER TERMINAL BLOCK W/SCREW DOWN BOX LUGS
E - CONTROL TERM BLOCK W/SCREW DOWN BOX LUGS
F - MULTI-CONDUCTOR CABLE, REMOVE OUTER JACKET AS SHOWN
G - WIRING AS SCHEDULED
H - WIRING HARNESS PERMANENTLY AFFIXED
I - PUMP CONTROL WIRING FROM PUMPS AS APPLICABLE
J - 1 1/2" PVC COATED CONDUIT NIPPLE
K - NEMA 6P STAINLESS STEEL JUNCTION BOX WITH GASKETED FRONT COVER, SINGLE QUARTER TURN, OIL-TIGHT LATCH AND PADLOCKING PROVISIONS, MINIMUM SIZE: 20"W X 24"H X 8"D
L - NAMEPLATE, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
M - NOT USED.
N - EXPANSION FITTING
O - DRAIN VENT

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

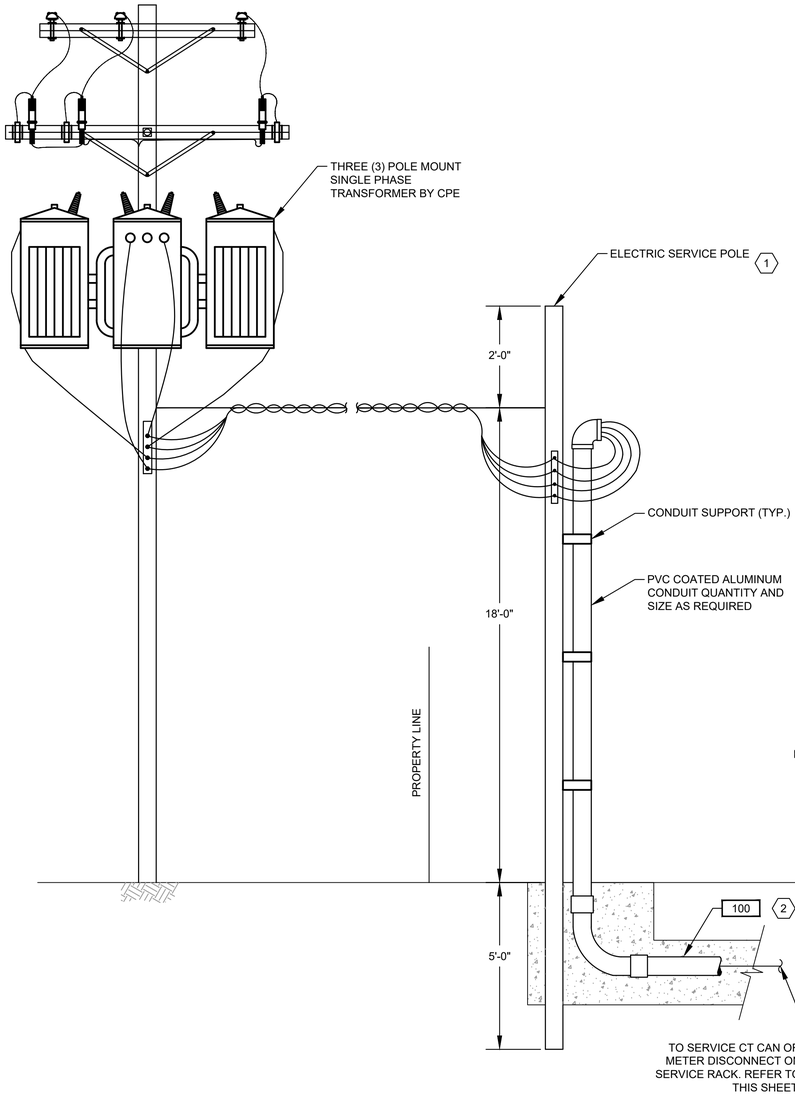
ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
TYPICAL JUNCTION BOX DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

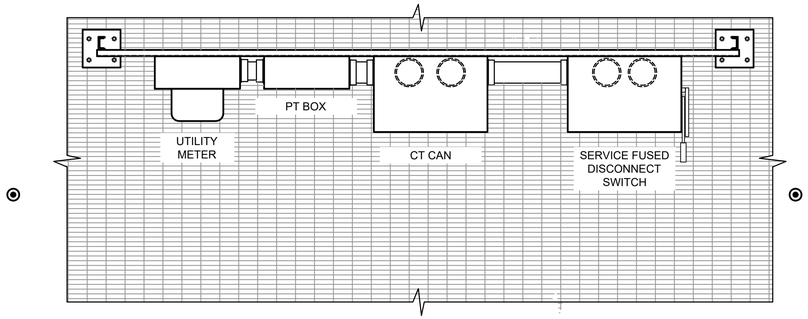
E-181-501

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-501.dwg

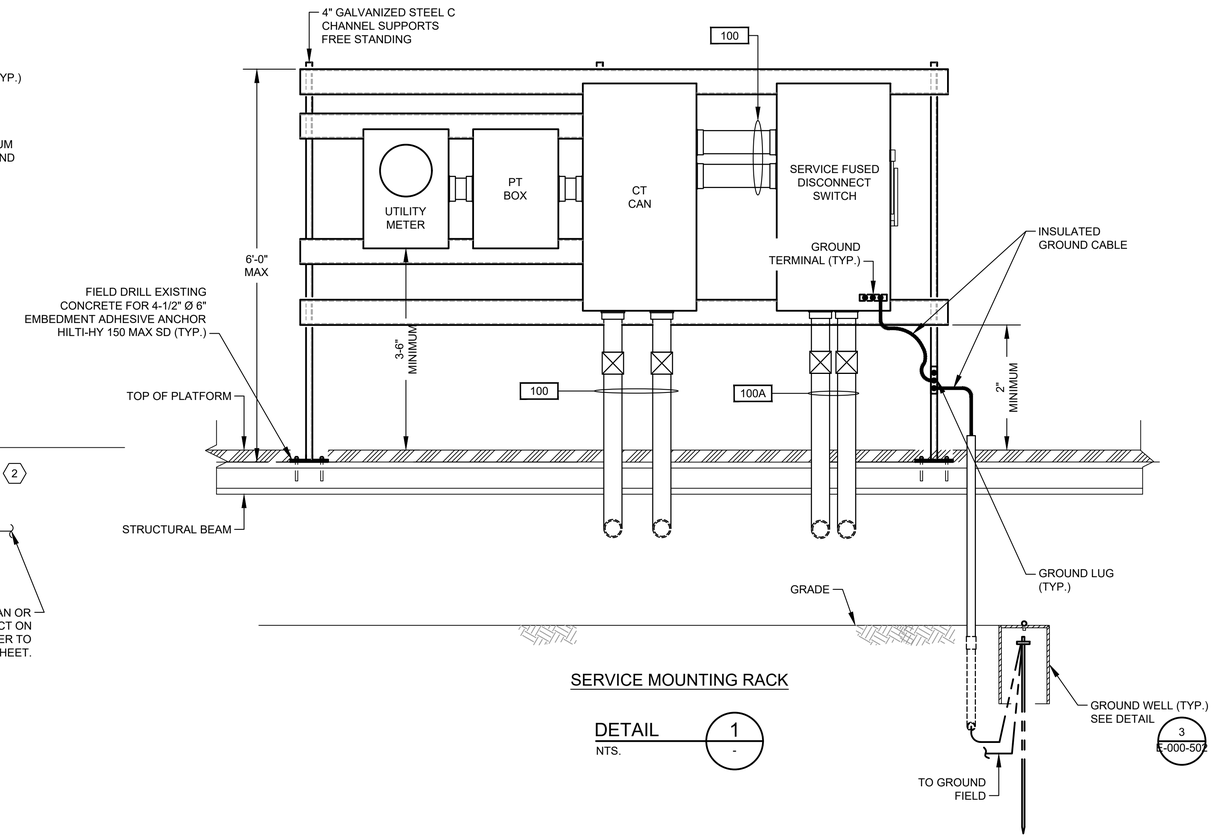


ELECTRICAL SERVICE ENTANCE

DETAIL 1 / NTS. -



PLAN



SERVICE MOUNTING RACK

DETAIL 1 / NTS. -

NOTES BY SYMBOL "#":

1. WOODEN POLE 20' LONG. TOP DIAMETER 6" BOTTOM DIAMETER 8" PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2. ELECTRICAL SERVICE FEEDER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. COORDINATE WITH CPE FOR THE REQUIREMENTS OF THE INSTALLATION.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

ELECTRICAL

SHERWOOD OAKS LIFT STATION SERIVCE POLE & SERVICE RACK DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
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NASIR FAZLJOO, P.E.	
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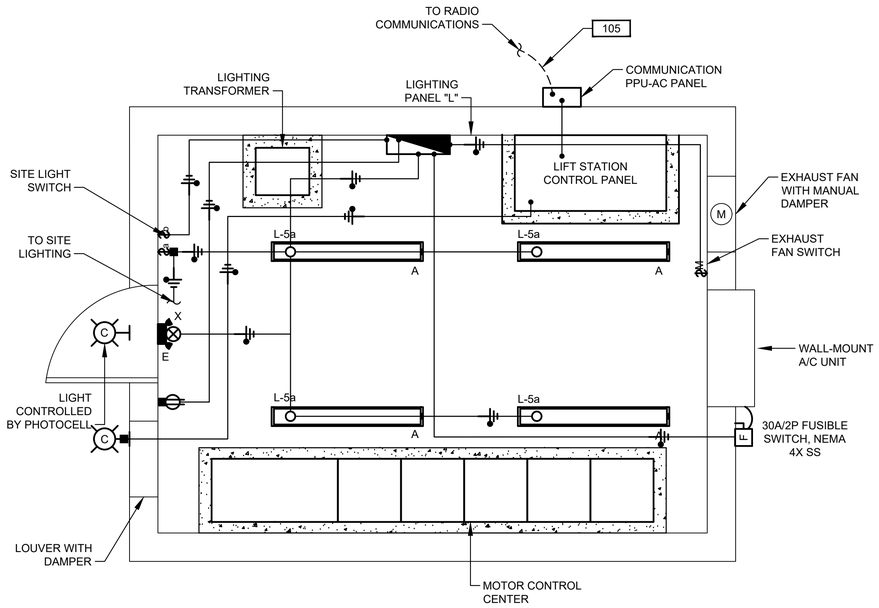
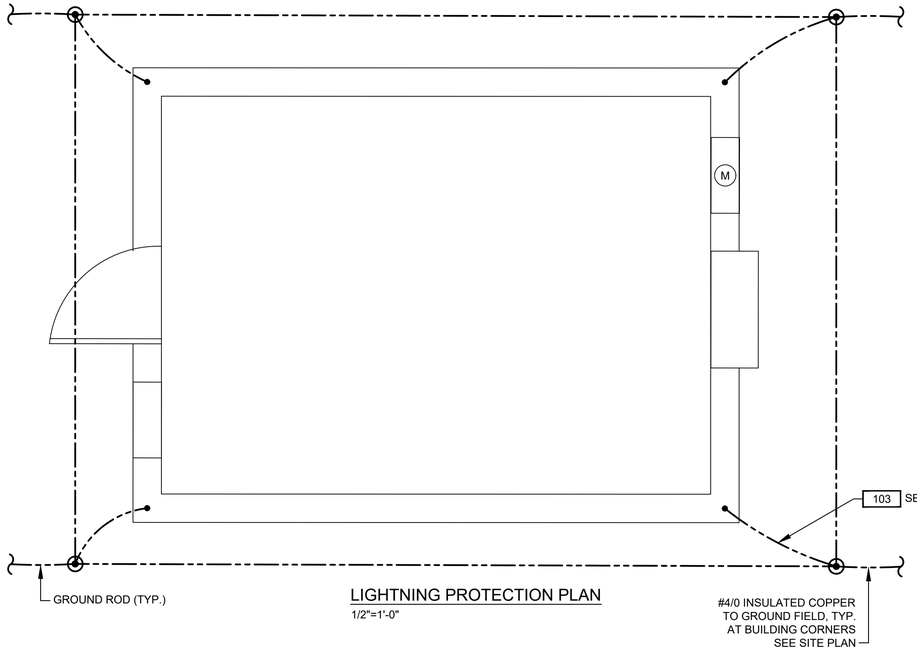
E-181-502

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-502.dwg



LIGHTING & COMMUNICATION SYSTEM PLAN

1/2"=1'-0"



LIGHTNING PROTECTION PLAN

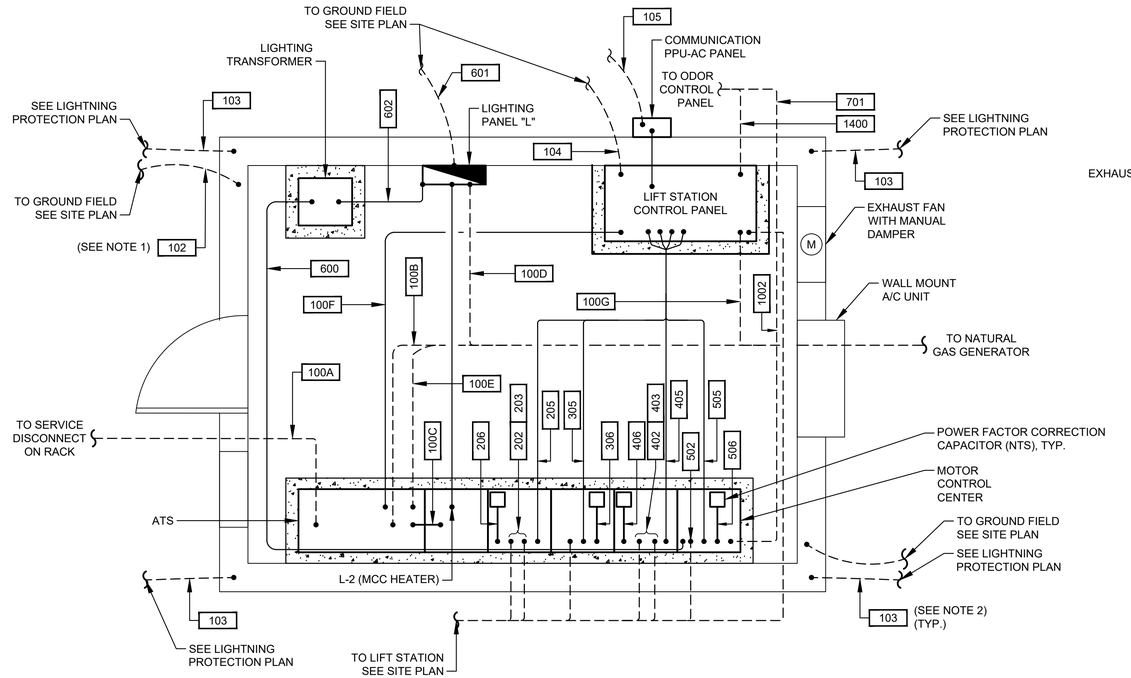
1/2"=1'-0"

NOTES:

1. THERMO WELD BUILDING GROUND CONDUCTOR TO BUILDING REINFORCING STEEL.
2. BOND REBAR IN CONCRETE FOOTER TO GROUND ROD.

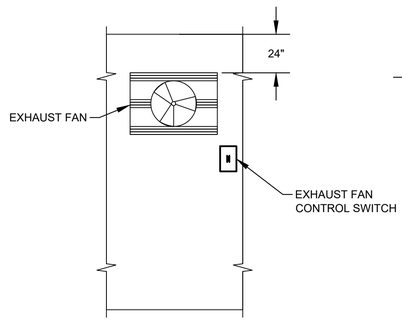
GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.



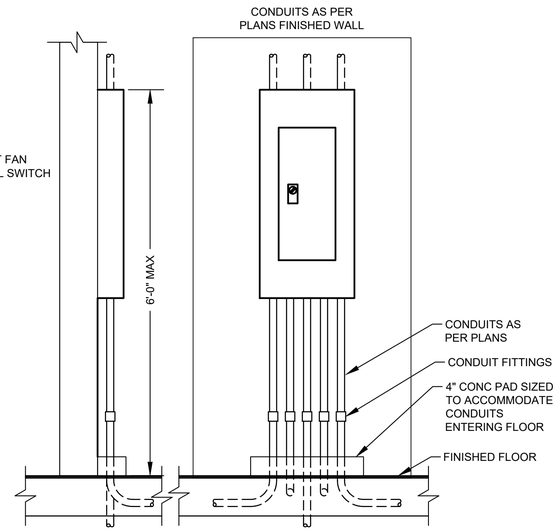
POWER PLAN

1/2"=1'-0"



EXHAUST FAN

NTS.



TYPICAL PANEL INSTALLATION

DETAIL - / NTS. -

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

ELECTRICAL

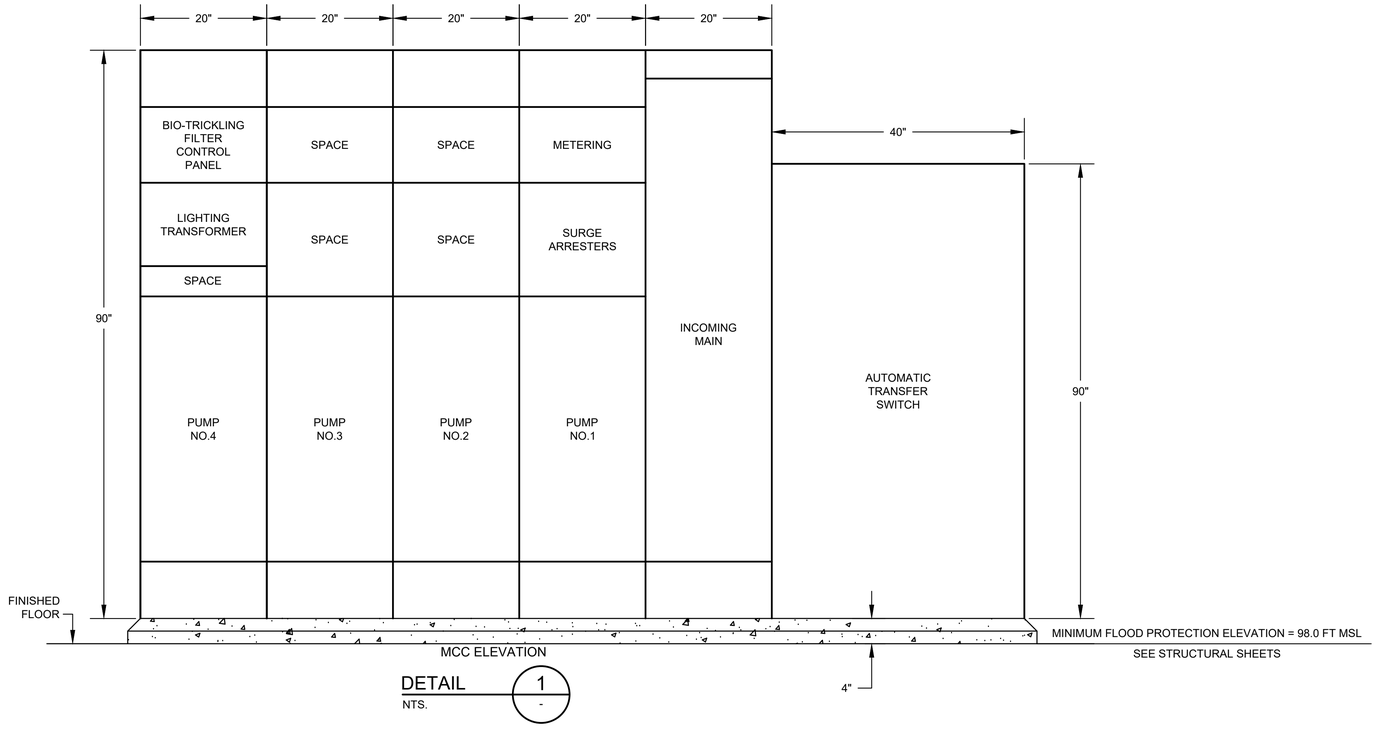
SHERWOOD OAKS LIFT STATION 11333 CHATTERTON DR. CONTROL BUILDING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-181-503

SHEET NO. 121 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-503.dwg



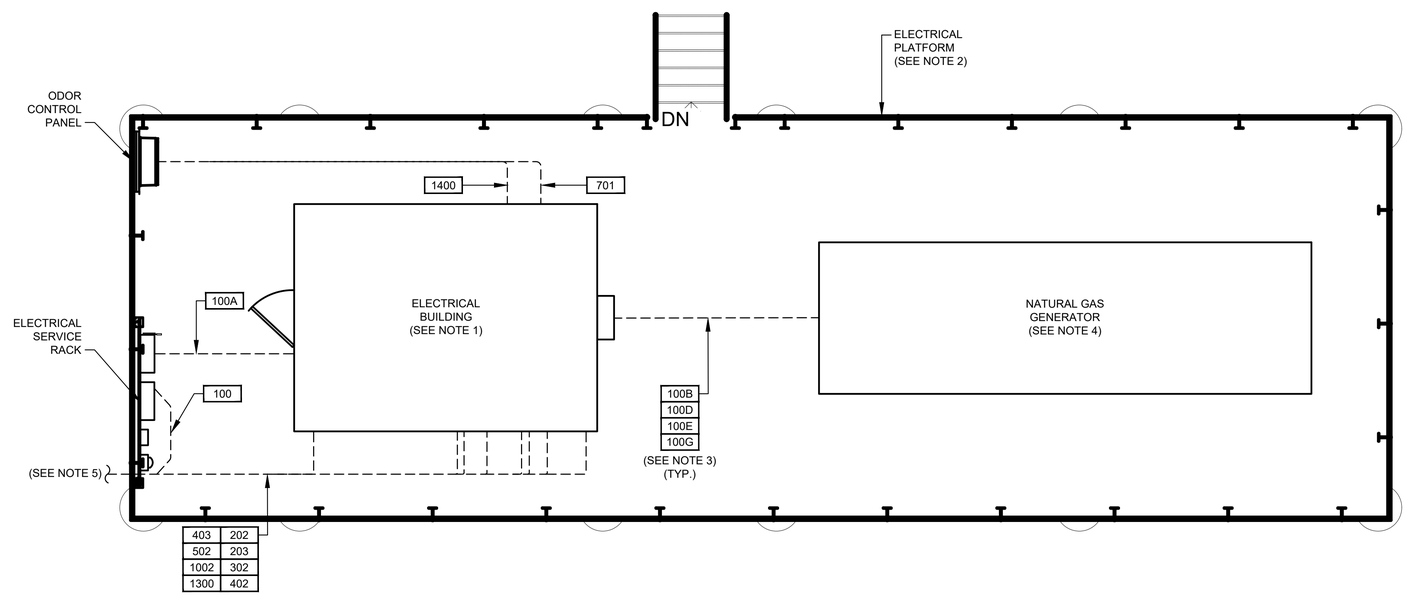
DETAIL 1 / NTS.

NOTES:

1. SEE SHEET E-181-503 AND I-181-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO STRUCTURAL DRAWINGS .
3. CONDUIT TO BE MOUNTED BELOW PLATFORM GRATING.
4. THE GENERATOR WILL BE USED IN EMERGENCY USE ONLY.
5. REFER TO SHEET E-181-101 FOR CONTINUATION.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.



CONTROL BUILDING ON ELEVATED PLATFORM DETAIL

DETAIL 2 / 1/4" = 1'-0"

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

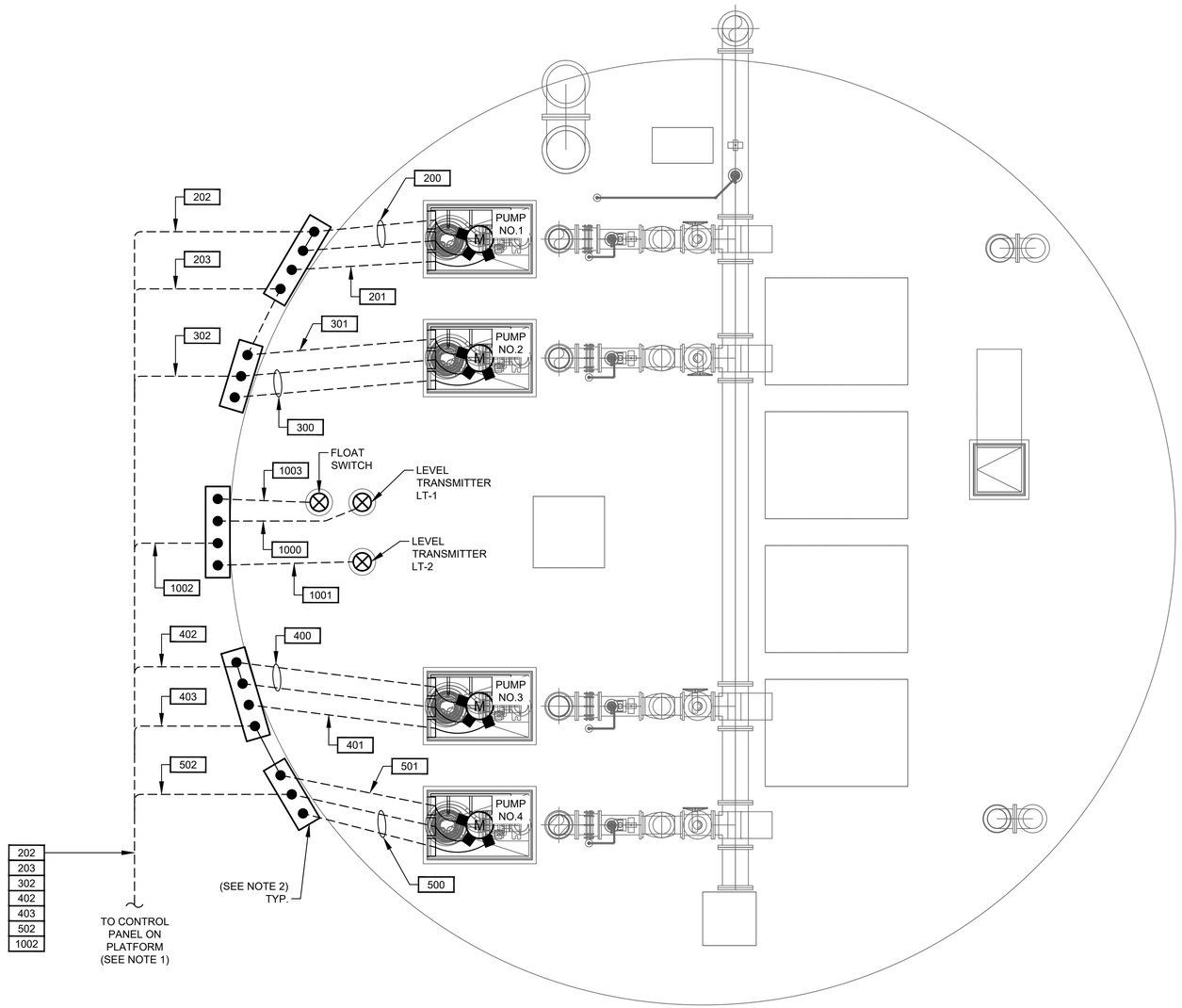
ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
MCC ELEV. & CTRL. BLDG. DET.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 122 OF 226	

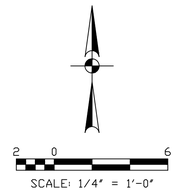
E-181-504

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-504.dwg



SHERWOOD OAKS LIFT STATION
ENLARGED PLAN

PLAN
1/4"=1'-0"



NOTES:

1. SEE SHEET E-181-101 FOR CONTINUATION.
2. REFER TO SHEET E-181-501.

GENERAL NOTES:

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
11333 CHATTERTON DR

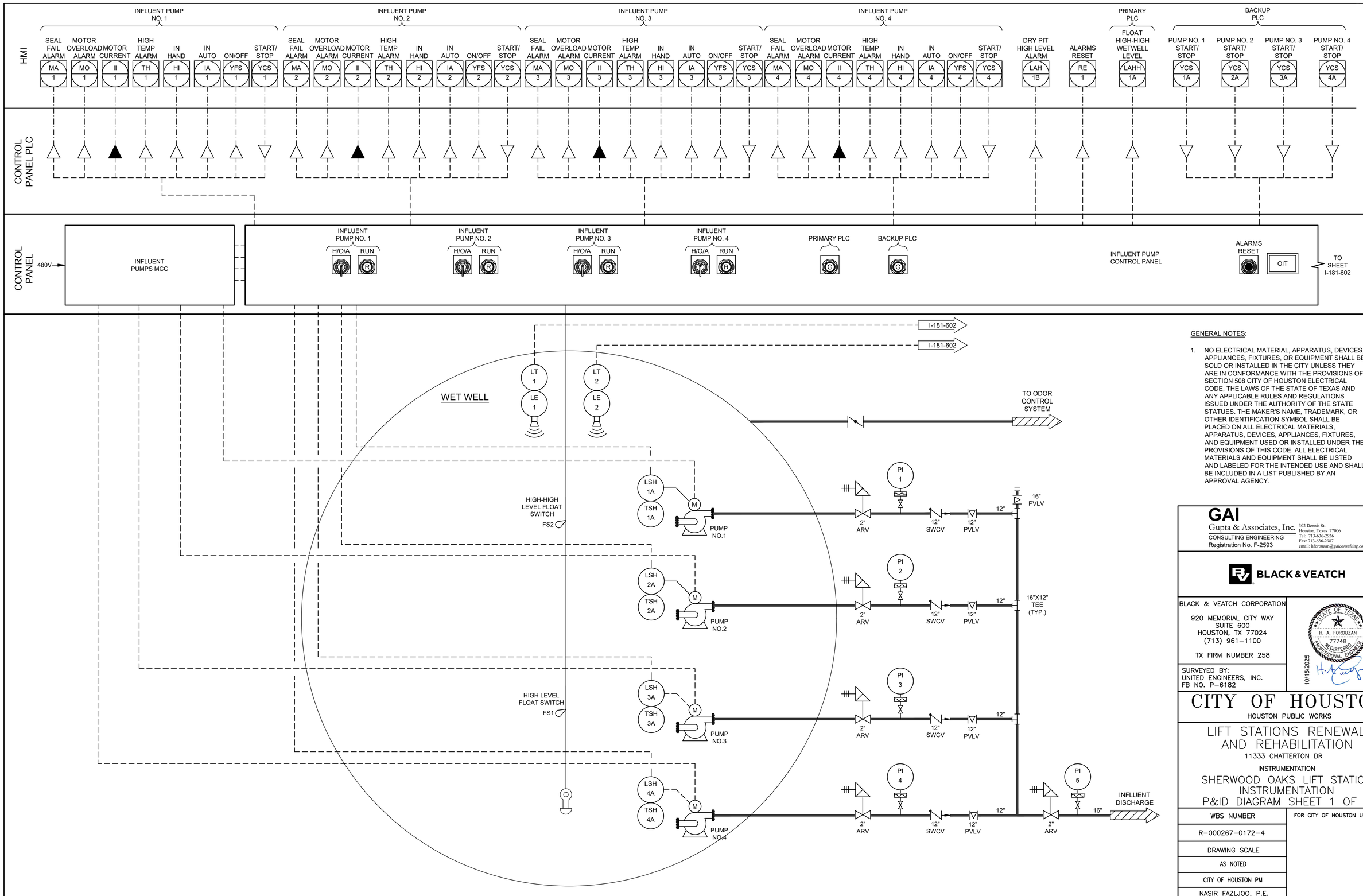
ELECTRICAL

SHERWOOD OAKS LIFT STATION
11333 CHATTERTON DR.
ENLARGED PLAN VIEW

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 123 OF 226	

E-181-505

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\Sherwood Oak\Sherwood Oak E-181-505.dwg



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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

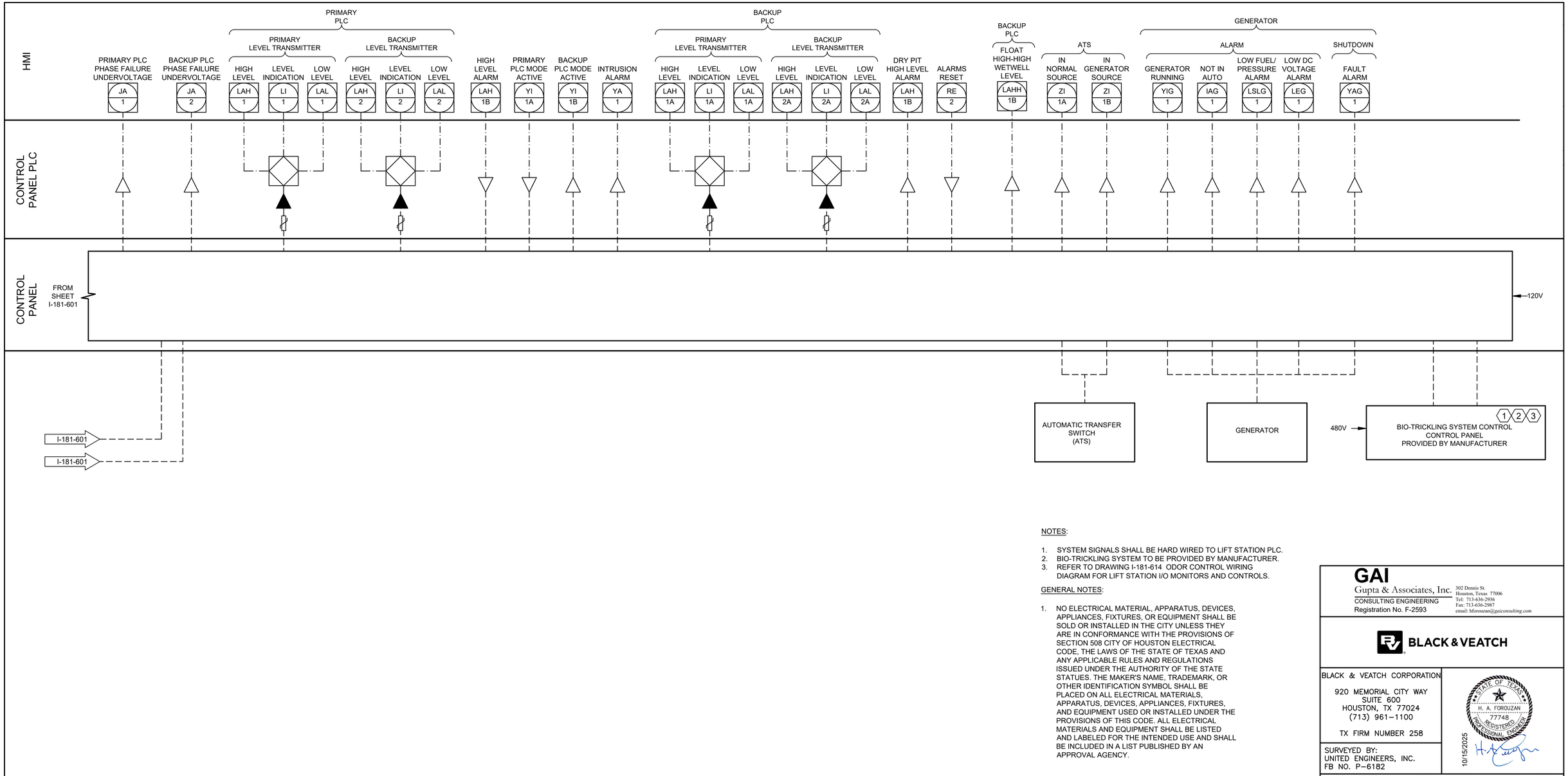
SHERWOOD OAKS LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-181-601

SHEET NO. 124 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-601.dwg



NOTES:

1. SYSTEM SIGNALS SHALL BE HARD WIRED TO LIFT STATION PLC.
2. BIO-TRICKLING SYSTEM TO BE PROVIDED BY MANUFACTURER.
3. REFER TO DRAWING I-181-614 ODOR CONTROL WIRING DIAGRAM FOR LIFT STATION I/O MONITORS AND CONTROLS.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

SHERWOOD OAKS LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
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CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 125 OF 226	

I-181-602

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-602.dwg

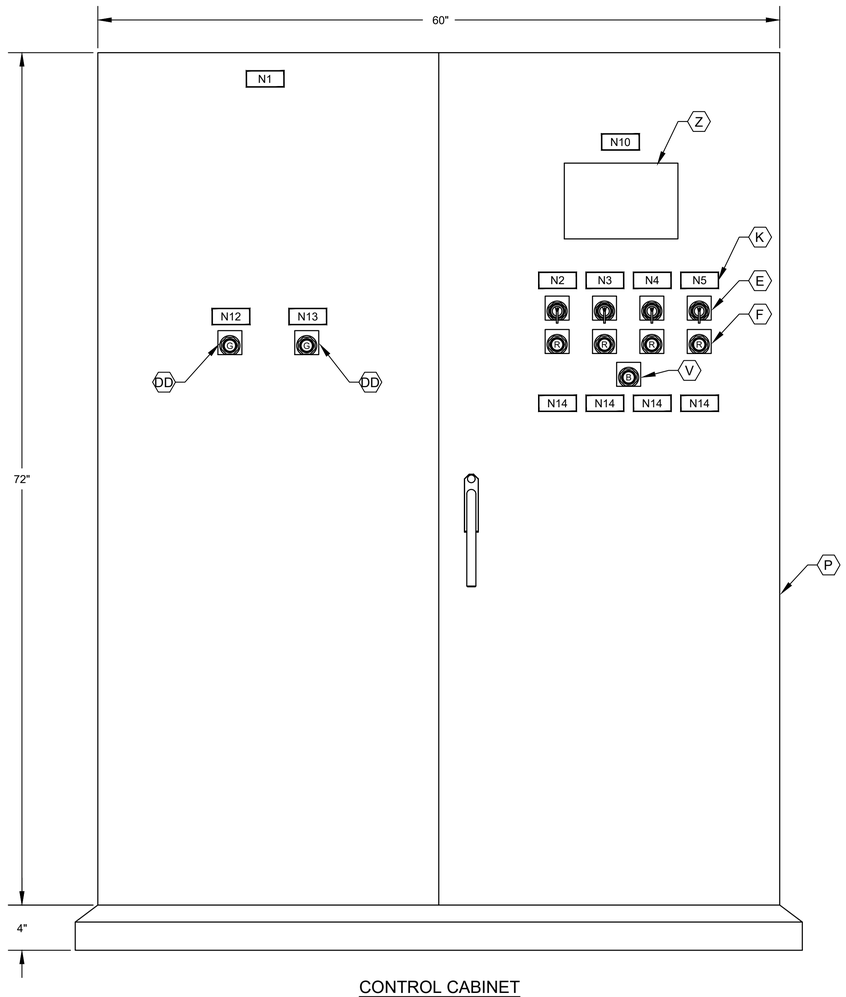
EQUIPMENT AND DEVICE SCHEDULE		
ITEM	QUANTITY	DESCRIPTION
A	1	SINGLE CHANNEL INTRINSICALLY SAFE RELAY
B	2	ANALOG SIGNAL ISOLATOR
C	4	PUMP PROTECTION MODULE
D	*	NOT USED
E	4	HAND-OFF-AUTO SWITCH, 3 POSITION, HEAVY-DUTY OIL TIGHT WITH 2 SETS OF CONTACT BLOCKS (PUMP CONTROL)
F	4	INDICATING LIGHT, HEAVY DUTY, OILTIGHT, RED, 24 VDC, LED, WITH "RUN" LEGEND
G	*	NOT USED.
H	1	SWITCH FOR CABINET LIGHT, 120V, 20A, SPST
I	2	DUPLEX RECEPTACLE, 120V, 20A, 2 WIRE, GROUNDED, GFCI TYPE
J	1	24" LED STRIP LIGHT 120V SUITABLE FOR ZERO DEGREE OPERATION
K	*	NAMEPLATES, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
L	2	PROGRAMMABLE LOGIC CONTROLLER WITH EXPANSION UNIT
M	*	CONTROL RELAY 24VDC RELAY WITH THREE FORM C CONTACTS AND 11 PIN SOCKET BASE
N	-	NOT USED
O	-	NOT USED
P	1	NEMA 12 GASKETED STEEL ENCLOSURES WITHOUT VENTS 72" H X 20" D X 60" W
Q	*	TERMINAL BLOCK
R	1	WIRE DUCT 2" WIDE X 2" DEEP MINIMUM
S	1	GROUND BUS
T	1	COMMUNICATION ETHERNET SWITCH
U	9	CARTRIDGE
V	1	PUSHBUTTON, BLACK WITH RESET LEGEND
W	-	NOT USED
X	*	FUSED TERMINAL BLOCKS
Y	1	POWER SURGE PROTECTOR - CONTROL POWER
Z	1	PROGRAMMING SCREEN (OIT)
AA	*	120VAC SYSTEM FUSES
BB	1	120VAC - 24VDC POWER SUPPLY, 5A
CC	*	NOT USED
DD	2	INDICATING LIGHT, HEAVY DUTY, OILTIGHT, GREEN, 24VDC, LED WITH "BACKUP PLC" & "PRIMARY PLC" LEGEND
EE	4	ANALOG I/O SURGE SUPPRESSOR
FF	-	NOT USED

* - AS SCHEDULED

NAMEPLATE SCHEDULE

DESIGNATION	ENGRAVED
N1	PUMP STATION DESIGNATION
N2	PUMP NO. 1
N3	PUMP NO. 2
N4	PUMP NO. 3
N5	PUMP NO. 4
N6	NOT USED.
N7	NOT USED.
N8	NOT USED.
N9	NOT USED.
N10	PROGRAMMING SCREEN
N11	NOT USED.
N12	PRIMARY PLC
N13	BACKUP PLC
N14	MOTOR DATA

HORSEPOWER (OUTPUT) ----------
RPM AT FULL LOAD ----------
TIME RATING ----------
FREQUENCY ----------
NUMBER OF PHASES ----------
MODEL NUMBER ----------
RATED VOLTAGE ----------
SERVICE FACTOR ----------
FULL LOAD AMPS ----------
INSULATION CLASS ----------
NEMA DESIGN LETTER ----------
TEMPERATURE RISE ----------
NEMA FRAME SIZE ----------
DATE OF MANUFACTURE ----------
THERMO PROTECTION (IF REQUIRED) --
MOISTURE PROTECTION (IF REQUIRED)-



CONTROL CABINET
FRONT DOOR ELEVATION

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO PANELS USING STAINLESS STEEL HARDWARE.
2. REFER SPECIFICATIONS FOR ALL PANEL COMPONENTS.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT & SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
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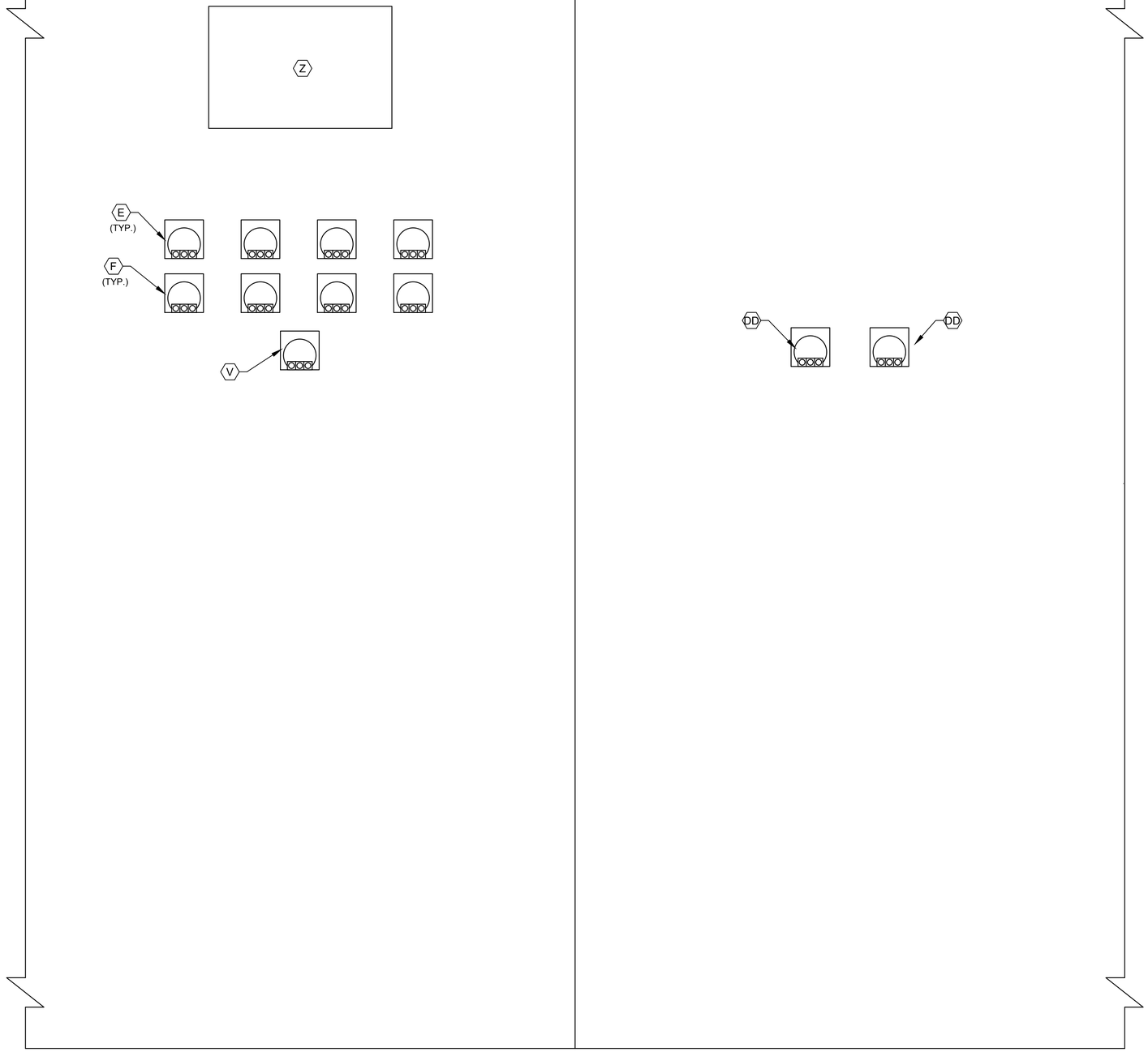
I-181-603

SHEET NO. 126 OF 226

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-603.dwg



CONTROL CABINET
BACK DOOR ELEVATION

NOTES:

1. SEE SHEET I-181-603 FOR EQUIPMENT SCHEDULE.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

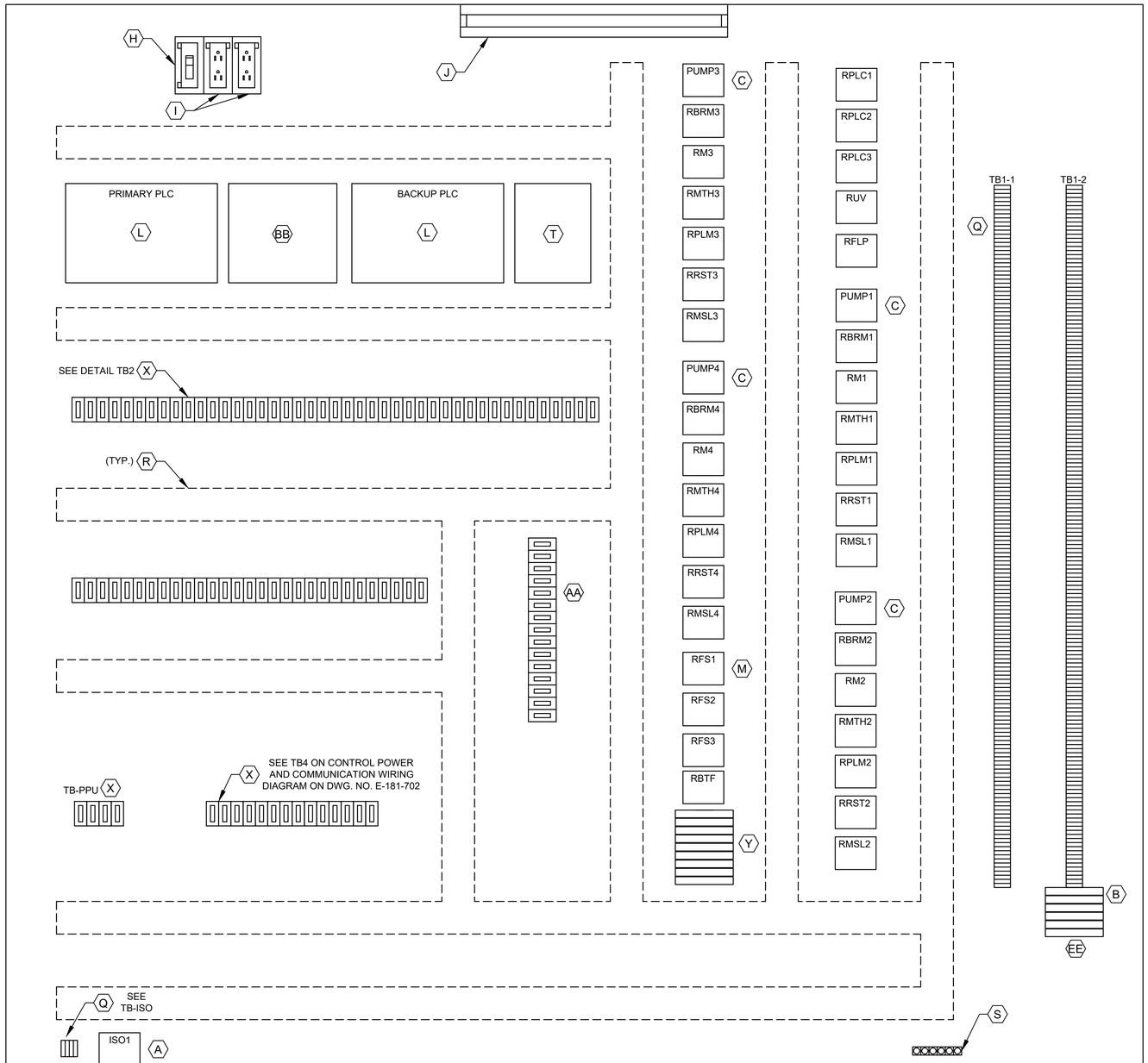
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 127 OF 226	

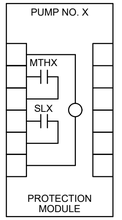
I-181-604

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-604.dwg



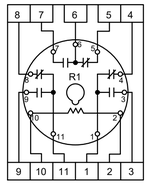
CONTROL PANEL ELEVATION

LEGEND	
TAG	DESCRIPTION
RMTH	MOTOR HIGH TEMPERATURE ALARM RELAY
RPLMP	PLC PUMP RUN RELAY
RRST	PUMP RESET AUX RELAY
RPLC	PLC MODE AUX RELAY
RM	PUMP RUN AUX RELAY
RUV	UNDER VOLTAGE RELAY
RBRM	BACKUP SYSTEM RUN RELAY
ISO	INTRINSICALLY SAFE RELAY
RFS	PUMP RUN FLOAT SWITCH RELAY
RMSL	MOTOR SEAL LEAK ALARM RELAY
RFLP	FLOAT LOCKOUT PUMP RELAY
RBTF	BIO-STRICKLING FILTER RELAY



PUMP PROTECTION MODULE DETAIL, ITEM C

NOTE: REPLACE "X" WITH APPROPRIATE PUMP NO.



RELAY DETAIL ITEM M

L1A
L1N
SPARE
3
3N
SPARE
49
50
51
52
53
54
1004
1
24V-
24V-
SPARE
1002
2
11
1001
1001A
12
1003
1003A
34
3N
19
20
102
103
3P1
109
110
112
116
117
120
121
122
123
124
125
126
127
SPARE
SPARE
202
203
3P2
209
210
212
216
217
220
221
222
223
224
225
226
227

DETAIL TB1-1

SPARE
SPARE
302
303
3P3
309
310
312
316
317
320
321
322
323
324
325
326
327
SPARE
SPARE
402
403
3P4
409
410
412
416
417
420
421
422
423
424
425
426
427

DETAIL TB1-2

36A
37A
50
52
54
52A
52A
54A
L+
M
35B
38B
41B
44B
SPARE
SPARE
47B
50B
53B
13B
13AB
B
L+
M
14B
14AB
14GB
119
SPARE
L+
M
13
13A
13G
14
14A
14G
1M
2M
1L
3
30
32
34
37
38
41
33B
45
18B
SPARE

DETAIL TB2

100
112
113
114
115
117
118
119
120
121
SPARE
200
212
213
214
215
217
218
219
220
221
SPARE
300
312
313
314
315
317
318
319
320
321
SPARE
400
412
413
414
415
417
418
419
420
421
SPARE

DETAIL TB2

1500
1501
1503
1504

DETAIL TB-ISO

NOTES:

1. SEE SHEET I-181-603 FOR EQUIPMENT SCHEDULE.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

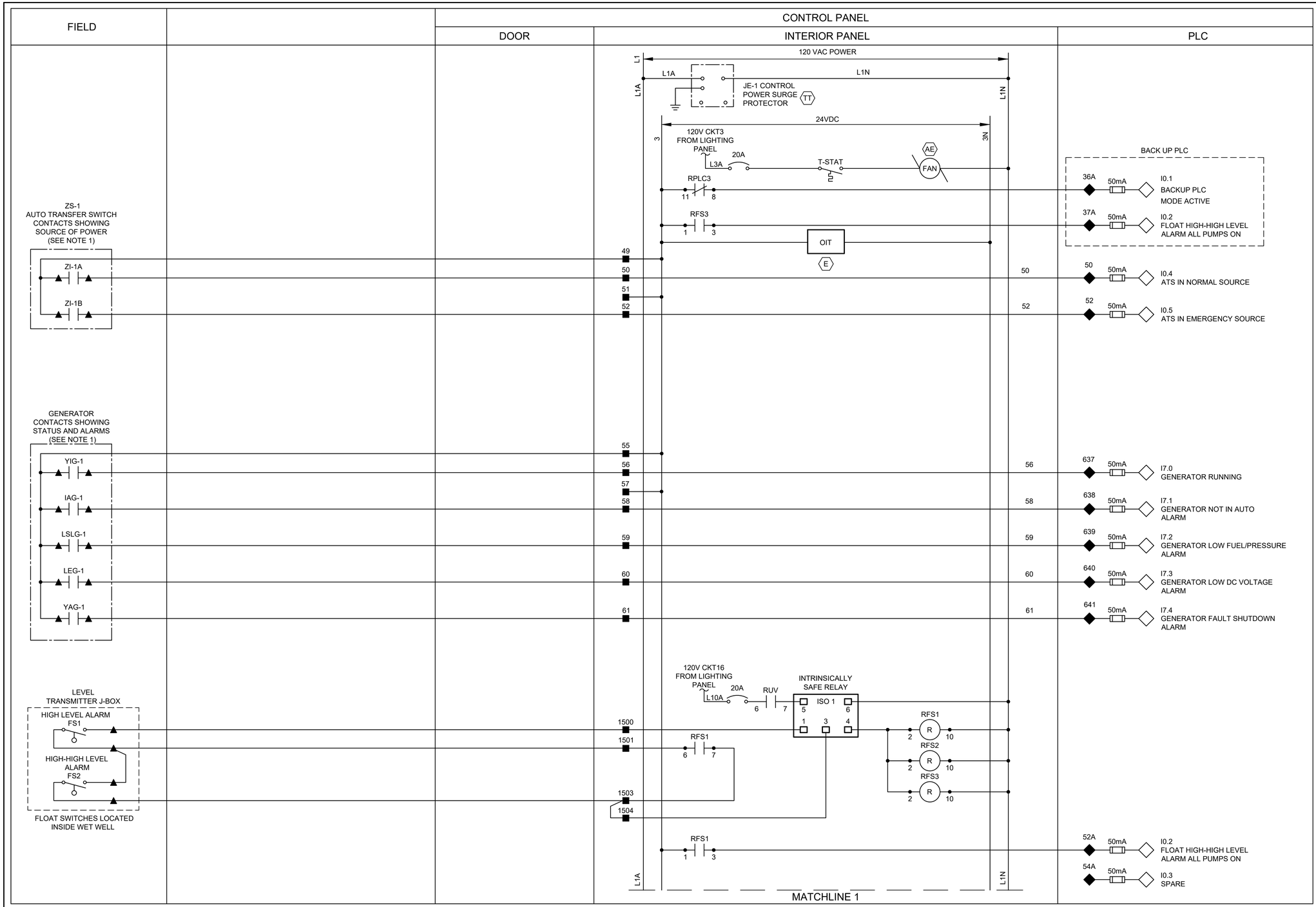
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 128 OF 226	

I-181-605

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks I-181-605.dwg



NOTES:

1. PROVIDE AUTOMATIC TRANSFER SWITCH DRY CONTACT.
2. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 1 OF 3

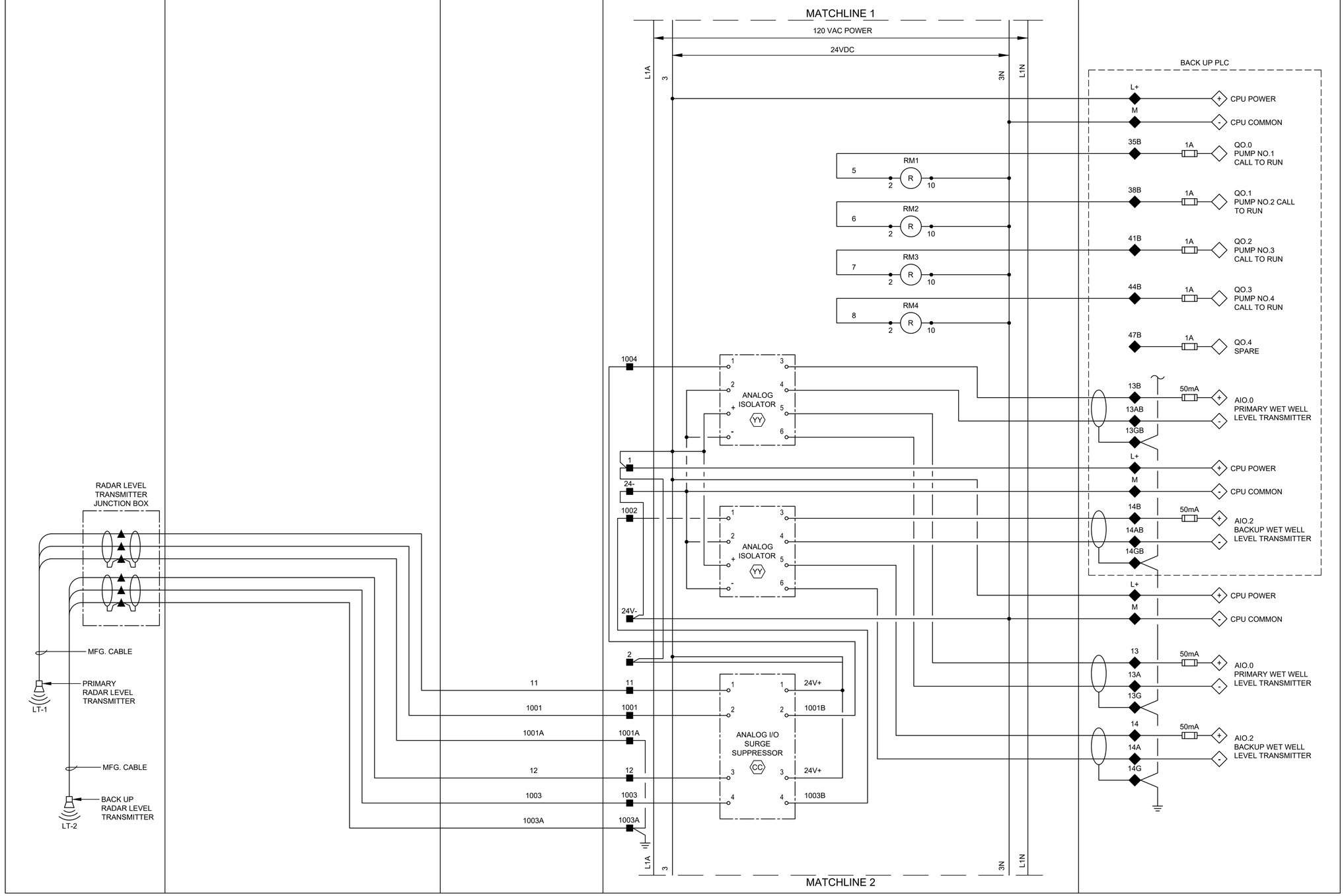
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 129 OF 226	

I-181-606

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-606.dwg

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-607.dwg

FIELD		CONTROL PANEL		
		DOOR	INTERIOR PANEL	PLC



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

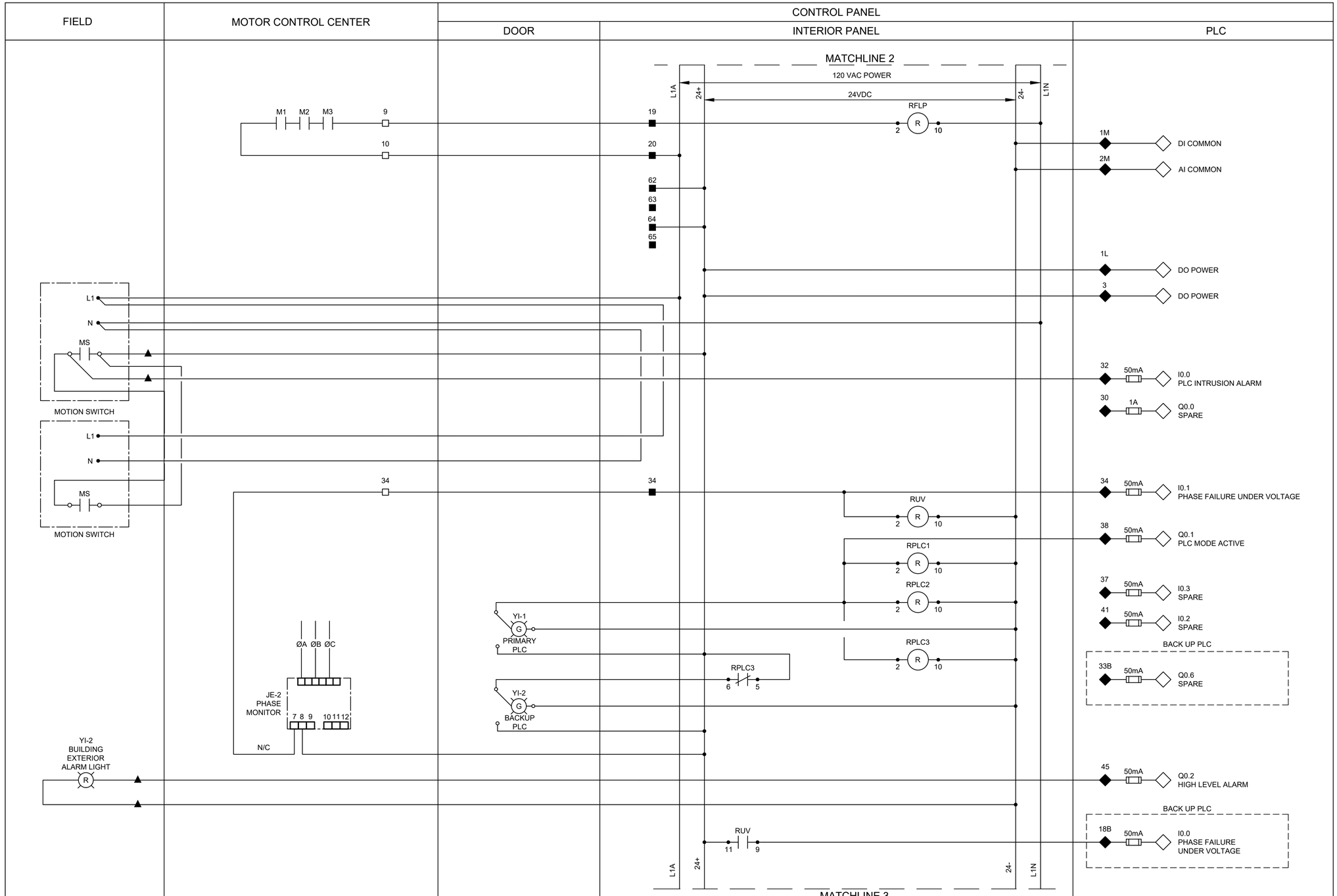
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 2 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 130 OF 226	

I-181-607

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-608.dwg



NOTES:

1. PROVIDE ONE LIMIT SWITCH PER EXTERIOR CONTROL PANEL AND POWER PANEL DOOR, WIRED IN PARALLEL.
2. RUNNING STATUS AND ALARM FROM MANUFACTURER PROVIDED BIO-TRICKLING CONTROL PANEL.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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STATE OF TEXAS
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PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

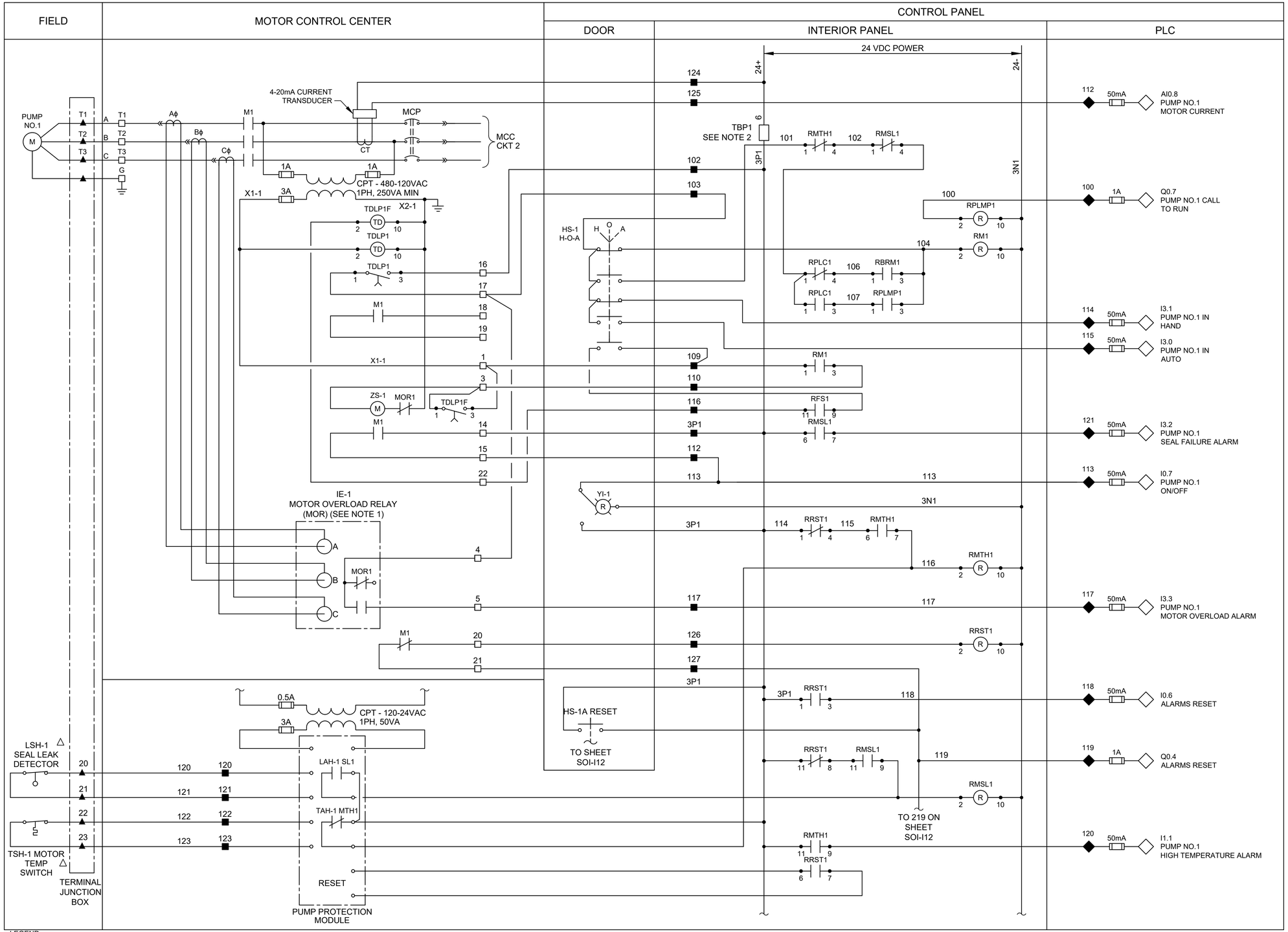
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 3 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 131 OF 226	

I-181-608

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Controls\Working\Sherwood Oaks\Sherwood Oaks I-181-609.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-181-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

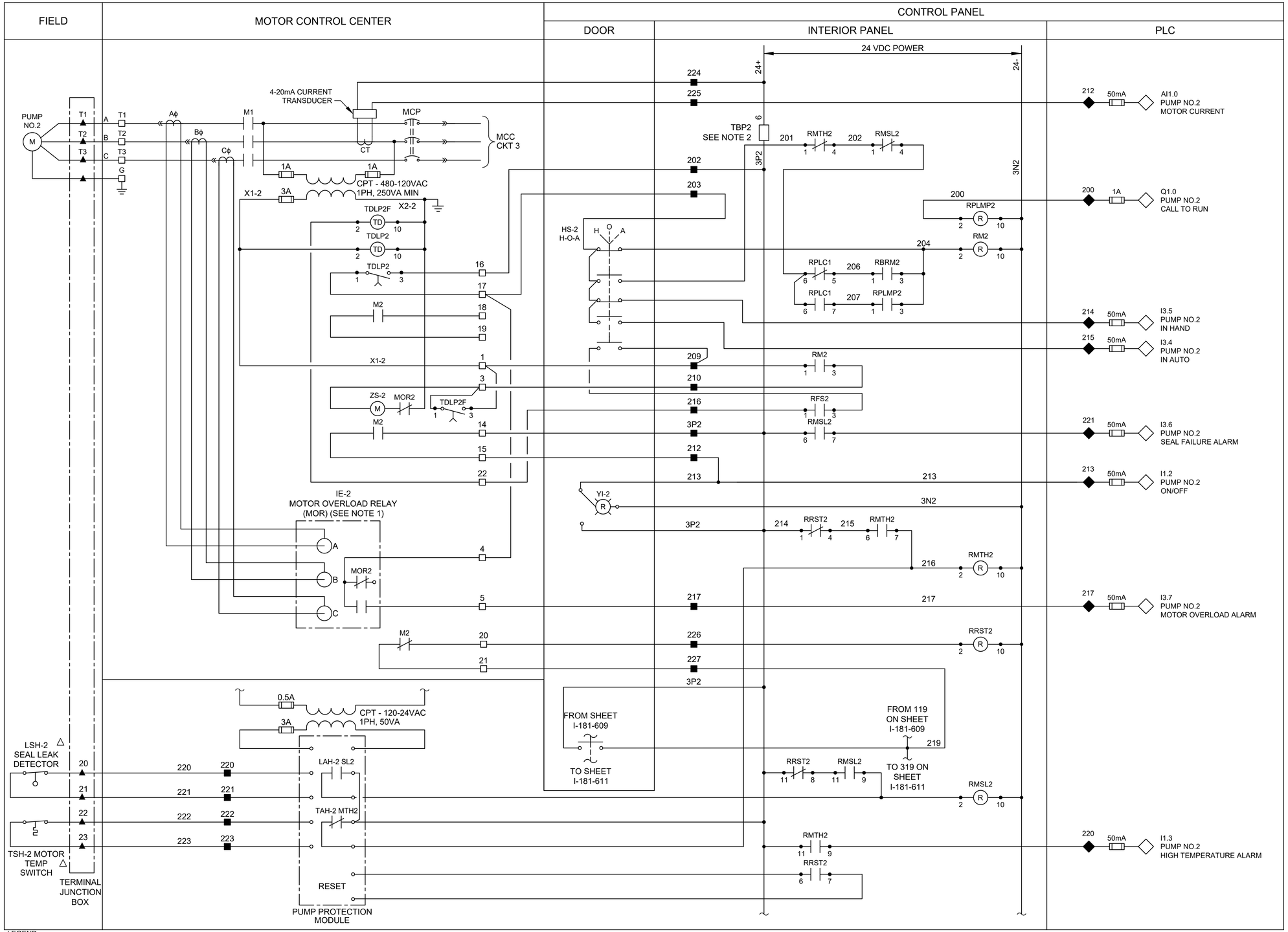
SHERWOOD OAKS LIFT STATION PUMP NO.1 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-181-609

SHEET NO. 132 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-610.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-181-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

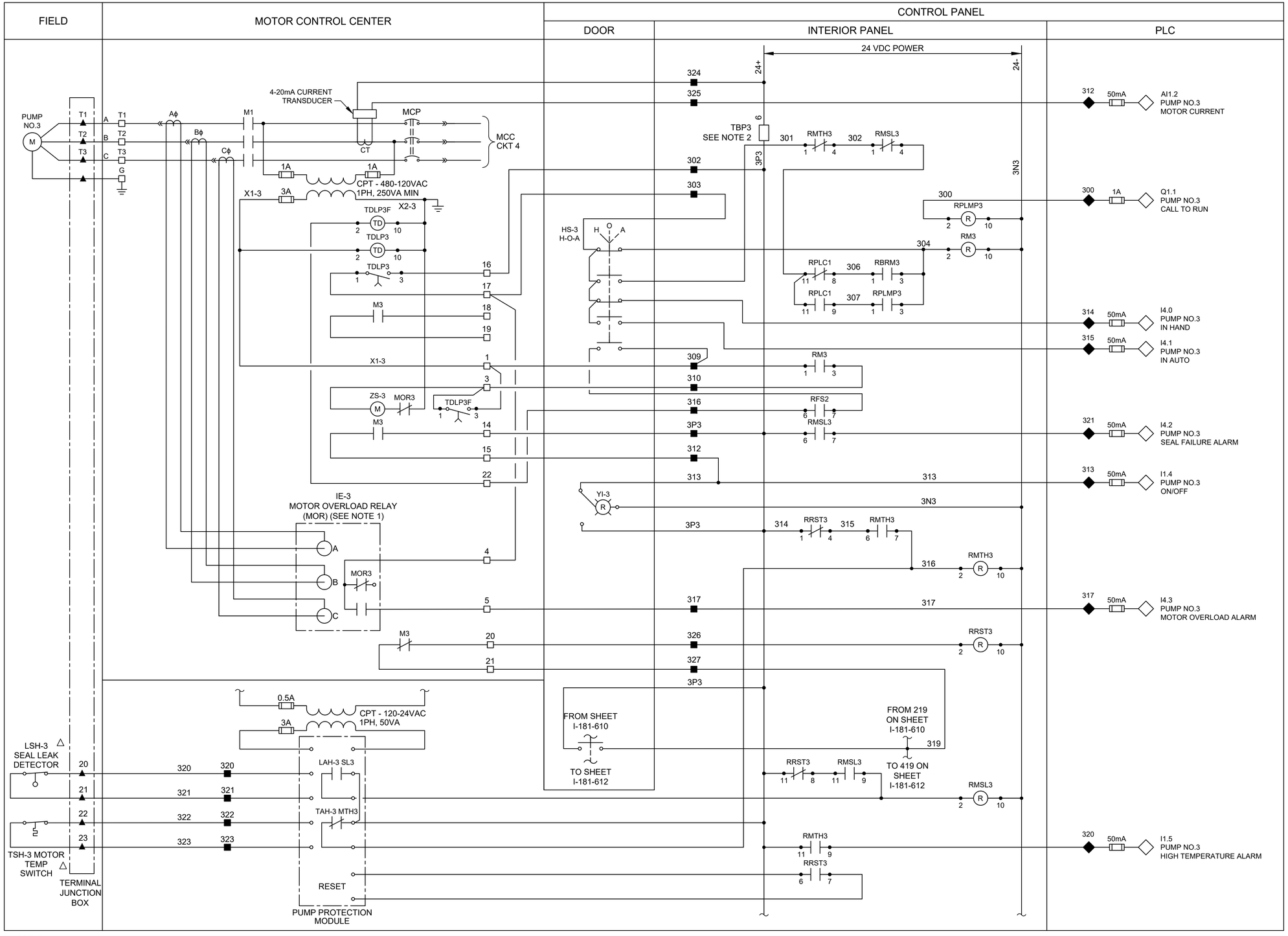
SHERWOOD OAKS LIFT STATION PUMP NO.2 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-181-610

SHEET NO. 133 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks I-181-611.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM. DRAWING NO. E-181-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
11333 CHATTERTON DR

INSTRUMENTATION

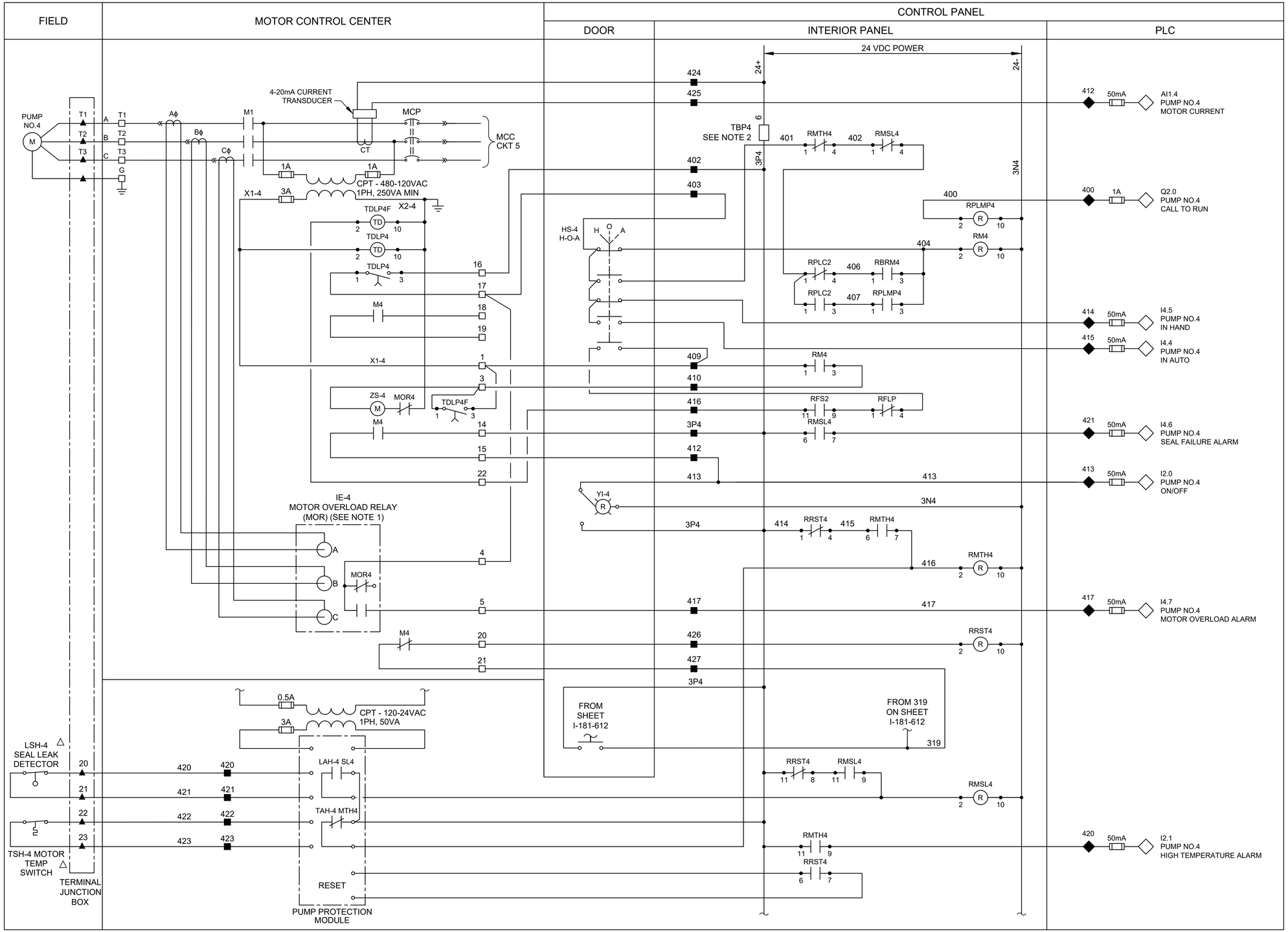
SHERWOOD OAKS LIFT STATION PUMP NO.3 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-181-611

SHEET NO. 134 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-612.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM. DRAWING NO. E-181-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

GAI
Gupta & Associates, Inc.
CONSULTING ENGINEERING
Registration No. F-2593
302 Dennis St.
Houston, Texas 77006
Tel: 713-636-2936
Fax: 713-636-2987
email: hforouzan@gaiconsulting.com

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

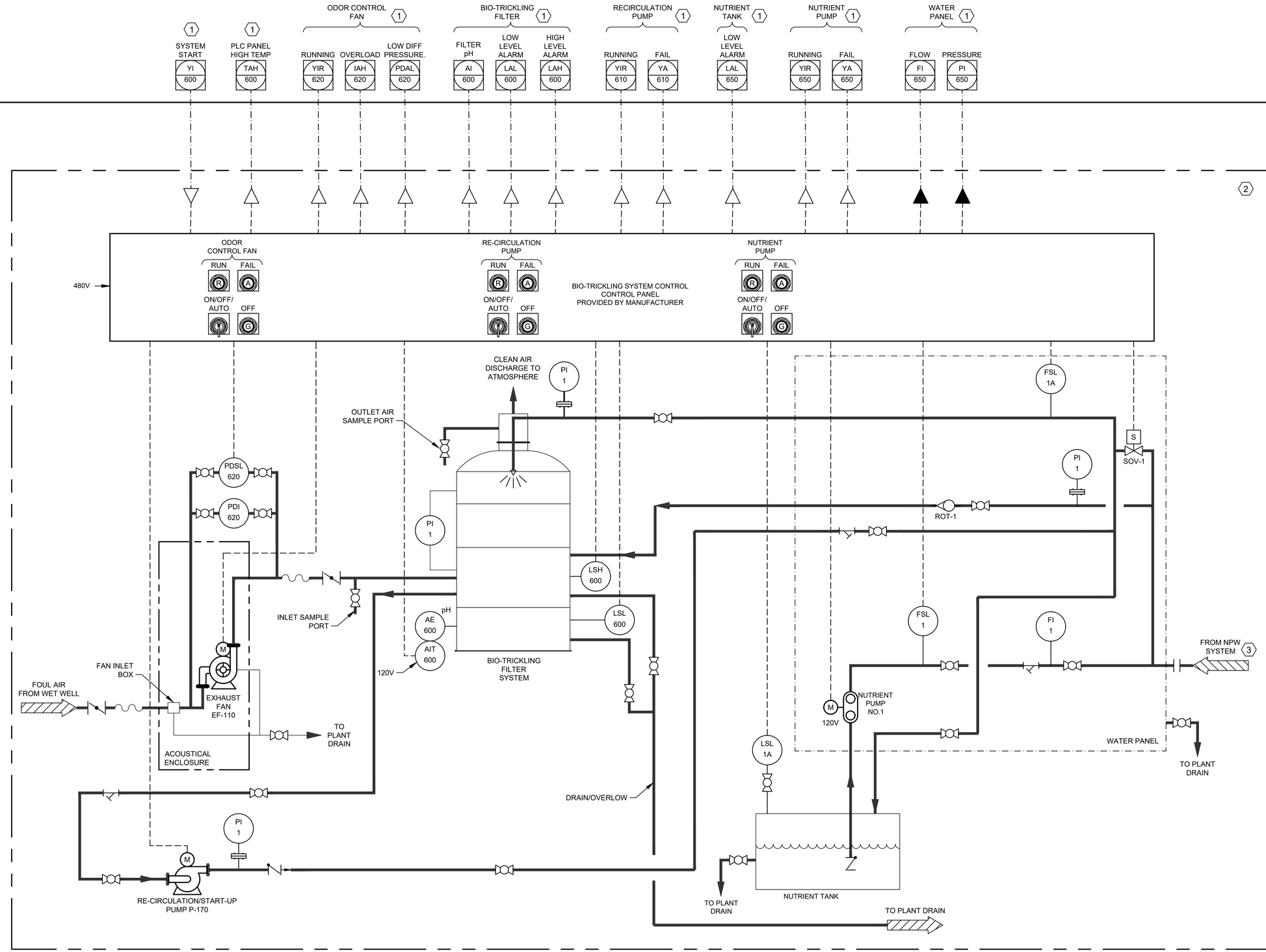
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION PUMP NO.4 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-181-612

SHEET NO. 135 OF 226



NOTES:

1. SYSTEM SIGNALS SHALL BE HARD WIRED TO LIFT STATION PLC.
2. ITEMS SHOWN INSIDE THE DASHED BOX SHALL BE SUPPLIED AND PACKAGED BY THE ODOR CONTROL SYSTEM SUPPLIER.
3. NPW SYSTEM WATER CONSISTS OF POTABLE WATER AFTER A BACKFLOW PREVENTER.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

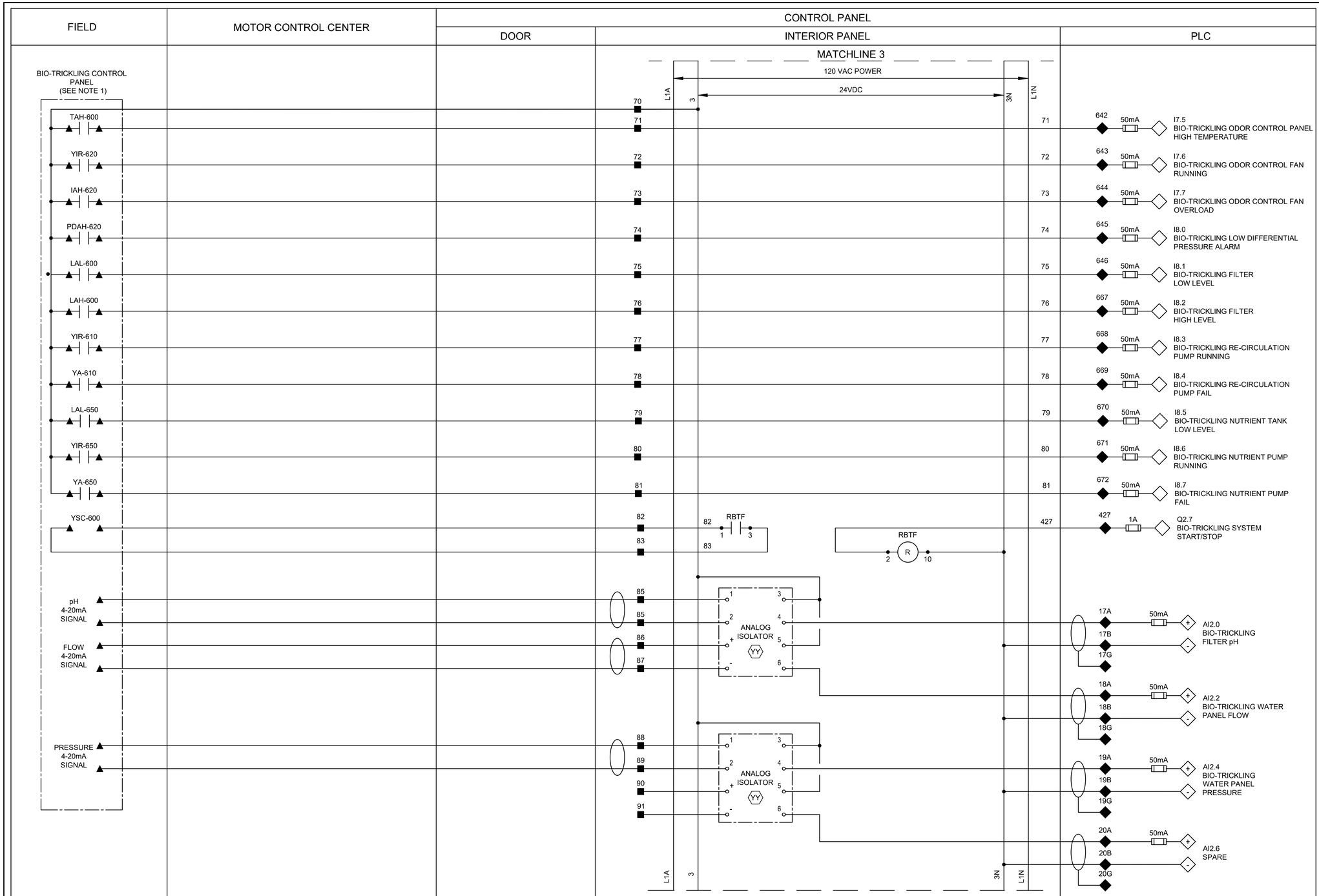
INSTRUMENTATION

SHERWOOD OAKS LIFT STATION ODOR CONTROL P&ID DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 136 OF 226	

I-181-613

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks I-181-613.dwg



NOTES:

1. RUNNING STATUS AND ALARM FROM MANUFACTURER PROVIDED BIO-TRICKLING CONTROL PANEL.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

11333 CHATTERTON DR

INSTRUMENTATION

SHERWOOD OAKS LIFT STATION ODOR CONTROL CONTROL WIRING DIAGRAM

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DRAWING SCALE	
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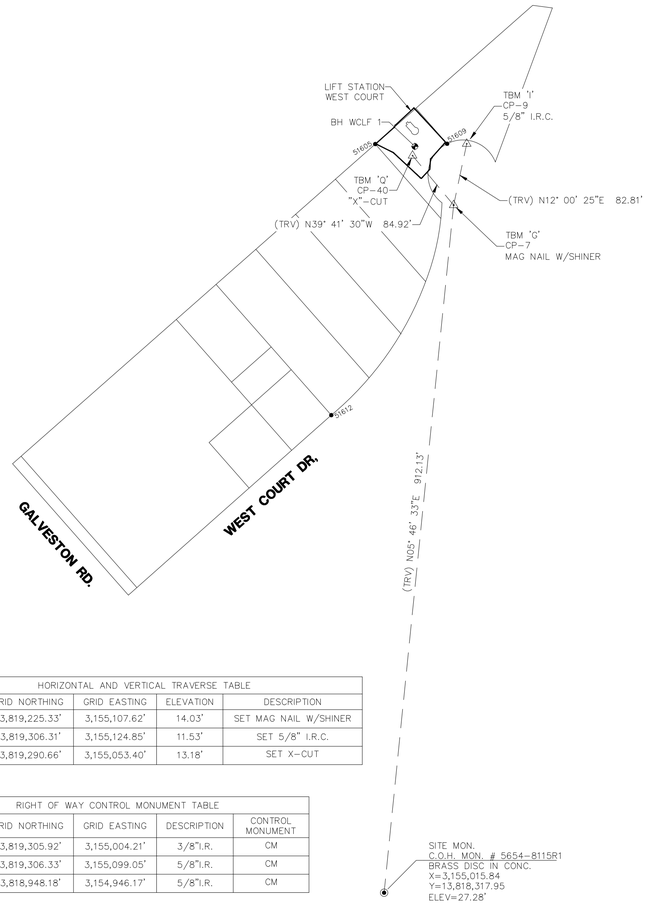
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 137 OF 226	

I-181-614

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\Sherwood Oaks\Sherwood Oaks I-181-614.dwg



HORIZONTAL AND VERTICAL TRAVERSE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
7	13,819,225.33'	3,155,107.62'	14.03'	SET MAG NAIL W/SHINER
9	13,819,306.31'	3,155,124.85'	11.53'	SET 5/8" I.R.C.
40	13,819,290.66'	3,155,053.40'	13.18'	SET X-CUT

RIGHT OF WAY CONTROL MONUMENT TABLE				
POINT #	GRID NORTHING	GRID EASTING	DESCRIPTION	CONTROL MONUMENT
51605	13,819,305.92'	3,155,004.21'	3/8"I.R.	CM
51609	13,819,306.33'	3,155,099.05'	5/8"I.R.	CM
51612	13,818,948.18'	3,154,946.17'	5/8"I.R.	CM

HORIZONTAL AND VERTICAL TRAVERSE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
30353	13,819,302.79'	3,155,056.47'	13.12'	BH WCLF 1

CITY OF HOUSTON

CITY SURVEY 5654-8115R1
SITE CONTROL MONUMENT

Project WBS# R-000020-0089-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,155,015.84
Y= 13,818,317.95

Lat.= N 29°41'33.19"
Lon.= W 95°15'43.85"

Reference Frame Used: ITRF (EPOCH: 2010.0000)
Vertical Adjustment used: NAVD '88 (CORS '96)
General Location: ON EAST SIDE OF BRIDGE AT GALVESTON ROAD AND SIMS BAYOU APPROX. 540' NORTHWEST OF ROCKLEIGH INTERSECTION
Date Set: 05-15-2003 Type of Mark: BRASS DISK (TSARP 030020)
3 Nearest project control points (bearings and distances stated below):
TO CP-7, MAG NAIL W/SHINER, S 10° 33' 12" E ~ 625.99'
TO CP-8, MAG NAIL W/SHINER, N 04° 51' 04" W ~ 68.62'

NOTE:
1. Bearings are grid bearings.
2. Scale Factor = 0.999870017
3. Surface= Grid
S.F.

Keymap Page: 535F
Orthometric Elevation = 27.28
Ellipsoid Height= -62.09
Geoid: GEOID 12B
Datum Source & Adjustment:
NAD '83 (CORS '96)

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
10-24-24

United Engineers, Inc.
8301 SOUTHWEST FREEWAY, SUITE 500
HOUSTON, TEXAS 77074
ENGINEERING FIRM # F-00142
TEL: (713) 271-2900
FAX (713) 271-2999
SURVEY FIRM # 10117B-00

Date Observed: September 30, 2024
City of Houston, Harris County, Texas

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM No.:	030020	**Reference Mark Status**	
Stream Number:	C100-00-00	**Date:**	6/4/2013
		Condition:	Recovered
County: Harris	**State:** Texas	**Established By:**	CDS/Muery & Pate Eng.
Key Map No.:	535Q	**Date Established:**	5/14/2003
NGS Classification(1):	Range VI	**Watershed:**	Sims Bayou
RM's Directly Tied:	030205,030025,030015	**Survey Method Horz:**	GPSOBS
Units of Measure:	US Survey Foot	**Survey Method Vert:**	GPSOBS
Horizontal Datum:	NAD83	**Vertical Datum:**	NAVD88
Horizontal Adj.(2):	2001 Adjustment	**Vertical Adj.(3):**	2001 Adjustment
Projection Zone:	Texas South Central 4204	**Geoid Model Used:**	GEOID99 (CONUS)
Station Name:	030020	**Contractor PID:**	3076
Marker:	Brass DISC	**Rod Depth:**	NA
Stamping:	C100 RAINS	**Sleeve Depth:**	NA
Mark Logo:	HCFCD	**Geoid Height:**	-88.98
Latitude:	29° 41' 33.19363" N	**Northing:**	13818317.82
Longitude:	95° 15' 43.84993" W	**Easting:**	3155015.85
Ellipsoid Height:	-62.15	**Elevation(4):**	27.09
Convergence:	1° 49' 52"	**Scale Factor:**	0.99988265
Satellite Observable:	YES	**Elevation Factor:**	1.00000297
NGS PID (if applic):	NA	**Combined Factor:**	0.99988562

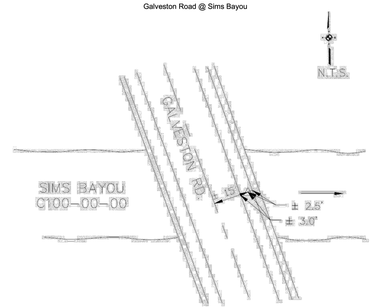
Notes:
1. This is NGS' new classification system. Range VI indicates that this position meets the 0.02m-0.05m Accuracy Standard for Horizontal Position, Ellipsoidal Height, and Orthometric Height (elevation) at the 95% confidence level (m=meters).
2. Horizontal Adjustment - This survey is constrained to the NGS Published Horizontal positions of the geodetic stations adjusted by NGS in 2001.
3. Vertical Adjustment - This survey is constrained to the NGS Published Elevation for Northeast 2250 CORS ARP adjusted by NGS in 2001 and as published in PID AJ6430. Epoch Date 1997.00.
4. The elevation shown equals the Ellipsoid Height minus Geoid Height (from GEOID99) plus a constant of 0.253 feet.
5. The elevation is established by differential leveling techniques, utilizing the published elevations from nearby Reference Marks.

Station Recovery Data: Report an Issue with a Reference Mark - submit to Harris County Flood Control

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM Number: 030020
Stream Number: C100-00-00
Northing: 13818317.82 **Easting:** 3155015.85 **Elevation:** 27.09

Location:
Galveston Road @ Sims Bayou



To Reach Description
From the intersection of Park Place Boulevard and Galveston Road, travel Southeast on Galveston Road approximately 0.2 mile to bridge at Bayou. Monument is located on the East side of bridge on sidewalk at centerline of stream.

Photo 1-Station Detail:

Photo 2-Station Area Picture:

TSARP CONVERSION REFERENCE MONUMENT

(TSARP) HARRIS COUNTY FLOODPLAIN REFERENCE MARK NUMBER 030020
FLOOD PLAIN REFERENCE MARK, BRASS DISC, STAMPED C100 RAINS.
FROM THE INTERSECTION OF PARK PLACE BLVD. AND GALVESTON ROAD, TRAVEL SOUTHEAST ON GALVESTON ROAD APPROXIMATELY 0.2 MILE TO BRIDGE AT BAYOU. MONUMENT IS LOCATED ON EAST SIDE OF BRIDGE ON SIDEWALK AT CENTERLINE OF STREAM.
PUBLISHED ELEV= 27.09' (NAVD 1988, 2001 ADJUSTMENT)
OBSERVED ELEV= 27.28' (NAVD 1988, (CORS '96) COMPUTED USING GEOID 12B)

TBM LIST:

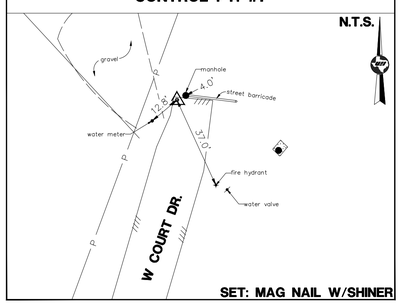
TBM 'G', CP-7, MAG NAIL W/SHINER.
ELEV=14.03'

TBM 'H', CP-8, MAG NAIL W/SHINER.
ELEV=18.02'

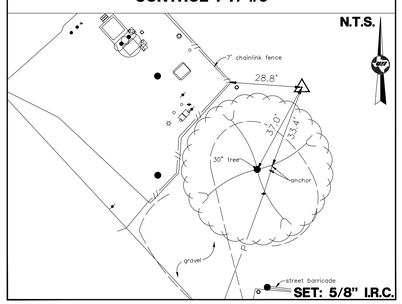
TBM 'I', CP-9, 5/8-INCH IRON ROD WITH CAP.
ELEV=11.53'

TBM 'Q', CP-40, X-CUT IN CONCRETE.
ELEV=13.18'

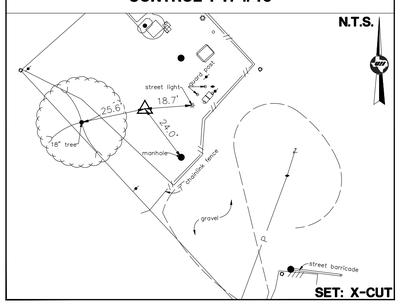
CONTROL PT. #7



CONTROL PT. #9



CONTROL PT. #40



CERTIFICATION:

I HEREBY CERTIFY THAT: (1) THIS PLAT WAS PREPARED FROM AN ON THE GROUND SURVEY MADE UNDER MY SUPERVISION; (2) THAT THIS PLAT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF SURVEY; (3) THAT THIS PLAT AND THE SURVEY IT REPRESENTS, CONFORMS TO THE REQUIREMENTS OF THE LAND SURVEYING PRACTICES ACT IN EFFECT AT THE TIME OF THE SURVEY FOR THE TYPE OF PROFESSIONAL SERVICE SO STATED.

TYPE OF PROFESSIONAL SERVICE: TOPOGRAPHIC AND R.O.W. SURVEY

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
6-9-25

CHRISTIN M. NORRIS, R.P.L.S. 6207 DATE

C-207-101

100 0 50 100 200
SCALE: 1" = 100'

LEGEND:
HCAD PROPERTY LINE
10' U.E.
EASEMENT
RIGHT-OF-WAY PROPERTY LINE
(TRV.) N 00° 00' 00" E. TRAVERSE LINE
(BL.) N 00° 00' 00" E. BASELINE
CONTROL MONUMENTS

GENERAL NOTES:
CP= indicates Traverse Point
BP# indicates Baseline Point
(TRV.) indicates Traverse Line
(BL) indicates Baseline Line
CM indicates Control Monument
Fnd. indicates Found
RT indicates Right
LT indicates Left
XC indicates "X" Cut
I.P. indicates Iron Pipe
I.R. indicates Iron Rod
I.R.C. indicates Iron Rod w/Cap
P.I.P. indicates Pinch Iron Pipe
MAG indicates MAG Nail
U.T.S. indicates unable to set
PC indicates Point of Curve
PCC indicates Point of Compound Curvature
PT indicates Point of Tangent
TBM indicates Temporary Benchmark
#XXXX indicates Address
W.L.E. indicates Water Line Easement
U.E. indicates Utility Easement
S.S.E. indicates Sanitary Sewer Easement
S.E. indicates Storm Sewer Easement
B.L. indicates Building Line
M.R.H.C.C. TX. indicates Map Records Harris County, Texas
D.R.H.C., TX. indicates Deed Records Harris County, Texas
H.C.C.F. indicates Harris County Clerk's File
O.P.R.R.P.H.C., TX. indicates Official Public Records Real Property Harris County, Texas

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE TIED TO THE NSRS AND EXPRESSED IN THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, NAD 83' (2011), ITRF (EPOCH 2010.0000), NAVD '88 (GEOID 12B).
2. ALL DISTANCES SHOWN HEREON ARE SURFACE VALUES. ALL COORDINATES SHOWN HEREON ARE GRID VALUES UNLESS OTHERWISE NOTED. TO CONVERT SURFACE VALUES TO GRID VALUES MULTIPLY BY THE SCALE FACTOR OF 0.999870017.
3. THE RIGHT OF WAY SHOWN HEREON IS BASED ON THE BEST AVAILABLE EVIDENCE FOUND IN THE FIELD AT THE TIME OF THE SURVEY COUPLED WITH THE DOCUMENTS OF RECORD IN THE COUNTY CLERK'S OFFICE PROVIDED BY COURTHOUSE SPECIALIST.
4. TO CONVERT PROJECT TO TSARP DATUM (GD99) SUBTRACT 0.19 FEET FROM ALL ELEVATIONS.

United Engineers, Inc.
CIVIL ENGINEERING • LAND DEVELOPMENT
CONSTRUCTION MANAGEMENT
SURVEYING • UTILITY ENGINEERING
ENGINEERING FIRM # F-00142 SURVEY FIRM # 10117B-00
10375 RICHMOND AVE., SUITE 1325 TEL. (713) 271-2900
HOUSTON, TEXAS 77042 FAX (713) 271-2999

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

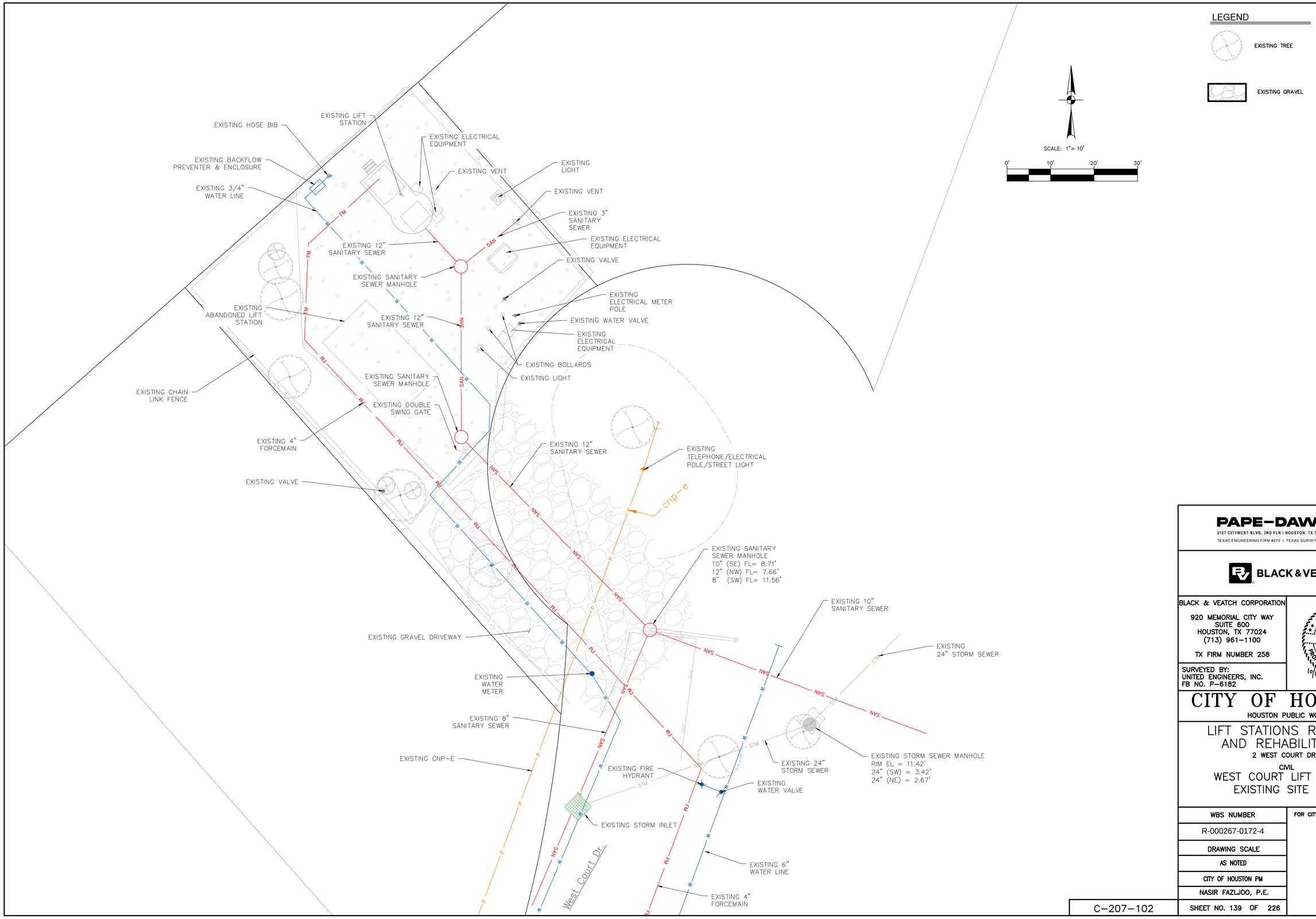
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATION RENEWAL AND REHABILITATION

WEST COURT LIFT STATION
SURVEY CONTROL MAP
SHEET 1 OF 1
SURVEY

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
H: 1"=100'	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 138 OF 226	

K:\CIV\224-076 - Four LS Black and Veatch\Survey\Dwg\SURVEY CONTROL MAP\SCM MASTER 4LS.dwg Aug 08, 2025



LEGEND

EXISTING TREE

EXISTING GRAVEL

SCALE: 1"= 10'

0' 10' 20' 30'

PAPE-DAWSON

2107 CITYWEST BLVD, 3RD FLR | HOUSTON, TX 77042 | 713.428.2400

TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
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FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION EXISTING SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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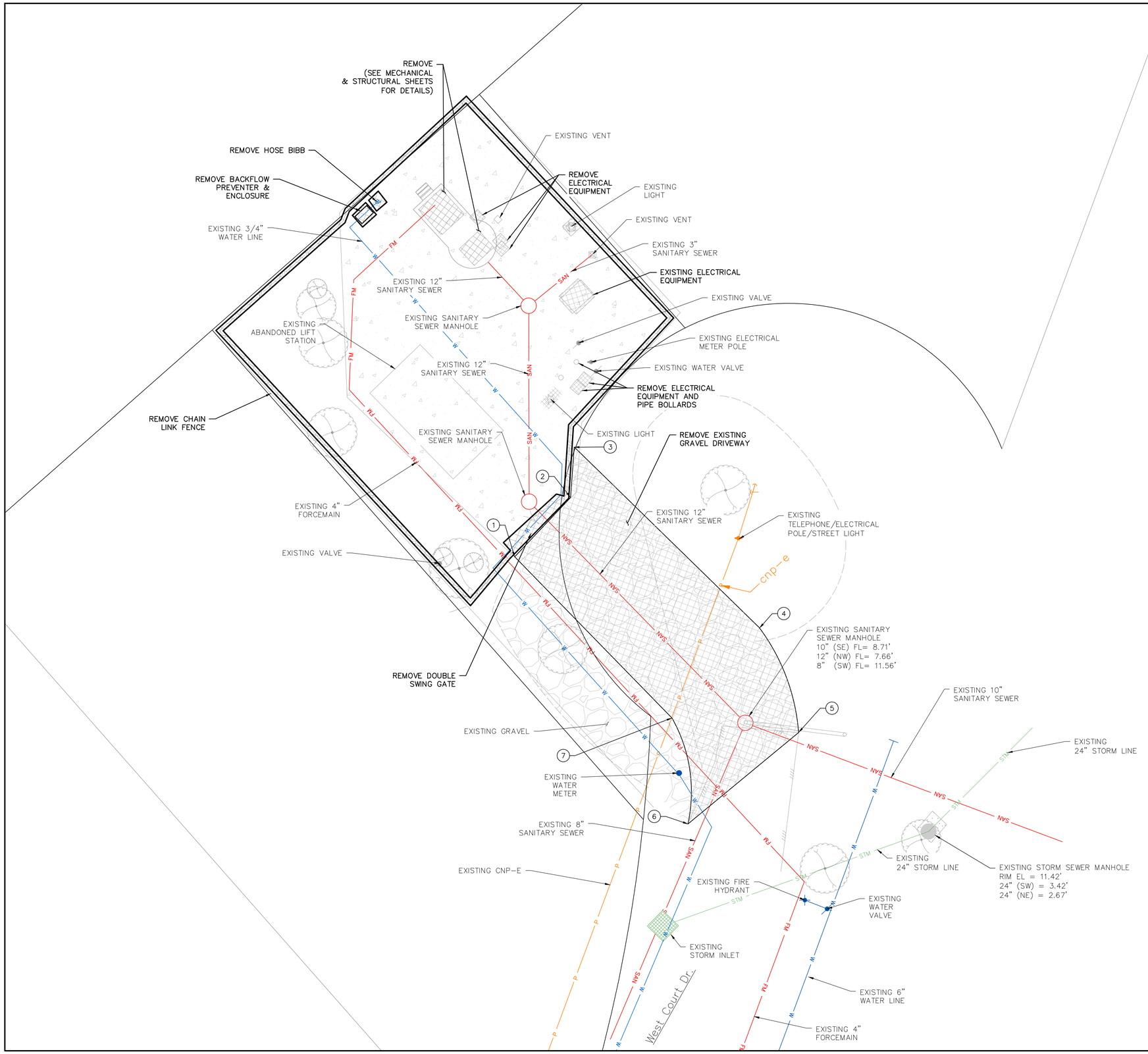
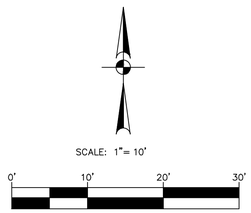
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 139 OF 226	

C-207-102

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\EXISTING SITE PLAN.dwg





Point Table		
Point #	Northing	Easting
1	13821056.5188	3155475.0058
2	13821068.4197	3155486.2056
3	13821078.5069	3155486.9673
4	13821042.2480	3155524.1318
5	13821021.3154	3155531.9802
6	13821002.9313	3155509.7503
7	13821024.2015	3155506.5241

LEGEND

- DEMOLISH/REMOVE
- EXISTING TREE
- EXISTING GRAVEL

NOTES:

1. THE SOUND PRODUCED BY THE ERECTION, EXCAVATION, CONSTRUCTION, OR DEMOLITION OF ANY BUILDING OR STRUCTURE, INCLUDING THE USE OF ANY NECESSARY TOOLS OR EQUIPMENT, CONDUCTED BETWEEN THE HOURS OF 7 A.M. AND 8 P.M., SHALL NOT PRODUCE A SOUND EXCEEDING 85 DB(A) WHEN MEASURED FROM THE PROPERTY LINE OF THE RESIDENTIAL PROPERTY WHERE THE SOUND IS BEING RECEIVED.
2. PER SECTION 01145S, THE CITY OF HOUSTON TO HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

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920 MEMORIAL CITY WAY
SUITE 600
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SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

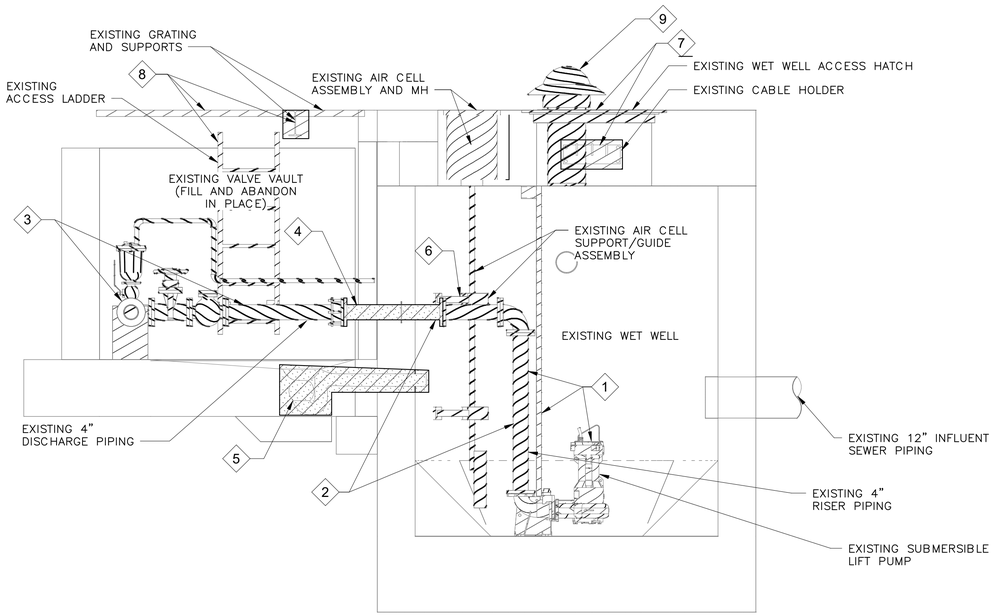
DEMOLITION

WEST COURT LIFT STATION SITE DEMOLITION PLAN

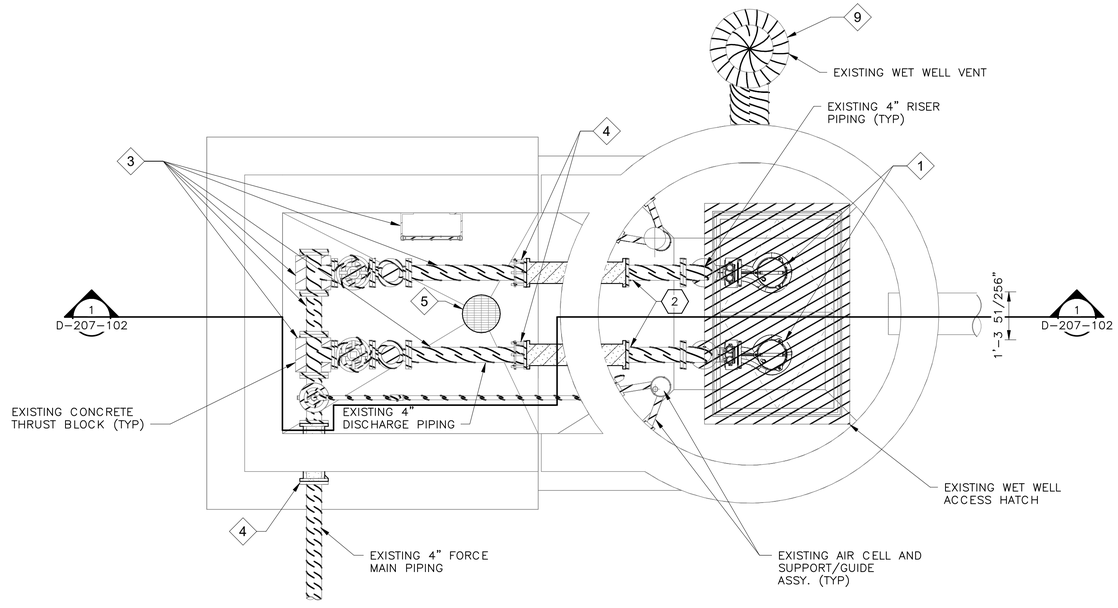
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 140 OF 226	

D-207-101

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\SITE DEMOLITION PLAN.dwg



1 SECTION
D-207-102 1/2" = 1'-0"



LOWER LEVEL – DEMOLITION PLAN
1/2" = 1'-0"

2 S-207-302

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING SUBMERSIBLE PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE.
2	DEMOLISH THE EXISTING RISER PIPING UP TO THE WALL PIPE. INSTALL A PLUG ON THE WALL PIPE AND ABANDON IN PLACE.
3	DEMOLISH ALL DISCHARGE PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE LOCATED INSIDE THE EXISTING VALVE VAULT.
4	PLUG ALL WALL PIPE CONNECTIONS LOCATED INSIDE THE EXISTING VALVE VAULT AND ABANDON IN PLACE.
5	PLUG THE EXISTING VALVE VAULT DRAIN AND ABANDON IN PLACE.
6	DEMOLISH THE EXISTING AIR CELL SYSTEM, ASSOCIATED SUPPORTS, GUIDES, ASSEMBLY ITEMS, AND HARDWARE.
7	DEMOLISH EXISTING WET WELL HATCHES, ASSOCIATED SUPPORTS, HARDWARE, AND CABLE HOLDER ASSEMBLY.
8	DEMOLISH EXISTING VALVE VAULT GRATING PANELS, HATCHES, ACCESS LADDERS, SUPPORTS, AND ASSOCIATED HARDWARE.
9	DEMOLISH EXISTING WET WELL VENTING AND ASSOCIATED HARDWARE.

LEGEND

TO BE DEMOLISHED

TO BE ABANDONED-IN-PLACE

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON-SHRINK GROUT.
3. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STRUCTURE AFTER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
4. ALL DEMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONSTRUCTION PHASING PLANS.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
6. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.
7. REFER TO SPECIFICATIONS FOR DIVERSION PUMPING REQUIREMENTS.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100

TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

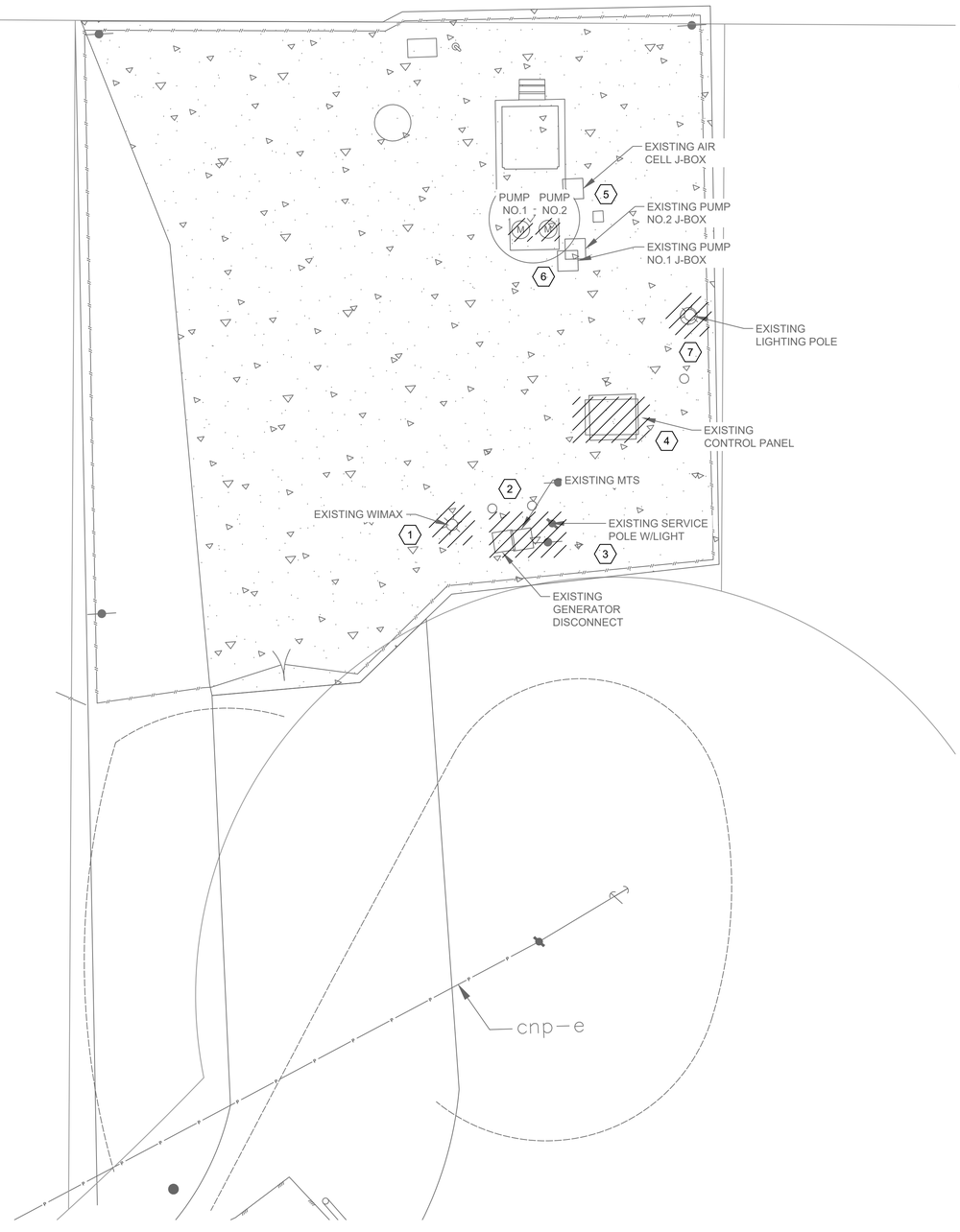
LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

DEMOLITION
WEST COURT LIFT STATION
DEMOLITION PLAN AND SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 141 OF 226	

D-207-102

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-207-WEST_COURT_LS-BV.rvt



WEST COURT LIFT STATION
ELECTRICAL DEMOLITION SITE

PLAN

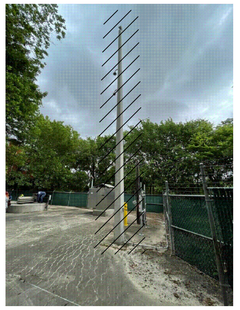
1" = 8'-0"

SCALE: 1"= 8'

0' 8' 16' 24'

NOTES BY SYMBOL "⟨#⟩":

1. EXISTING WIMAX POLE TO BE DEMOLISHED AND REMOVED.
2. EXISTING MTS AND GENERATOR DISCONNECT SWITCH TO BE REMOVED AND RETURNED TO THE WASTEWATER FACILITY MAINTENANCE DEPARMENT OF THE CITY.
3. EXISTING SERVICE POLE, METER, AND SERVICE DISCONNECT TO BE DEMOLISHED AND REMOVED.
4. EXISTING LIFT STATION CONTROL CABINET TO BE DEMOLISHED AND REMOVED.
5. EXISTING AIR CELL J-BOX TO BE DEMOLISHED AND REMOVED.
6. EXISTING PUMP NO.1 AND NO.2 J-BOX TO BE DEMOLISHED AND REMOVED.
7. EXISTING YARD LIGHT TO BE DEMOLISHED AND REMOVED.



EXISTING WIMAX POLE ⟨1⟩

PHOTOGRAPH A
NTS -

EXISTING MTS AND GENERATOR DISCONNECT SWITCH ⟨2⟩

PHOTOGRAPH B
NTS -

EXISTING METERING POLE AND MAIN DISCONNECT ⟨3⟩

PHOTOGRAPH C
NTS -

EXISTING CONTROL PANEL ⟨4⟩

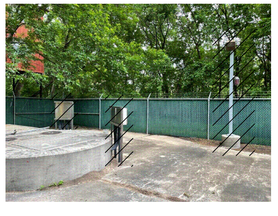
PHOTOGRAPH D
NTS -

EXISTING AIR CELL J-BOX ⟨5⟩

PHOTOGRAPH E
NTS -

EXISTING PUMP NO.1 & NO.2 J-BOX ⟨6⟩

PHOTOGRAPH F
NTS -



EXISTING LIGHT POLE ⟨7⟩

PHOTOGRAPH G
NTS -

LEGEND:

ITEMS TO BE DEMOLISHED.

GAI
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CONSULTING ENGINEERING
Registration No. F-2593
302 Dennis St.
Houston, Texas 77006
Tel: 713-636-2936
Fax: 713-636-2987
email: hforouzan@gaiconsulting.com

BLACK & VEATCH

BLACK & VEATCH CORPORATION
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(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

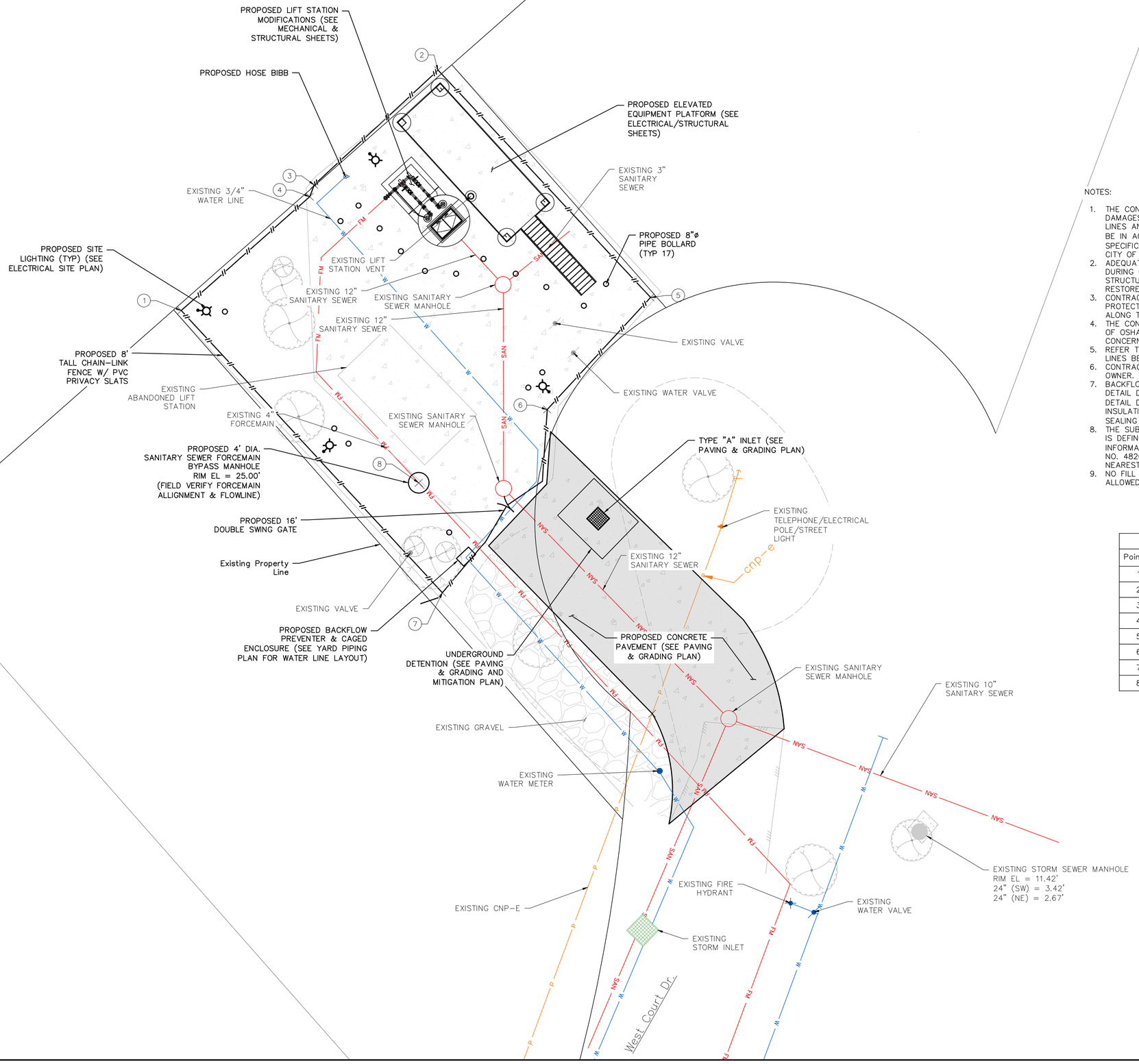
ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
DEMOLITION SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 142 OF 226	

D-207-103

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court D-207-103.dwg



LEGEND

PROPOSED 7" THICK CONCRETE PAVEMENT

EXISTING TREE

SCALE: 1"= 10'

0' 10' 20' 30'

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. BACKFLOW PREVENTOR TO BE AS PER COH STANDARD DETAIL DWG. ZOC10 AND HOSE BIBB AS PER COH STANDARD DETAIL DWG. ZOC07. GREEN BACKFLOW COVER/BAG MIN. INSULATION RATING R-13 WITH ZIP TIES AND GROMMETS FOR SEALING (MIN. SIZE 24"x24").
8. THE SUBJECT TRACT LIES WITHIN SHADED ZONE AE, WHICH IS DEFINED AS AN AREA WITH BASE FLOOD ELEVATION. THIS INFORMATION IS PER FEMA'S FLOOD INSURANCE RATE MAP NO. 48201C0885N, EFFECTIVE DATE MAY 2, 2019. THE NEAREST 100-YR BASE FLOOD ELEVATION IS 21.00 FT.
9. NO FILL IS ALLOWED IN THE FLOODPLAIN AND NO FILL IS ALLOWED IN THE FLOODWAY.

Point Table		
Point #	Northing	Easting
1	13821102.3003	3155415.8444
2	13821148.6013	3155465.3080
3	13821126.5031	3155441.4476
4	13821124.2397	3155440.5905
5	13821104.8298	3155506.2345
6	13821083.2365	3155486.3245
7	13821047.9460	3155466.1418
8	13821069.1064	3155461.5889

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2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION PROPOSED SITE PLAN

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CITY OF HOUSTON PM	
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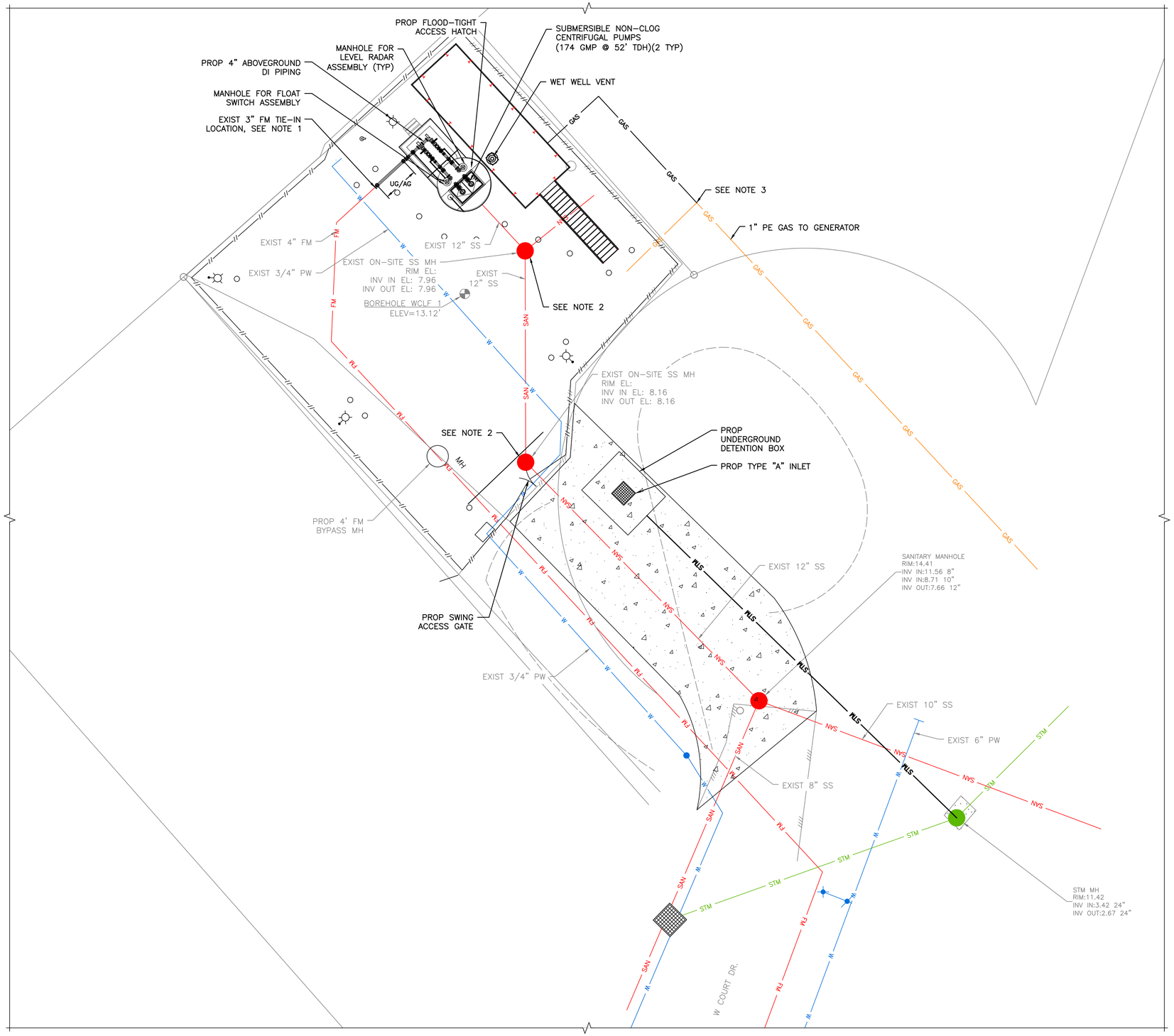
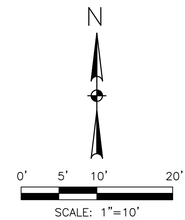
C-207-103

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\PROPOSED SITE PLAN.dwg





NOTES:

1. CONTRACTOR SHALL CONFIRM THE LOCATION, ALIGNMENT, AND DEPTH OF THE EXISTING 4" FORCE MAIN AT THE LIFT STATION STRUCTURE PRIOR TO INSTALLING THE PROPOSED ABOVEGROUND DISCHARGE PIPING.
2. REPAIR INFLUENT MANHOLE INTERIOR SURFACES, BLAST, AND APPLY PROTECTIVE COATING.
3. LOCATION OF NATURAL GAS LINE TO BE DETERMINED AFTER COORDINATION WITH CENTERPOINT GAS.

   CONNECTION FOR PROPOSED NATURAL GAS LINE TO EXISTING GAS LINE SHALL BE FIELD LOCATED AND ROUTED BY THE CONTRACTOR. ANY PORTION OF THE EXISTING NATURAL GAS LINE NOT USED IN THE PROPOSED GAS LINE SHALL BE DISCONNECTED AND/OR CAPPED.

   CONTRACTOR SHALL COORDINATE CONNECTION TO PROPOSED EQUIPMENT AS DETERMINED BY THE LOCATION OF THE PROPOSED NATURAL GAS LINE.

CITY OF HOUSTON WASTEWATER OPERATIONS SHALL OWN AND MAINTAIN THE PROPOSED UNDERGROUND DETENTION BOX WITHIN THE RIGHT–OF–WAY.

BLACK & VEATCH

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UNITED ENGINEERS, INC.
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STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION PROPOSED YARD PIPING PLAN

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AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 144 OF 226	

C–207–104

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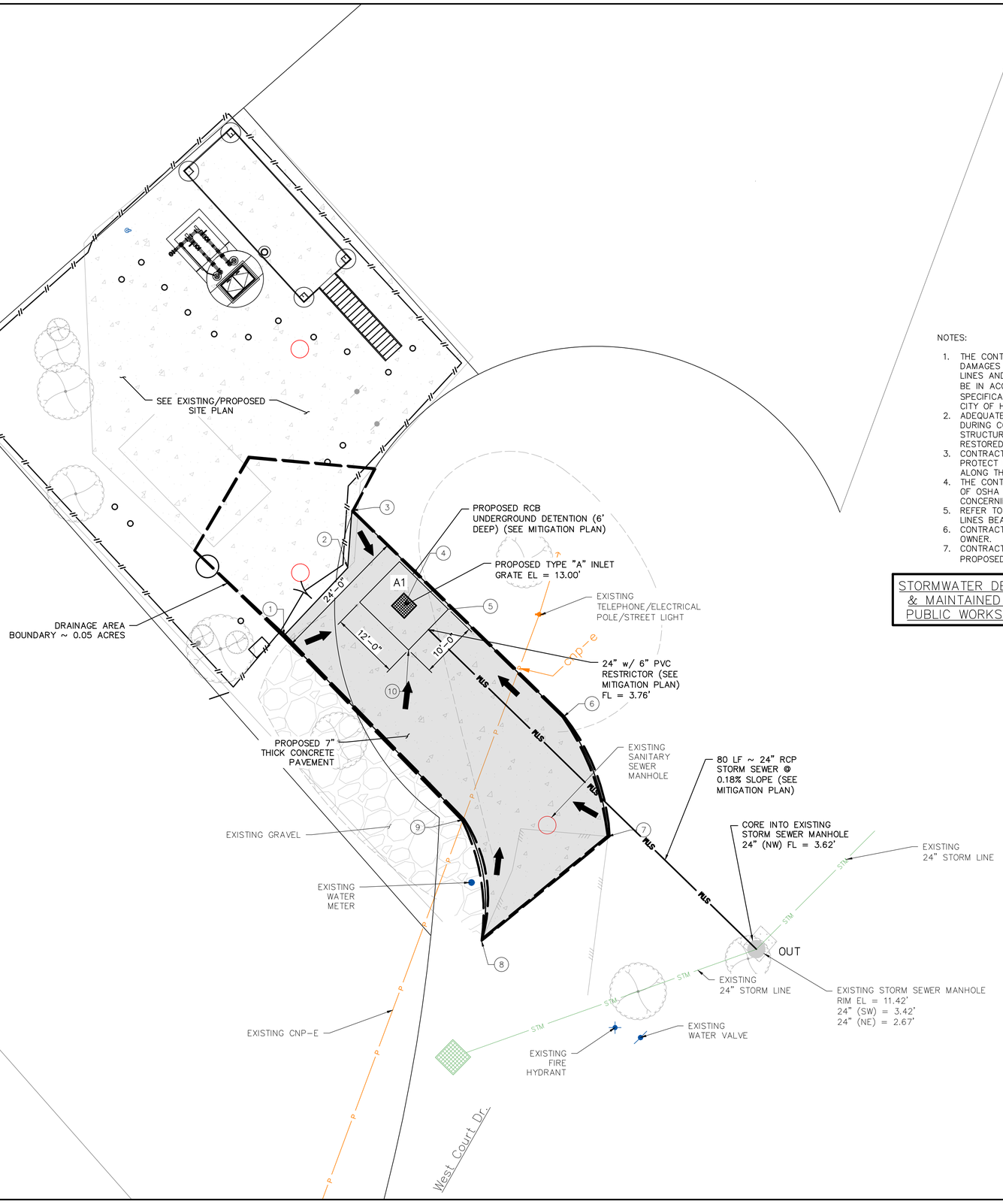
PROPOSED PAVEMENT			
ITEM	LOCATION	ACTION	SQUARE FOOTAGE
CONCRETE PAVEMENT	INSIDE PROPERTY BOUNDARY	REMOVING & REPLACING EXISTING GRAVEL DRIVEWAY WITH CONCRETE	±96.58
CONCRETE PAVEMENT	OUTSIDE PROPERTY BOUNDARY	REMOVING & REPLACING EXISTING GRAVEL DRIVEWAY WITH CONCRETE	±1,561.62



SCALE: 1"= 10'

0' 10' 20' 30'

LEGEND

- DRAINAGE DIRECTION
- PROPOSED 7" THICK CONCRETE PAVEMENT
- EXISTING TREE

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.

STORMWATER DETENTION BOX TO BE OWNED & MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.

PAPE-DAWSON
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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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HOUSTON, TX 77024
(713) 961-1100
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SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/19/22

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION PROPOSED PAVING & GRADING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
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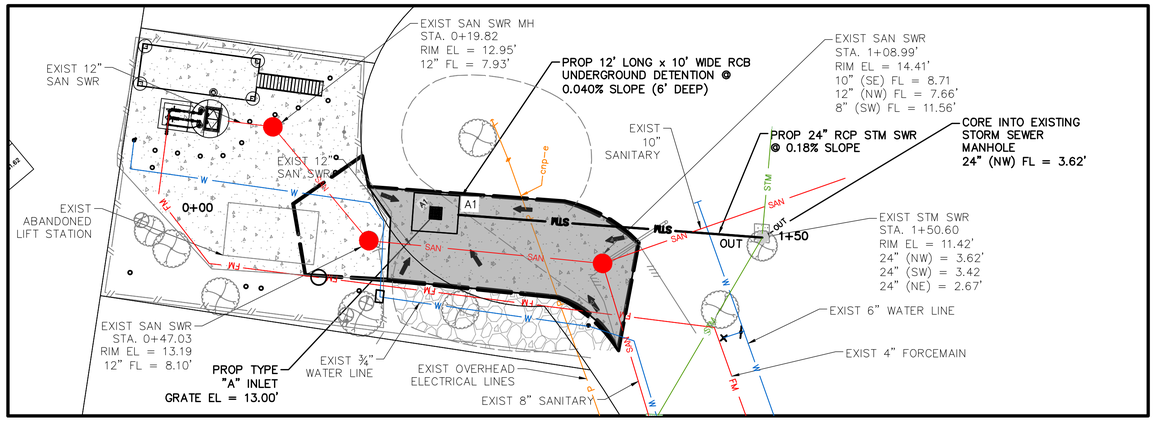
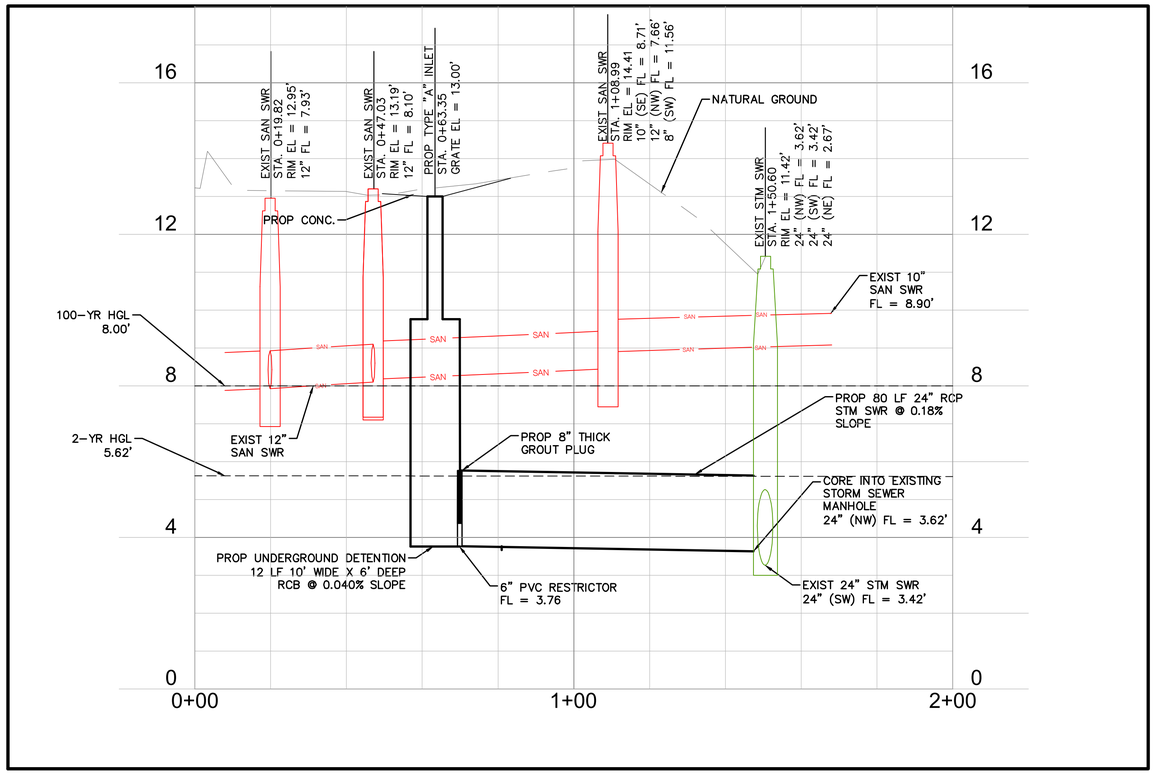
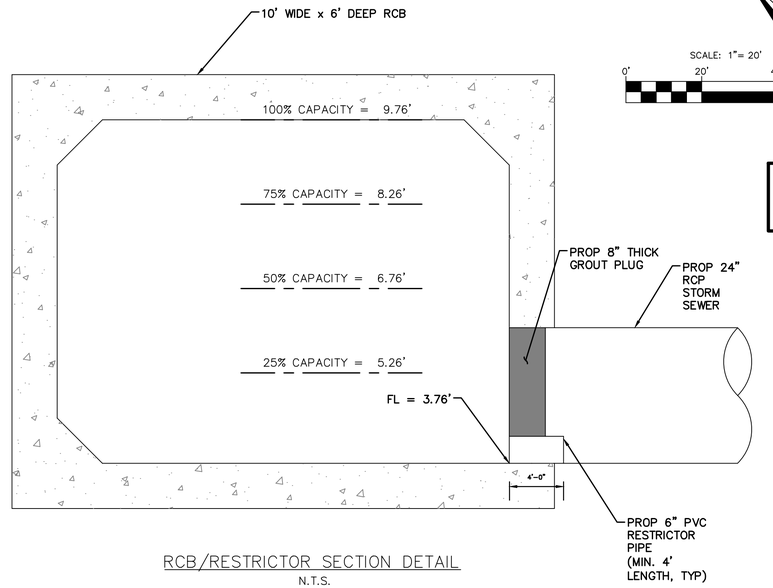
C-207-105

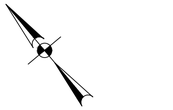
FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\PROPOSED PAVING & GRADING PLAN.dwg

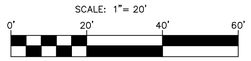






RCB/RESTRICTOR SECTION DETAIL
N.T.S.





STORMWATER DETENTION BOX TO BE OWNED & MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.

NOTES:
1. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
2. CONTRACTOR TO REHABILITATE ALL DISTURBED SITE & LANDSCAPING TO PRE-CONSTRUCTION OR BETTER CONDITIONS.
3. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/ OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/ GEOTECHNICAL/ SAFETY/ EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

Disturbed Area	0.0384	ac	
Detention Rate (R_d)	0.80	ac-ft/ac	
Proposed (final) Impervious Area (A_p) =	0.0384	ac	
Existing Impervious Area To Be Removed (A_e) =	0.0395	ac	
Required Detention Volume =	(Ap * Rd) - (Ae * 0.40 ac-ft/ac)		
Total Required Detention Volume =	0.0149	ac-ft	
Provided Detention Volume =	10' x 6' x 12' (W x D x L)	=	0.0165 ac-ft

RESTRICTORS:

Low Level Restrictor (25% Flow)

Total Drainage Area =	0.0500	ac
Outflow Rate Allowed for Low Flow QL1 =	0.0250	cfs
Head HL1 (water surface differential) for Low Flow =	1.25	ft
Calculated Low Level Restrictor Size DL =	0.80	in
Provided/Designed Low Level Restrictor Size DL1 =	6	in

High Level Restrictor (75% Flow)

Total Drainage Area =	0.0500	ac
Total Outflow Rate (100%) Q =	0.1000	cfs
Re-calculated Head HL2 (water surface differential) for Low Level Restrictor =	4.25	ft
Re-calculated Low Flow Q L2 for Low Level Restrictor =	2.599	cfs
Outflow Rate Allowed for High Flow Qh1 (75%) =	-2.4987	cfs
Head Hh2 (water surface differential) for High Level Restrictor =	1.25	ft
Calculated High Level Restrictor Size Dh =	#NUM!	in
Provided/Designed High Level Restrictor Size Dh1 (75%) =	N/A	in

No need for High Level Restrictor

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SURVEYED BY:
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JOHN W. LACY
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LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

C-207-106

SHEET NO. 146 OF 226

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\MITIGATION PLAN & DRAINAGE CALCULATIONS.dwg

DESIGN STORM SEWER CALCULATIONS (2-YEAR)

Project Name: WEST COURT LS IMPROVEMENTS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 2 year
Design Multiplier: 1.00
Starting W.S. Elev.: 5.62 feet

Rainfall Coeff.
b = 75.0
d = 16.2
e = 0.832

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.05	0.05	0.90	0.05	20.9	20.9	3.72	0.17	0.17	RCP	80	24	1	0.180	0.013	9.6	3.1	0.14	N/A	3.76	3.62	0.05	0.000	0.00	5.62	5.62	5.62	5.62	13.00	No Curb	13.00	0.0 in.

EXTREME EVENT STORM SEWER CALCULATIONS (100-YEAR)

Project Name: WEST COURT LS IMPROVEMENTS - EXTREME EVENT ANALYSIS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 100 year
Design Multiplier: 1.00
Starting W.S. Elev.: 8.00 feet

Rainfall Coeff.
b = 125.4
d = 21.8
e = 0.750

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.05	0.05	0.90	0.05	20.9	20.9	7.51	0.34	0.34	RCP	80	24	1	0.180	0.013	9.6	3.1	0.14	N/A	3.76	3.62	0.11	0.000	0.00	8.00	8.00	8.00	8.00	13.00	No Curb	13.00	0.0 in.

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\West Court\DWGs\STORM SEWER CALCULATIONS.dwg

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/17/25

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR
CIVIL
WEST COURT LIFT STATION
STORM SEWER CALCULATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

N

0' 5' 10' 20'

SCALE: 1"=10'

NOTES:

1. CONTRACTOR SHALL DECIDE WHICH AREA NEEDS TO HAVE POLLUTION PREVENTION ACCORDING TO CONSTRUCTION SEQUENCE.
2. FILTER FABRIC FENCE SHALL NOT BE PLACED ACROSS DRIVEWAYS OR SIDEWALKS ACCESSING PRIVATE PROPERTY.
3. CONTRACTOR SHALL PROTECT THE GRATE INLET ON THE DRIVEWAY ADJACENT TO THE LIFT STATION FROM ANY WATER ENCOUNTER DURING THE PROGRESS OF WORK.
4. CONTRACTOR SHALL REMOVE AND REPLACE INLET PROTECTION BARRIER PER REQUEST BY THE CITY RELATED TO SEVERE WEATHER EVENTS.

–X–FF–X—— FILTER FABRIC FENCE

IPB–II TYPE 2 INLET PROTECTION BARRIER

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THOMAS P. WILSHUSEN
79350
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PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

CIVIL

WEST COURT LIFT STATION STORM WATER POLLUTION PREVENTION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 148 OF 226	

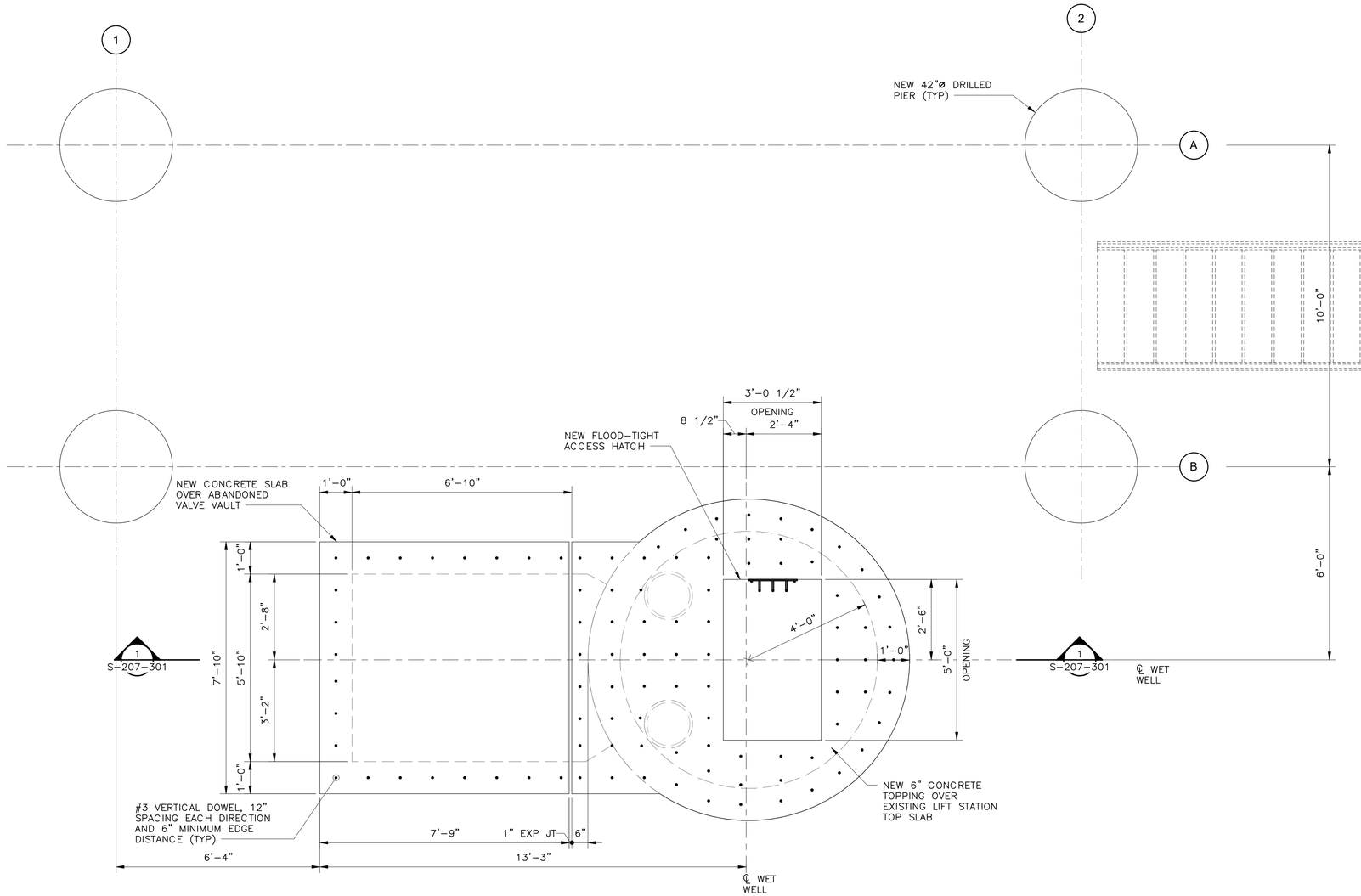
C–207–108

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 – COH Lift Station Renew–Replace\Project Files\5.0 Design Files – B&V\5.0.5 Civil 3D\C–207–108.dwg

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

1/2" = 1'-0"

N



LIFT STATION PLAN @ GRADE

1/2" = 1'-0"

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-207-WEST_COURT_LS-BV.rvt

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SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

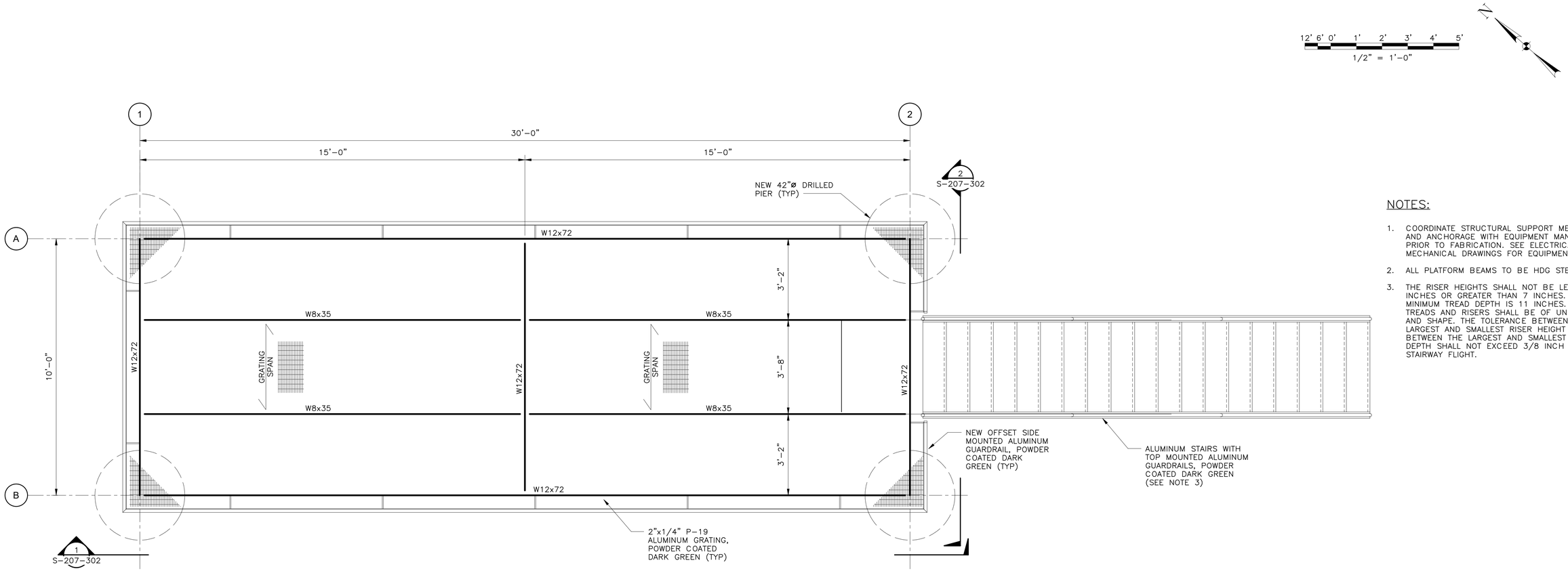
2 WEST COURT DR

STRUCTURAL

WEST COURT LIFT STATION
LIFT STATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 149 OF 226	

S-207-101



PLATFORM PLAN @ TOS EL 30.00'

1/2" = 1'-0"

NOTES:

1. COORDINATE STRUCTURAL SUPPORT MEMBERS AND ANCHORAGE WITH EQUIPMENT MANUFACTURER PRIOR TO FABRICATION. SEE ELECTRICAL AND MECHANICAL DRAWINGS FOR EQUIPMENT LAYOUT.
2. ALL PLATFORM BEAMS TO BE HDG STEEL.
3. THE RISER HEIGHTS SHALL NOT BE LESS THAN 4 INCHES OR GREATER THAN 7 INCHES. THE MINIMUM TREAD DEPTH IS 11 INCHES. STAIR TREADS AND RISERS SHALL BE OF UNIFORM SIZE AND SHAPE. THE TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTH SHALL NOT EXCEED 3/8 INCH IN A STAIRWAY FLIGHT.

BLACK & VEATCH

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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

STRUCTURAL
WEST COURT LIFT STATION
EQUIPMENT PLATFORM PLAN

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S-207-102

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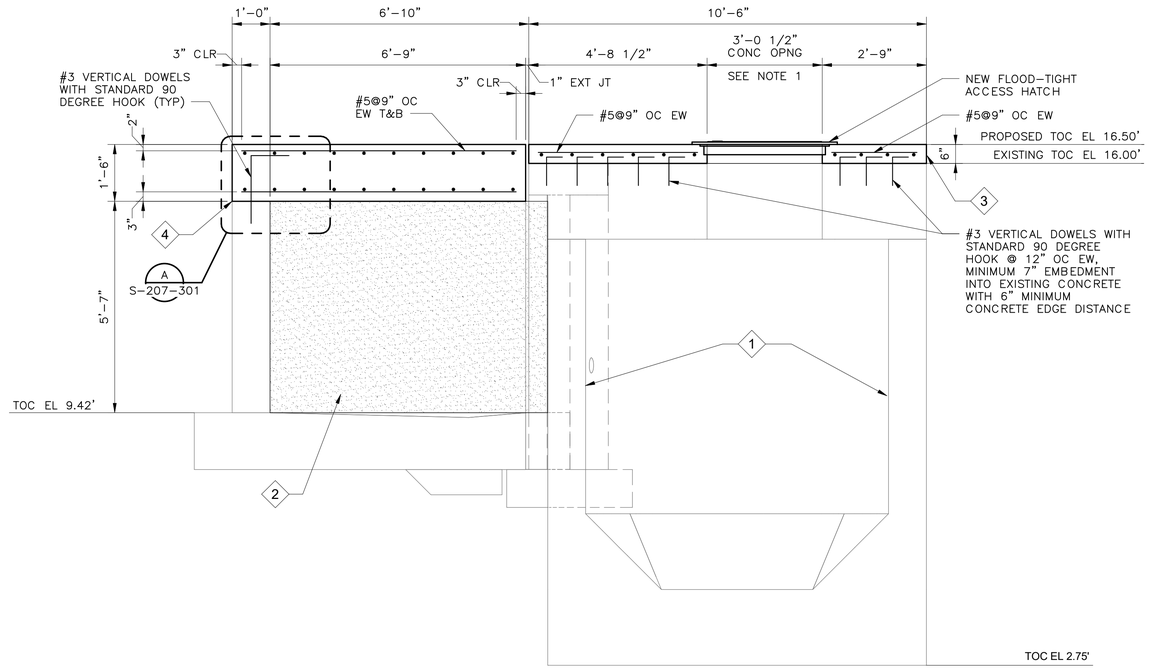
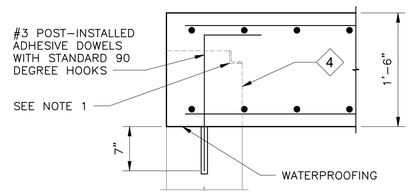


1 LIFT STATION SECTION
S-207-101 1/2" = 1'-0"



A DETAIL
S-207-301 1" = 1'-0"

NOTES:

1. EXISTING ANGLE FRAMING AROUND INSIDE PERIMETER OF VALVE VAULT AND PUMP ACCESS HATCH TO BE SAWCUT AND REMOVED PRIOR TO INSTALLATION OF WATERPROOFING, DOWELS, REBAR, AND NEW CONCRETE. EXISTING CONCRETE STUDS ATTACHING TO ANGLE FRAMING TO BE CUT AND LEFT IN PLACE WHERE CONCRETE IS TO REMAIN.

ITEMS OF WORK	
NO.	DESCRIPTION
1	INTERIOR SURFACE OF WET WELL AND ACCESSIBLE PORTIONS OF INFLUENT MANHOLE TO BE CLEANED AND ALL SIGNS OF SURFACE DAMAGE AND/OR CRACKS TO BE REPAIRED. REFER TO SHEET S-000-513 AND SPECIFICATION SECTIONS 03920 AND 03930. SURFACES TO BE COATED PER COH STANDARDS.
2	FILL VALVE VAULT WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM) MAXIMUM LIFTS OF 4FT WITH 7 DAYS OF CURING IN BETWEEN LIFTS.
3	ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE AND INSTALL ADDITIONAL 6 INCHES OF CONCRETE OVER LIFT STATION TOP SLAB.
4	DEMOLISH TOP 1FT OF VALVE VAULT WALLS ON THREE SIDES TO ACCOMMODATE INSTALLATION OF NEW CONCRETE SLAB OVER TOP OF EXISTING VALVE VAULT. ROUGHEN EXISTING SURFACES OF NEW CONCRETE JOINT TO A 1/4" AMPLITUDE PRIOR TO PLACING CONCRETE.

12" 9" 6" 3" 0' 1' 2'
1" = 1'-0"

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
2 WEST COURT DR

STRUCTURAL
WEST COURT LIFT STATION
LIFT STATION SECTION

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SHEET NO. 151 OF 226	

S-207-301

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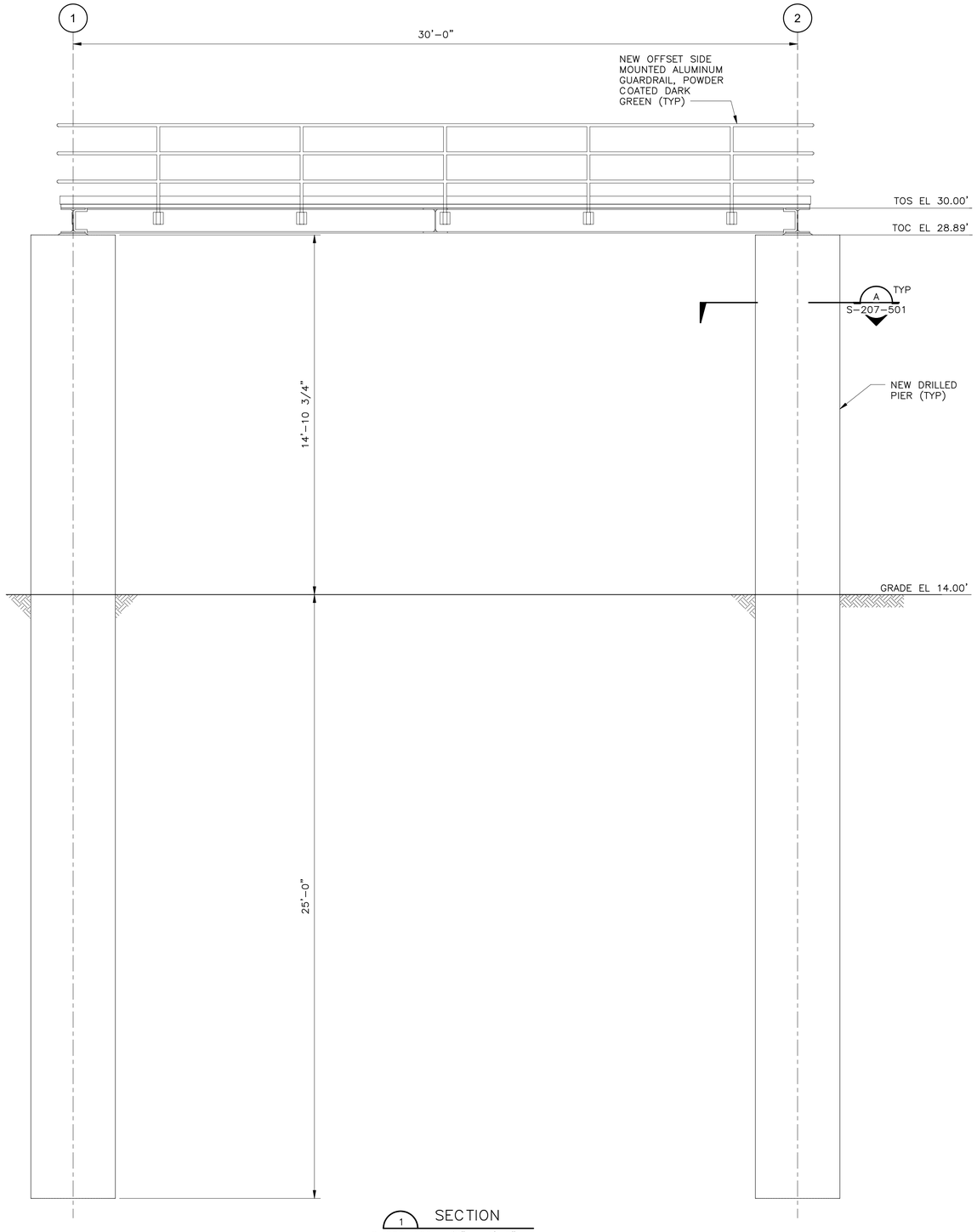
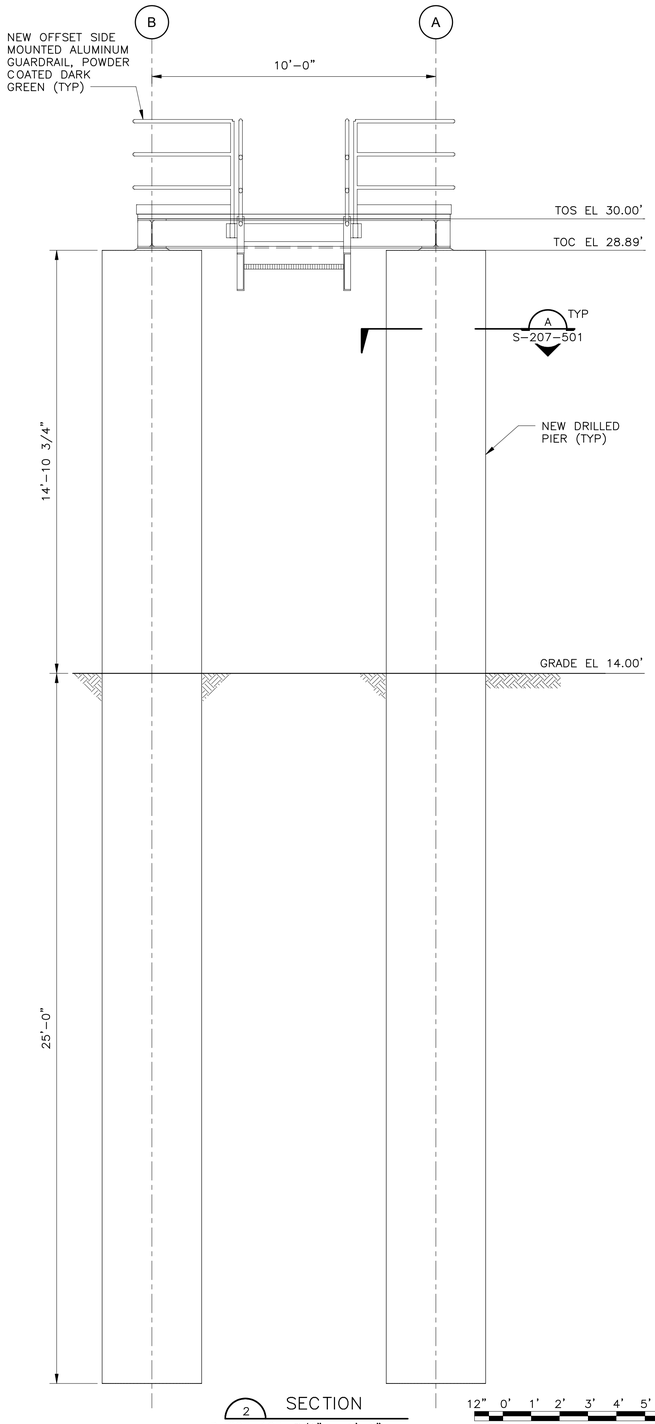


1 SECTION
S-207-102 3/8" = 1'-0"



2 SECTION
D-207-103 3/8" = 1'-0"

12" 0' 1' 2' 3' 4' 5' 6' 7'
3/8" = 1'-0"

S-207-302

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

STRUCTURAL

WEST COURT LIFT STATION EQUIPMENT PLATFORM SECTIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
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CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 152 OF 226	

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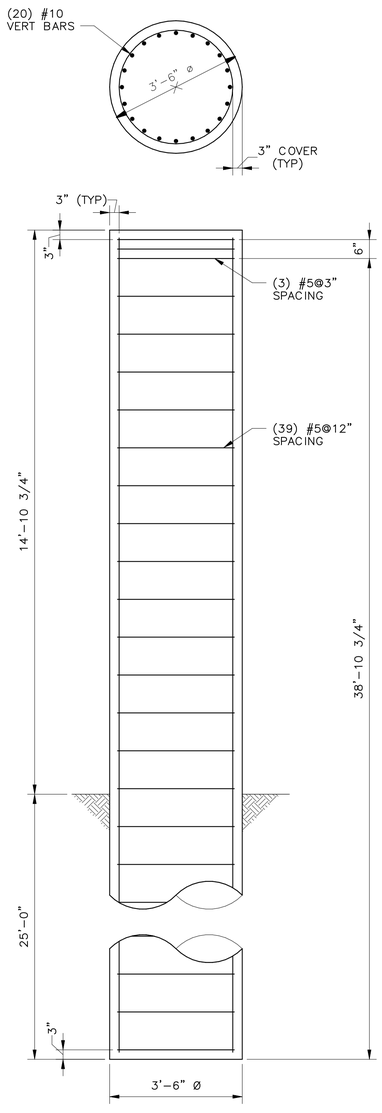

A DRILLED PIER DETAIL
S-207-302 1/2" = 1'-0"

12' 6' 0' 1' 2' 3' 4' 5'
1/2" = 1'-0"

S-207-501

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
2 WEST COURT DR

STRUCTURAL
WEST COURT LIFT STATION
EQUIPMENT PLATFORM DETAILS

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CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 153 OF 226	

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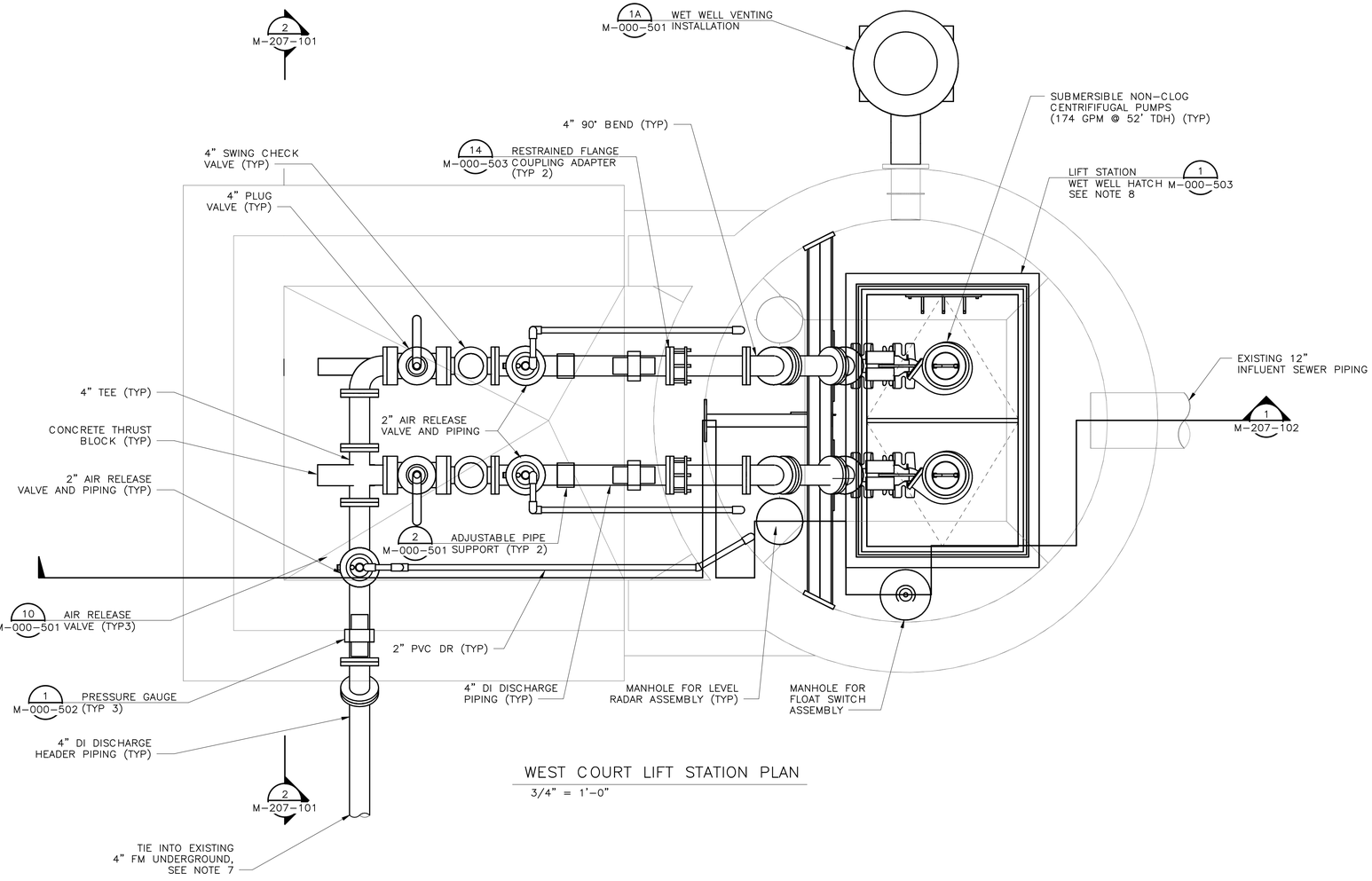
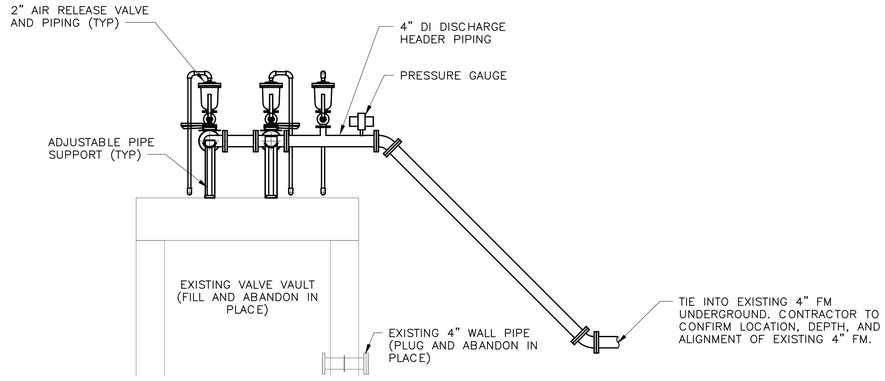


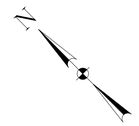
WEST COURT LIFT STATION PLAN

3/4" = 1'-0"



2 SECTION

M-207-101 3/8" = 1'-0"



12" 6" 0' 1' 2' 3'

3/4" = 1'-0"

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SITE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. INSTALL PLUG VALVES TO OPEN UPWARD AND TO CLOSE TO A SEATING POSITION.
4. INSTALL CHECK VALVES SO THAT THE WEIGHT LEVEL IS APPROXIMATELY 45° BELOW THE VALVE HORIZONTAL CENTER LINE IN THE CLOSED POSITION; AND APPROXIMATELY 45° ABOVE THE VALVE HORIZONTAL CENTER LINE IN THE FULL OPEN POSITION.
5. SLEEVED OR CORED DISCHARGE PIPE OPENINGS SEALED WITH LINK-SEAL (OR APPROVED EQUAL), MAY BE SUBSTITUTED FOR POURED IN PLACE WALL PIPES TO ACCOMMODATE CONSTRUCTION METHOD.
6. LABEL HATCHES WITH THE CORRESPONDING PUMP NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING WELDED TO THE HATCH. LABEL VALVE NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING ADHERED TO THE TOP OF THE CHECK VALVE.
7. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
8. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.
9. CONTRACTOR SHALL PROVIDE PIPE SUPPORTS FOR PIPES 12" AND SMALLER.

BLACK & VEATCH

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FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

PROCESS MECHANICAL

WEST COURT LIFT STATION
LIFT STATION PLAN AND SECTION VIEW

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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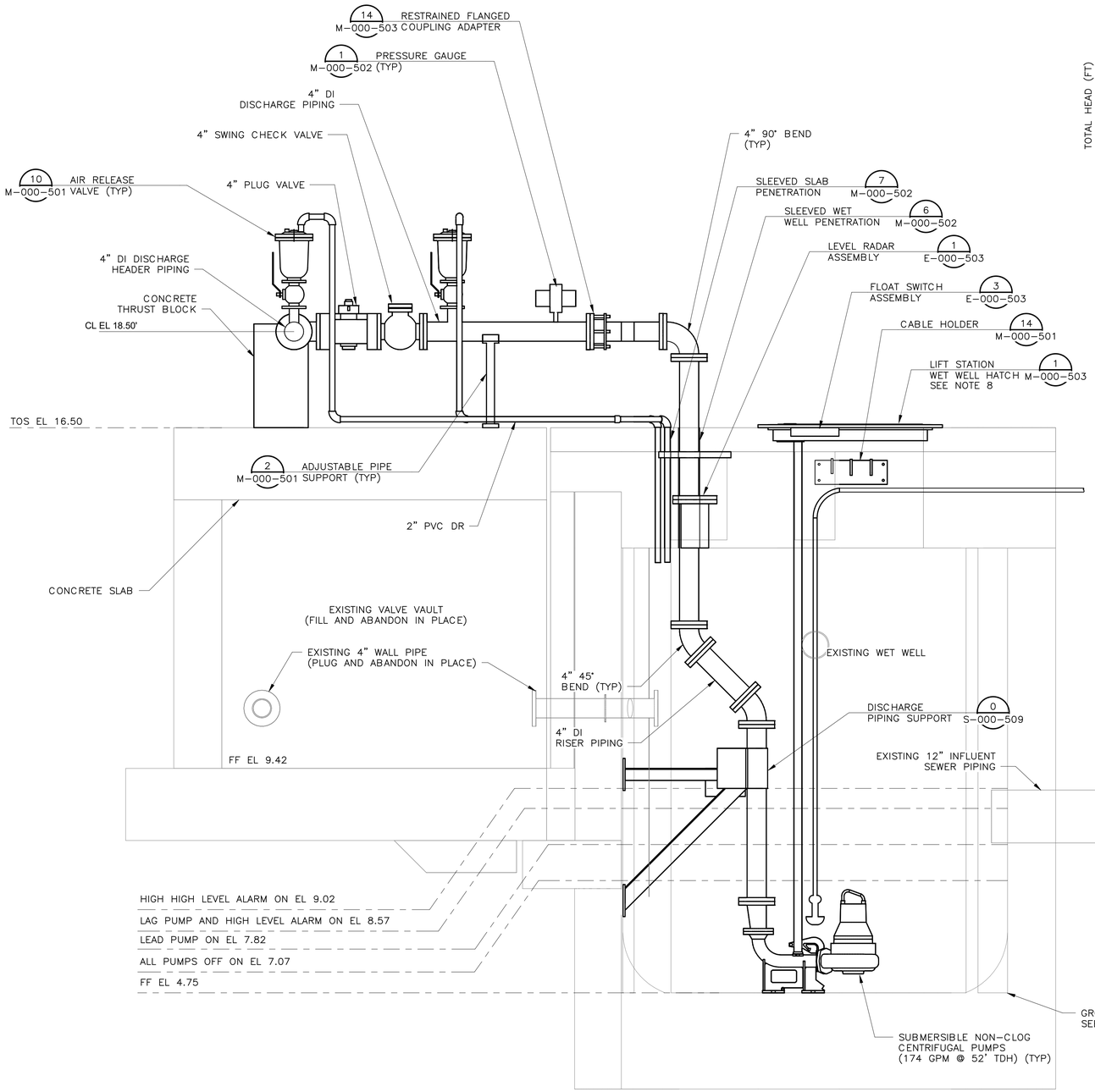
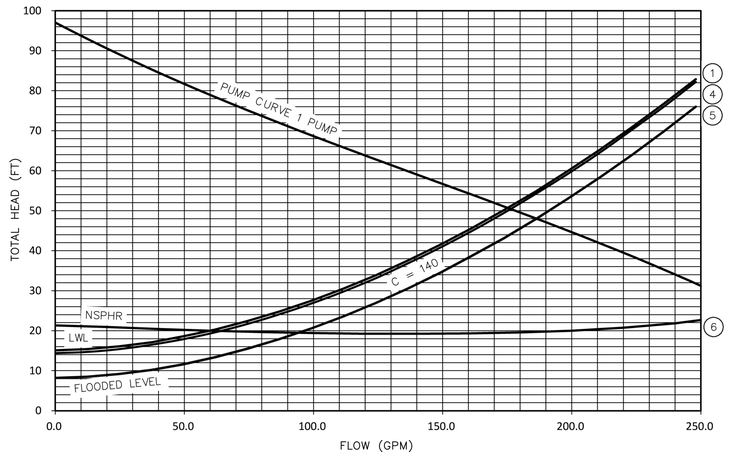
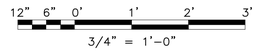


1 SECTION
M-207-101 3/4" = 1'-0"





PUMP OPERATION CURVES

PUMP CURVE NOTES:

1. LOW NORMAL OPERATING LEVEL C=120 – DESIGN.
2. HIGH NORMAL OPERATING LEVEL C=100 – INFORMATION ONLY (TCEQ).
3. HIGH NORMAL OPERATING LEVEL C=120 – DESIGN.
4. HIGH NORMAL OPERATING LEVEL C=140 – INFORMATION ONLY
5. EMERGERNCY FLOODED OPERATING LEVEL C=140 – MAXIMUM DISCHARGE
6. NET POSITIVE SUCTION HEAD REQUIRED (NPSHR) BASED ON NORMAL OPERATING WATER LEVELS.
7. PUMP CURVES ARE MODIFIED FOR STATION LOSSES.

STATION OPERATION TABLES

RISING LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
2.33'	7.07'	PUMPS OFF LEVEL – NO ACTION	ALL PUMPS ARE OFF
3.08'	7.82'	LEAD PUMP TURNS ON	LEAD PUMP ON
3.83'	8.57'	HIGH WATER ALARM ON	HIGH WATER ALARM SOUNDS
4.25'	9.02'	HIGH HIGH LEVEL ALARM (FLOAT ON LEVEL)	DUTY PUMPS ON (FLOAT)

FALL LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	DUTY PUMP ON
–	–	FLOAT OFF LEVEL	ALL PUMPS OFF (FLOATS)
3.50'	7.82'	HIGH WATER LEVEL ALARM OFF	LEAD PUMP ON
2.50'	7.07'	LEAD PUMP TURNS OFF	ALL PUMPS OFF – STANDBY PUMP SWITCHES TO LEAD PUMP
2.00'	6.75'	LOW LEVEL ALARM	–

PUMP DATA TABLE

PUMP CHARACTERISTICS	PUMP NO. 1	PUMP NO. 2
MOTOR DATA NOMINAL SIZE (HP) MAX SPEED (RPM)	9.0 1,800	9.0 1,800
SOLIDS PASSAGE MIN SPHERE (IN)	3.0	3.0
CAPACITY (GPM) DESIGN	174	174
DISCHARGE HEAD (FT) DESIGN	52	52
EFFICIENCY (%) DESIGN	51	51
NPSHR (FT) DESIGN	21.3	21.3
PUMP CYCLE TIME (MIN)	6	6
CUMULATIVE CAPACITY (GPM)	174	NA*

*NOTE: CUMULATIVE CAPACITY PROVIDED FOR PUMP FIRM CAPACITY (N-1)

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. PUMP ANCHOR BOLTS ARE TO BE ADHESIVE TYPE, AND EMBEDDED IN CONCRETE SLAB. CONTRACTOR TO SUBMIT DESIGN OF PUMP ANCHOR BOLTS AND PATTERN INCLUDING CALCULATION, DURING SHOP DRAWINGS SUBMISSION.
4. CONTRACTOR TO PROVIDE ADHESIVE ANCHORS IN LIEU OF WEDGE ANCHORS FOR ALL SUBMERGED CONDITIONS, AND SUBMIT DESIGN OF ANCHOR BOLTS DURING SHOP DRAWINGS SUBMISSION.
5. ALL PIPING IN THE WET WELL SHALL BE FLANGED. NO FLANGED COUPLING ADAPTERS, OR VICTAULIC STYLE COUPLINGS SHALL BE PERMITTED INSIDE THE WET WELL.
6. CONTRACTOR SHALL COORDINATE WITH SUPPLIED PUMPS TO ENSURE GROUT IN WET WELL IS OUTSIDE THE MINIMUM REQUIRED CLEARANCE AREA FOR PUMPS IF THE EXISTING GROUT CONICIDES WITH THE MANUFACTURER'S MINIMUM CLEAR AREA REQUIRED AROUND THE PROPOSED PUMPS. THE EXISTING GROUT SHALL BE DEMOLISHED AND REPLACED SUCH THAT THE GROUT IS OUTSIDE THE MINIMUM CLEAR AREA AT NO ADDITIONAL COST TO THE OWNER.
7. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
8. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.

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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
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PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

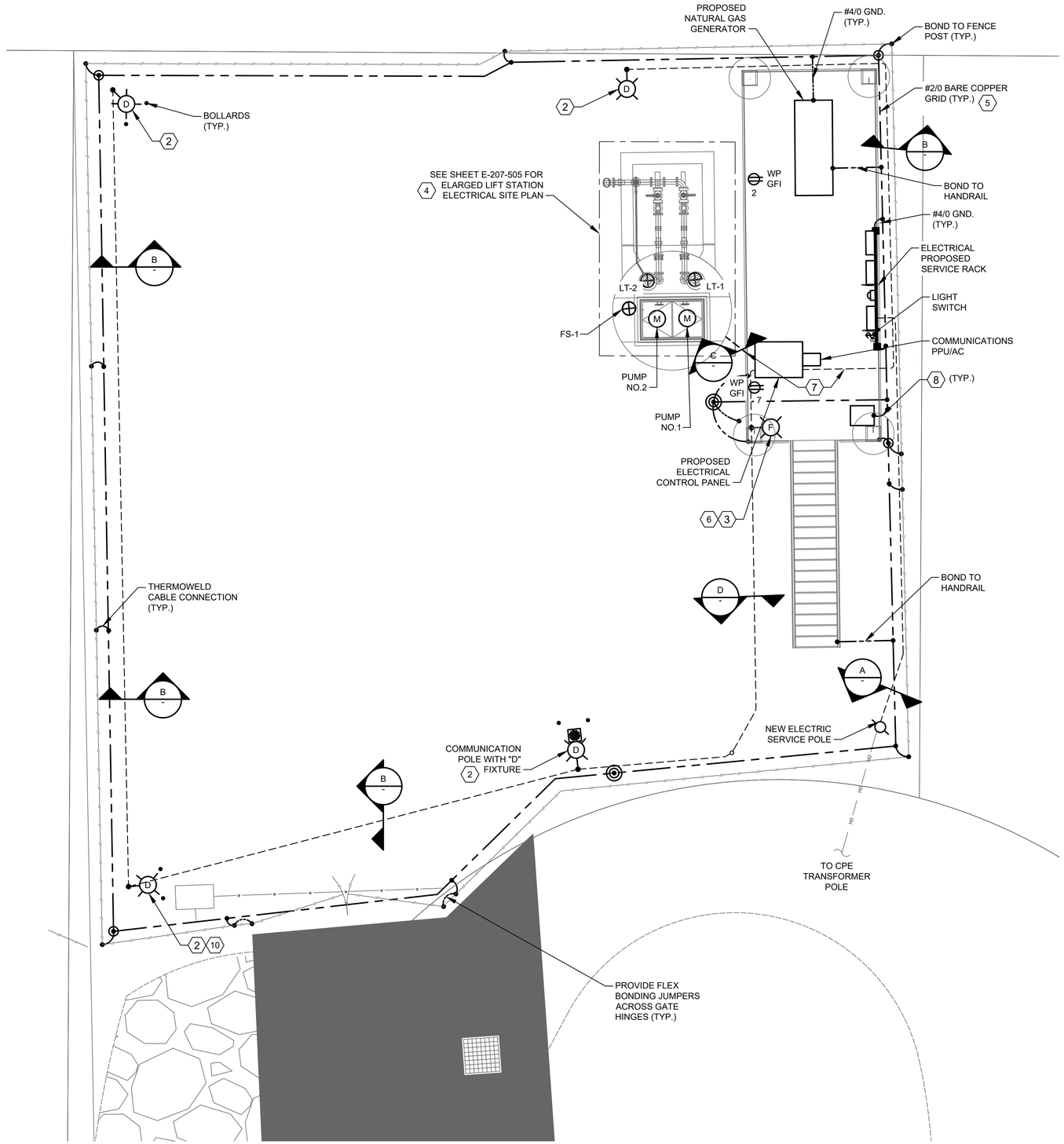
PROCESS MECHANICAL

WEST COURT LIFT STATION
LIFT STATION SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 155 OF 226	

M-207-102

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-207-WEST_COURT_LS-BV.rvt



WEST COURT LIFT STATION
ELECTRICAL PROPOSED SITE (B)

PLAN
1" = 5'-0"

SCALE: 1"= 5'

0' 5' 10' 15'

NOTES BY SYMBOL "#":

1. THE ELECTRICAL INSTALLATION IN THE WET WELL SHALL BE EXPLOSION PROOF, IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR CLASS I, DIVISION 1 LOCATIONS.
2. YARD LIGHT CONTROLLED BY LIGHTING SWITCH.
3. DUSK TO DAWN PHOTOCELL CONTROL.
4. INSIDE WETWELL RATED NEMA CLASS 1, DIV. 1. OUTSIDE ABOVE GROUND, AROUND WETWELL RATED CLASS 1, DIV. 2 ACCORDING TO NFPA 820.
5. GROUNDING LOOP SHALL BE BURIED 30" BELOW FINISHED GRADE.
6. AREA LIGHTING MOUNTED ON PLATFORM. REFER TO SHEET E-000-504 FOR THE INSTALLATION OF THE LIGHT.
7. CONDUIT TO BE INSTALLED BELOW PLATFORM.
8. #4/0 BARE COPPER CONDUIT GROUNDING CONDUCTOR.
9. BOND REBAR IN CONCRETE FOOTER OR GROUND LOOP.
10. TYPE "B" FIXTURE TO BE INSTALLED ON THE POLE PROVIDING WIRES FOR THE "B" LIGHT.

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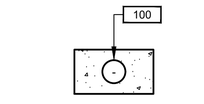
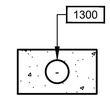


DUCTBANK
SECTION A
NTS



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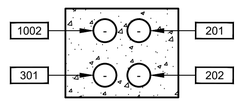
SECTION B
NTS



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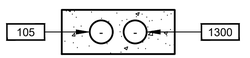
SECTION C
NTS



DUCTBANK
SECTION D
NTS

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
PROPOSED SITE PLAN

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SHEET NO. 156 OF 226	

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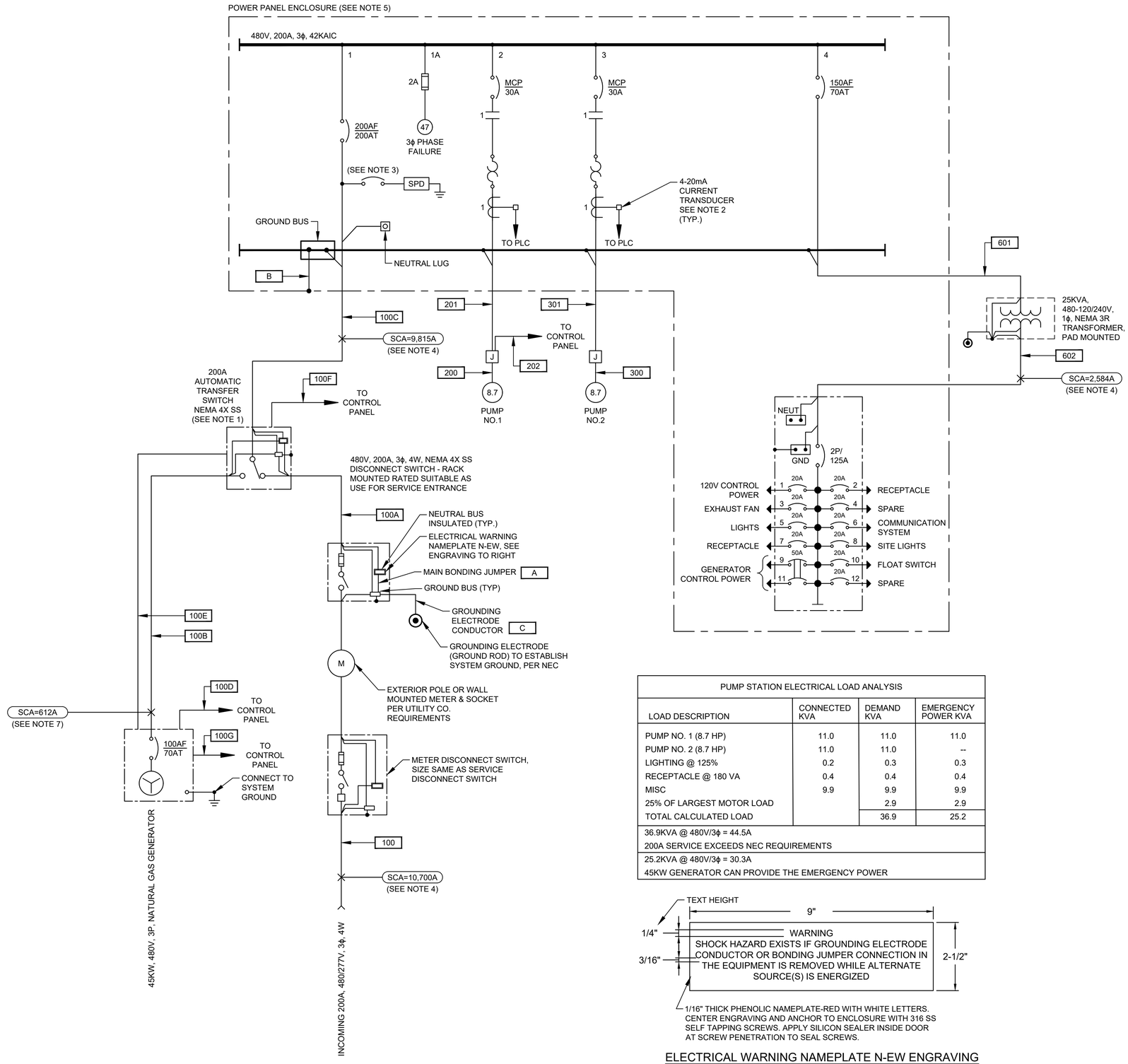
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-101.dwg



PUMP STATION ELECTRICAL LOAD ANALYSIS			
LOAD DESCRIPTION	CONNECTED KVA	DEMAND KVA	EMERGENCY POWER KVA
PUMP NO. 1 (8.7 HP)	11.0	11.0	11.0
PUMP NO. 2 (8.7 HP)	11.0	11.0	--
LIGHTING @ 125%	0.2	0.3	0.3
RECEPTACLE @ 180 VA	0.4	0.4	0.4
MISC	9.9	9.9	9.9
25% OF LARGEST MOTOR LOAD		2.9	2.9
TOTAL CALCULATED LOAD		36.9	25.2
36.9KVA @ 480V/3ϕ = 44.5A 200A SERVICE EXCEEDS NEC REQUIREMENTS			
25.2KVA @ 480V/3ϕ = 30.3A 45KW GENERATOR CAN PROVIDE THE EMERGENCY POWER			

1/16" THICK PHENOLIC NAMEPLATE-RED WITH WHITE LETTERS. CENTER ENGRAVING AND ANCHOR TO ENCLOSURE WITH 316 SS SELF TAPPING SCREWS. APPLY SILICON SEALER INSIDE DOOR AT SCREW PENETRATION TO SEAL SCREWS.

ELECTRICAL WARNING NAMEPLATE N-EW ENGRAVING

NOTES:

1. PROVIDE A NORMALLY OPEN (NO) AUXILIARY CONTACT FOR BOTH ON POSITIONS.
2. PROVIDE 5A PRIMARY TO 4-20mA CURRENT TRANSDUCER.
3. PROVIDE BREAKER ACCORDING TO MANUFACTURER'S REQUIREMENTS.
4. POINT TO POINT METHOD IS USED FOR SHORT CIRCUIT CURRENT CALCULATION.
5. CONTRACTOR SHALL PROVIDE A PERMANENTLY AFFIXED LABEL (2" X 3") SHOWING THE AVAILABLE FAULT CURRENT AND CALCULATION DATE. THE LABEL SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND.
6. THE INSULATION TYPES OF ALL ELECTRICAL CONDUCTOS USED IN THE PROJECT HAVE BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS (16120, 16121, AND 16122). THE TYPES OF CONDUITS USED IN THE PROJECT HAS BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS 16111.
7. THE INFORMATION IS PROVIDED BY GENERATOR MANUFACTURER (CUMMINS).

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION 2 WEST COURT DR. ONE-LINE DIAGRAM

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NASIR FAZLJOO, P.E.	

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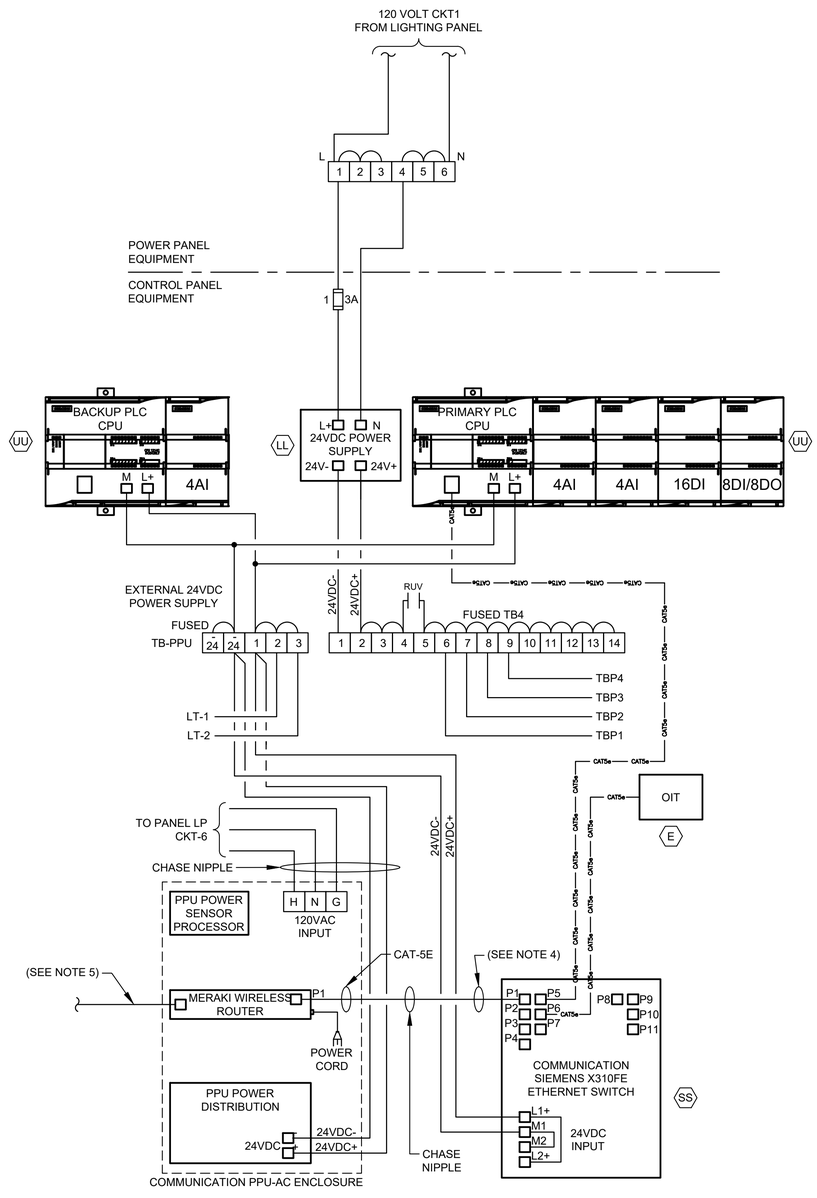
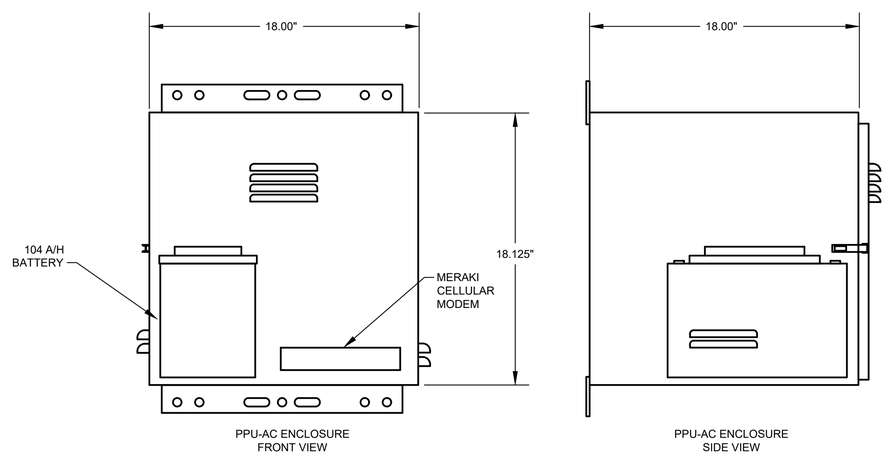


CONTROL POWER &
COMMUNICATIONS WIRING

DIAGRAM

NTS

(SEE NOTE 2 & 6)



PPU-AC ENCLOSURE
FRONT VIEW

PPU-AC ENCLOSURE
SIDE VIEW

PPU-AC
CONTROL ENCLOSURE

ELEVATION

NTS

(SEE NOTE 7)

NOTES:

1. FOR DESCRIPTION AND RATINGS OF ITEMS INDICATED WITH ITEM TAG, SEE DEVICE RATINGS SCHEDULE.
2. REFER TO SPEC SECTION 16120 FOR CONDUCTOR COLOR CODE.
3. THE PLC POWER SUPPLY SHALL FEED THE 24VDC I/O.
4. ETHERNET CABLE FOR MERAKI CELLULAR ROUTER (P1).
5. POE CABLE TO RADIO.
6. COMMUNICATION PPU-AC & SCADA SHALL BE PROVIDED BY CONTRACTOR INCLUDING TO RUN CONDUITS & WIRES.
7. COORDINATE WITH VENDOR TO PROVIDE PROPER VENTILATION WHERE APPLICABLE.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
ONE-LINE DIAGRAM

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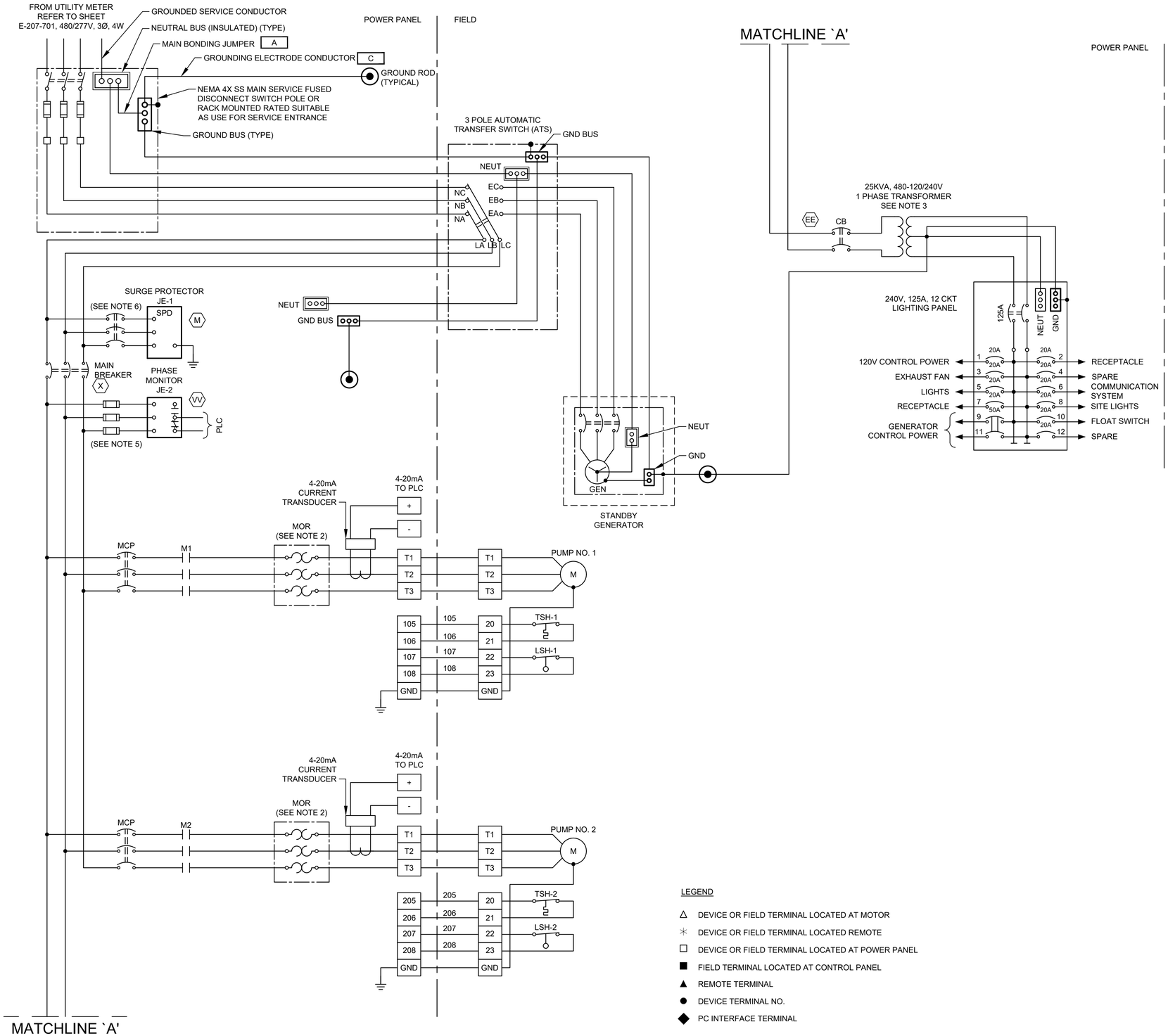

NOTES:

1. UNLESS OTHERWISE INDICATE, ALL DEVICES WITHOUT FURTHER DESIGNATION ARE LOCATED AT THE CONTROL PANEL.
2. THE COMBINATION OF CT AND MOTOR OVERLOAD RELAY IF REQUIRED.
3. CONTRACTOR TO REVISE DWG. BASED ON MANUFACTURE AND SIZE.
4. CONTRACTOR SHALL TERMINATE POWER & CONTROL WIRES PER MANUFACTURER'S REQUIREMENTS.
5. PROVIDE FUSE SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
6. PROVIDE BREAKER SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.

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LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PC INTERFACE TERMINAL

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
THREE-LINE DIAGRAM

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CONDUIT AND CABLE SCHEDULE

ITEM NO.	CONDUIT TAG.	CONDUIT QUANTITY	CONDUIT SIZE	# CONDS PAIRS/TRIADS	CONDUCTOR SIZE	AMPS OR HP	VOLTAGE LEVEL	FROM	TO	DESCRIPTION
1	A	1	-	-	#2 GND.	-	-	SERVICE DISCONNECT NEUTRAL BUS BAR	SERVICE DISCONNECT GROUND BUS BAR	MAIN BONDING JUMPER
2	B	1	-	-	#2 GND.	-	-	POWER PANEL GROUND BUS	POWER PANEL ENCLOSURE	EQUIPMENT BONDING JUMPER
3	C	1	-	-	#2 GND.	-	-	GROUNDING ELECTRODE	SERVICE DISCONNECT GROUND BUS BAR	GROUNDED ELECTRODE CONDUCTOR
4	100	1	2"	1/C	3#3/0 AWG., #2 GND.,	200A	480V	SERVICE POLE	METER DISCONNECT SWITCH	UTILITY 480V SERVICE POWER
5	100A	1	2"	1/C	3#3/0 AWG., #2 GND.,	200A	480V	SERVICE DISCONNECT SWITCH	ATS	UTILITY POWER ENTRANCE
6	100B	1	2"	1/C	3#3/0 AWG., #2 GND.,	200A	480V	STANDBY GENERATOR	ATS	GENERATOR POWER ENTRANCE
7	100C	1	2"	1/C	3#3/0 AWG., #2 GND.,	200A	480V	ATS	CONTROL PANEL	480V POWER
8	100D	1	1"	1/C	3#6 AWG., #8 GND.,	50A	120/240V	STANDBY GENERATOR	LIGHTING PANEL	GENERATOR CONTROL POWER
9	100E	1	1"	1/C	6#14 AWG., #14 GND.,	-	24VDC	STANDBY GENERATOR	ATS	GENERATOR CONTROLS
10	100F	1	1"	1/C	4#14 AWG., #14 GND.,	-	24VDC	ATS	CONTROL PANEL	NORMAL/EMERGENCY POWER STATUS
11	100G	1	1"	-	MANUFACTURER CABLE	-	24VDC	STANDBY GENERATOR	ANNUNCIATOR	GENERATOR ANNUNCIATOR
12	105	1	1"	-	POE CABLE	-	24VDC	COMMUNICATION POLE	PPU-AC ENCLOSURE	COMMUNICATION
13	200	1	2-1/2"	-	MANUFACTURER CABLE	8.7HP	480V/120V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 POWER & CONTROL
14	201	1	2"	1/C	3#10 AWG., #10 GND.,	8.7HP	480V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	PUMP NO.1 POWER
15	202	1	2"	1/C	8#14 AWG., #14 GND.,	-	120V	PUMP NO.1 JUNCTION BOX	CONTROL PANEL	COMBINED PUMP CONTROLS
16	300	1	2-1/2"	-	MANUFACTURER CABLE	8.7HP	480V/120V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 POWER & CONTROL
17	301	1	2"	1/C	3#10 AWG., #10 GND.,	8.7HP	480V	PUMP NO.2 JUNCTION BOX	PUMP STARTER	PUMP NO.2 POWER
17	1000	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
18	1001	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
19	1002	1	1"	-	2-TRIAD #16, 4#14,	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	COMBINED LEVEL TRANSMITTERS & FLOAT SWITCH
20	1003	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER JUNCTION BOX	TRANSMITTER JUNCTION BOX	WELL FLOAT SWITCHES
21	1100	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
22	1200	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
22	1300	1	1"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	SITE LIGHTS	SITE LIGHTING

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

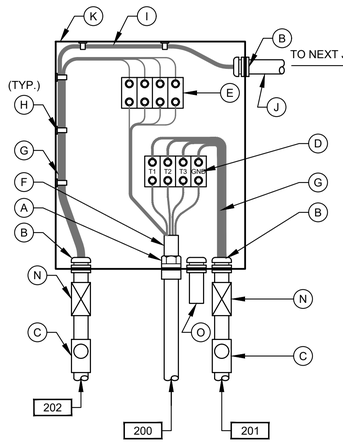
2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
CONDUIT SCHEDULE

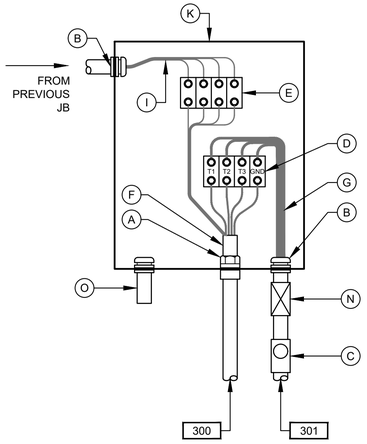
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-601.dwg



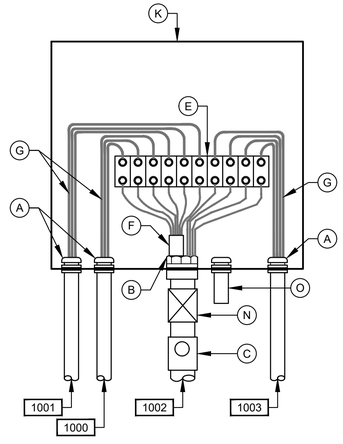
PUMP NO.1
JUNCTION BOX

DETAIL 3
NTS
(SEE NOTE 7)



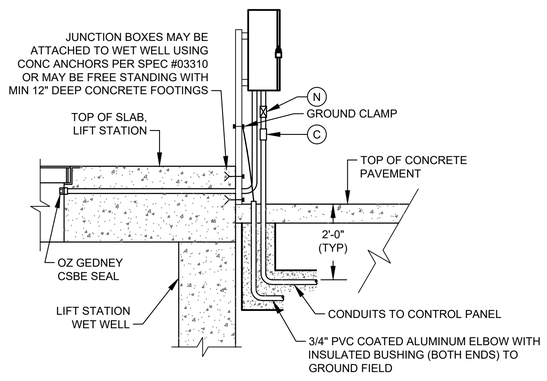
PUMP NO.2
JUNCTION BOX

DETAIL 4
NTS
(SEE NOTE 7)



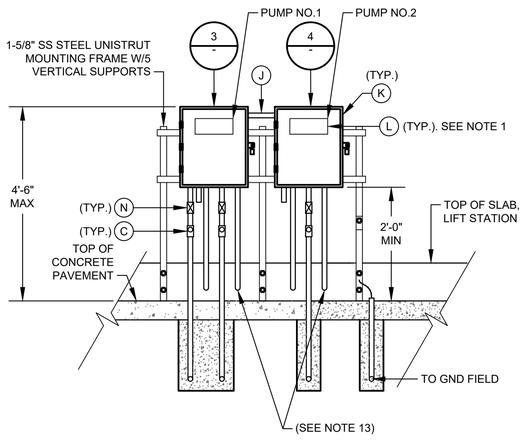
LEVEL TRANSMITTER
JUNCTION BOX

DETAIL 5
NTS
(SEE NOTE 7)

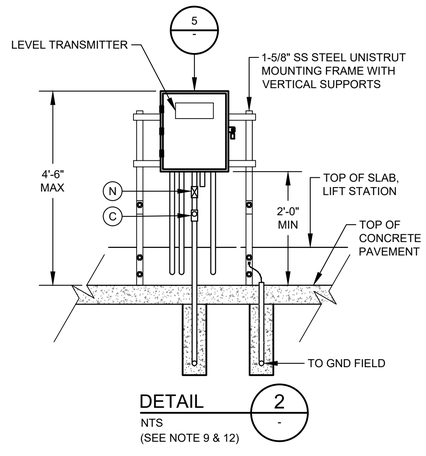


TYP SIDE VIEW FOR DETAIL 1 & 2

(SEE NOTE 10)



DETAIL 1
NTS
(SEE NOTE 9 & 12)



DETAIL 2
NTS
(SEE NOTE 9 & 12)

JUNCTION BOX EQUIPMENT SCHEDULE

A - OZ GEDNEY CSBE SEAL
B - WATERTIGHT CONDUIT HUB WITH INSULATED BUSHING
C - CLASS I, DIV 1, EXPLOSION PROOF SEAL INSTALLED PER NEC DIV 501
D - POWER TERMINAL BLOCK W/SCREW DOWN BOX LUGS
E - CONTROL TERM BLOCK W/SCREW DOWN BOX LUGS
F - MULTI-CONDUCTOR CABLE, REMOVE OUTER JACKET AS SHOWN
G - WIRING AS SCHEDULED
H - WIRING HARNESS PERMANENTLY AFFIXED
I - PUMP CONTROL WIRING FROM PUMPS 2; 2 & 3; 4; OR D2, AS APPLICABLE
J - 1 1/2" PVC COATED CONDUIT NIPPLE
K - NEMA 6P STAINLESS STEEL JUNCTION BOX WITH GASKETED FRONT COVER, SINGLE QUARTER TURN, OIL-TIGHT LATCH AND PADLOCKING PROVISIONS, HOFFMAN D-3L16H1206 SS LF OR EQUAL. MINIMUM SIZE: 12"W X 16"H X 6"D
L - NAMEPLATE, SEE SPECIFICATIONES (SEE NAMEPLATE SCHEDULE)
M - NOT USED
N - EXPANSION FITTING
O - DRAIN VENT

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO JUNCTION BOXES USING 316 STAINLESS STEEL HARDWARE.
2. MAINTAIN MINIMUM SEPARATION REQUIRED UNDER NEC ARTICLE 504, BETWEEN INTRINSICALLY SAFE CONTROL WIRING AND NON INTRINSICALLY SAFE MOTOR FEEDER WIRING.
3. UNLESS OTHERWISE NOTED, ALL EXTERIOR EXPOSED CONDUITS SHALL BE PVC COATED ALUMINUM.
4. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, SCREWS WASHERS, ETC SHALL BE TYPE 316 STAINLESS STEEL.
5. ALL UNDERGROUND CONDUITS TO BE ENCASED IN REINFORCED CONCRETE DUCTBANK.
6. PROVIDE ANTI-CORROSIVE SPRAY ON ANY BARE METAL PARTS OR EXPOSED WIRE.
7. SEE WIRING SCHEMATICS FOR TERMINALS AND WIRE NUMBERS.
8. ANY CONDUIT REQUIRING A CSBE SEAL, SHALL BE A MINIMUM SIZE OF 2 1/2" PER CABLE.
9. DETAIL SHOWN MAY BE MODIFIED PER SITE SITUATION.
10. COORDINATE WITH WASTE WATER OPERATIONS ELECTRICAL ORGANIZATION FOR THE OPENING OF JUNCTION BOXES TO THE SIDE OF WET WELL IF REQUIRED DURING CONSTRUCTION.
11. THE ENCLOSURES WITH ELECTRICAL CIRCUITS SHALL BE A MINIMUM OF 5 FEET FROM ANY CLASSIFIED AREA, OTHERWISE EXPLOSION PROOF TYPE ENCLOSURES SHALL BE USED.
12. ALL JUNCTION BOXES SHALL BE NEMA 6P 316 STAINLESS STEEL RATING.
13. THE CONDUIT IS USED AS A SPARE IF THERE IS ONLY ONE PUMP MANUFACTURER CABLE.

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TX FIRM NUMBER 258

SURVEYED BY:
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FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
2 WEST COURT DR

ELECTRICAL

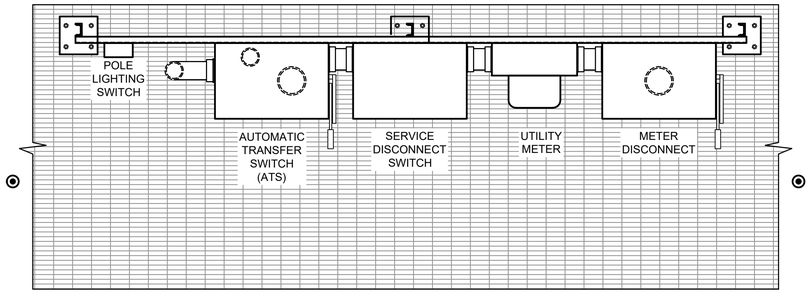
WEST COURT LIFT STATION
2 WEST COURT DR.
TYPICAL JUNCTION BOX DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

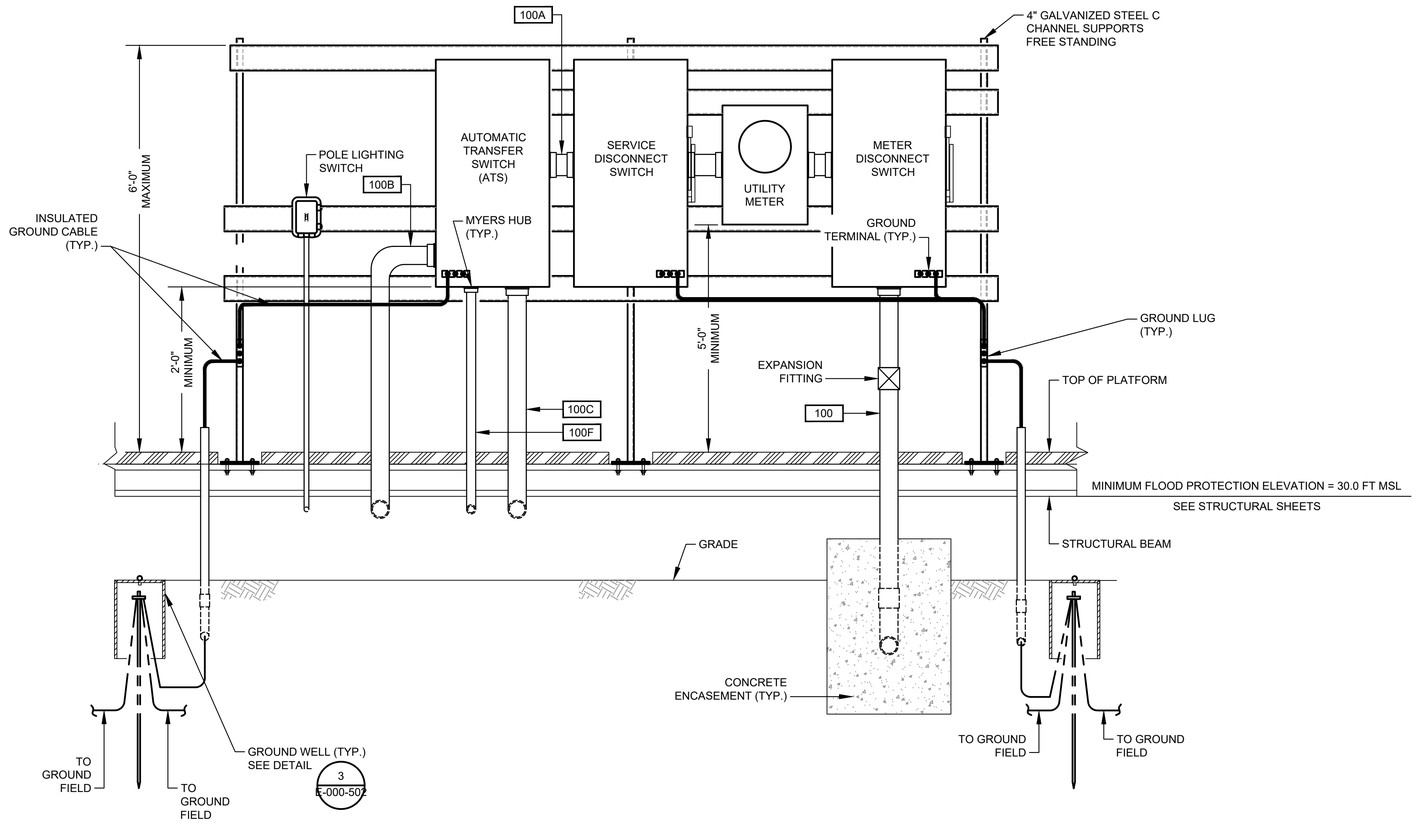
E-207-501

SHEET NO. 161 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-501.dwg



PLAN



SERVICE MOUNTING RACK

DETAIL 1 / - NTS.

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

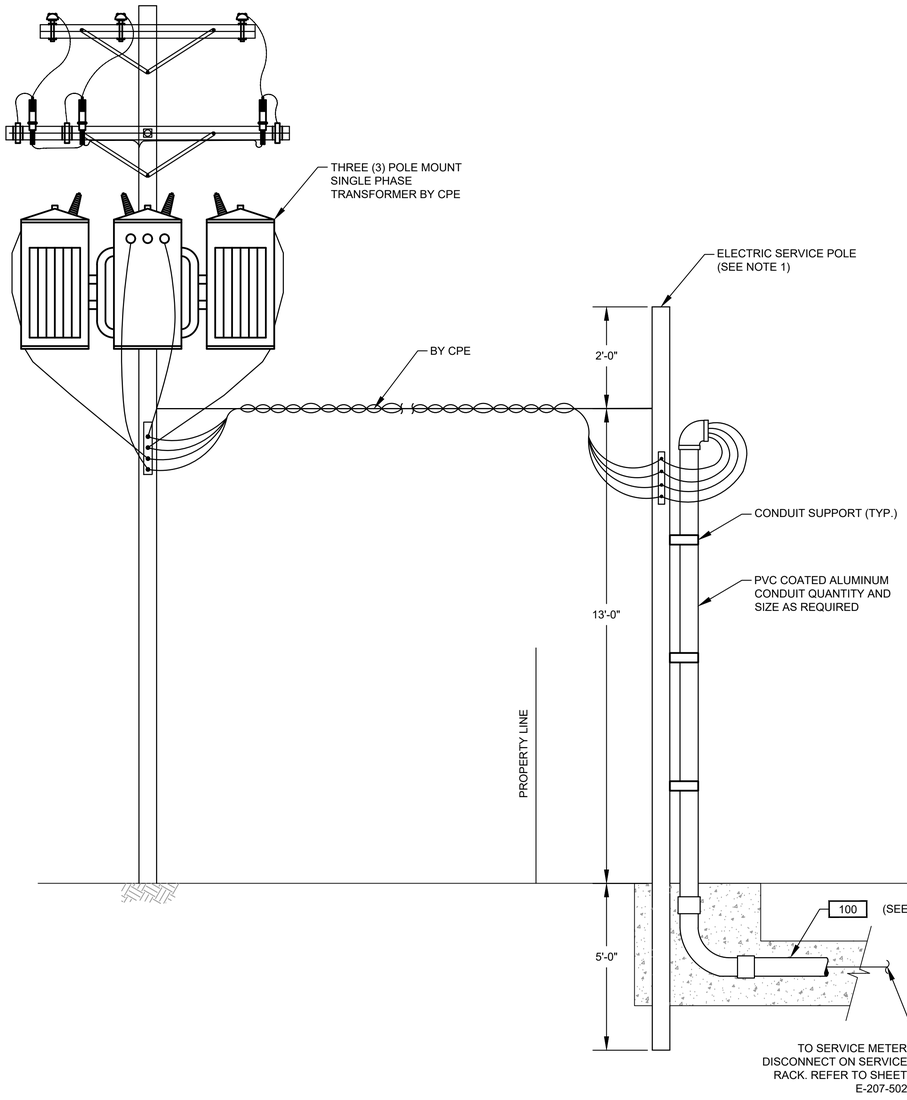
2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION 2 WEST COURT DR. SERVICE RACK DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-502.dwg



ELECTRICAL SERVICE ENTRANCE

DETAIL 1
NTS. -

NOTES:

1. WOODEN POLE 20' LONG. TOP DIAMETER 6", BOTTOM DIAMETER 8" PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2. ELECTRICAL SERVICE FEEDER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. COORDINATE WITH CPE FOR THE REQUIREMENTS OF THE INSTALLATION.

GENERAL NOTES:

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
2 WEST COURT DR

ELECTRICAL

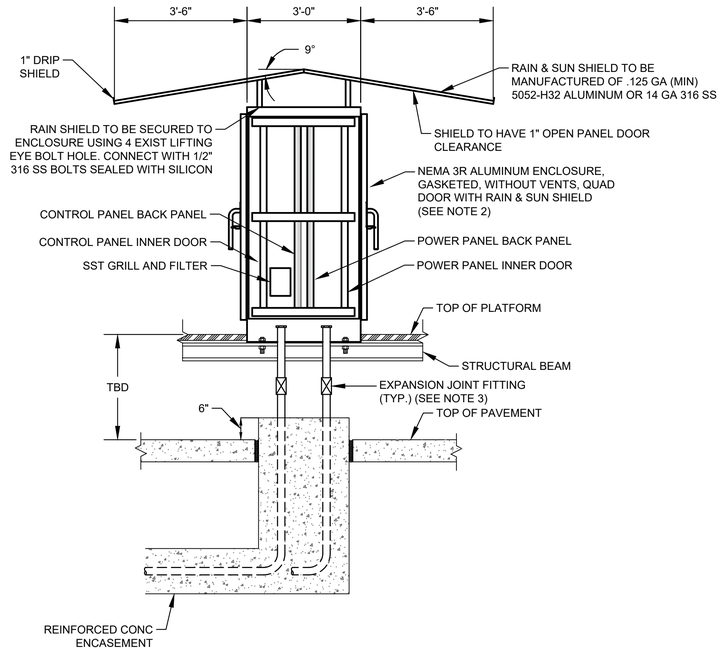
WEST COURT LIFT STATION
2 WEST COURT DR.
SERVICE POLE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

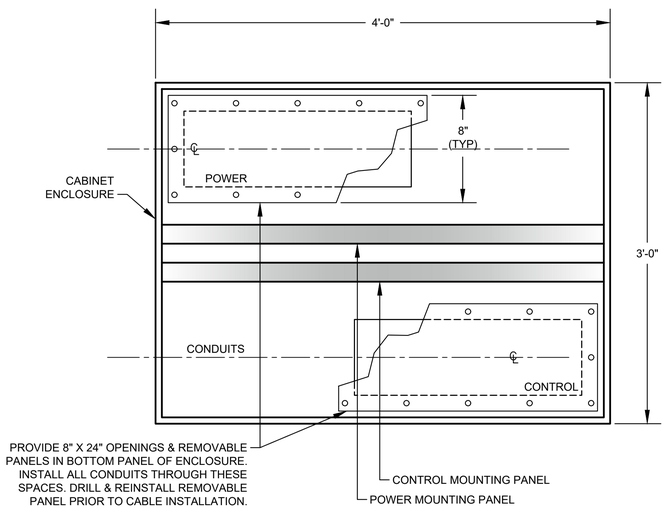
E-207-503

SHEET NO. 163 OF 226

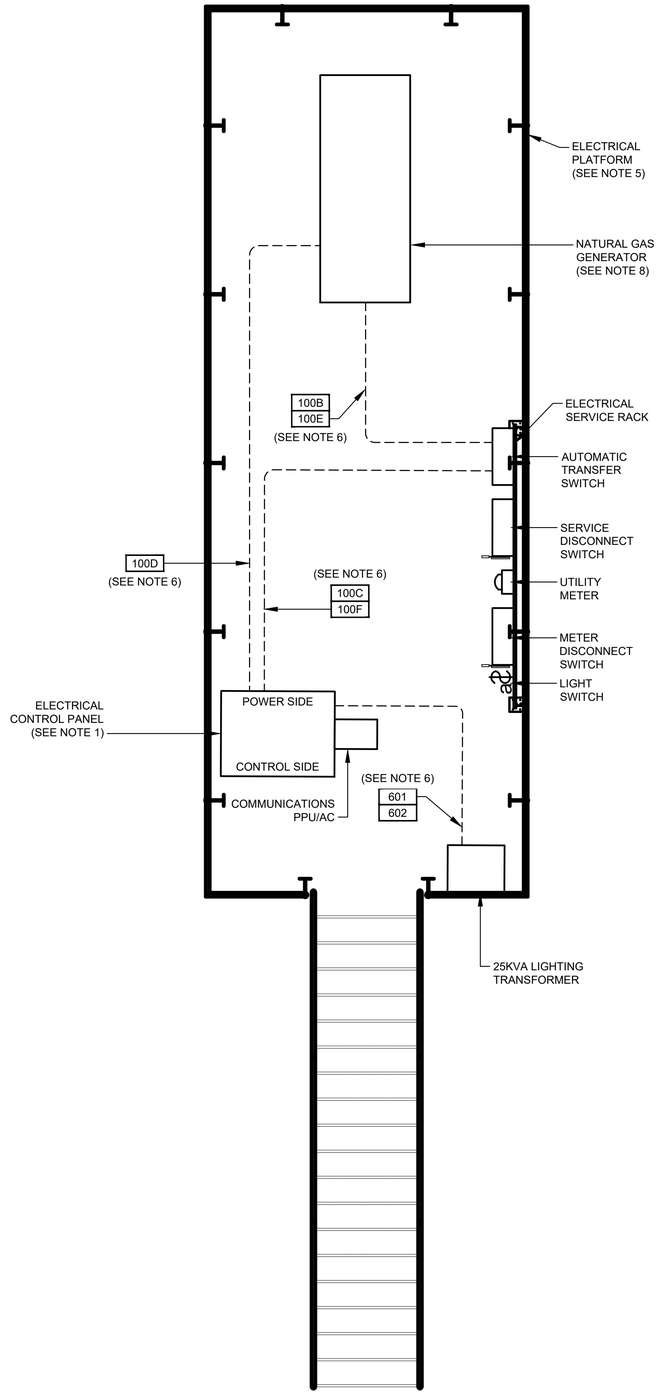
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-503.dwg



CONTROL CABINET ENCLOSURE WITH PLATFORM



SECTION 1 / - (SEE NOTE 7)
NTS



CONTROL CABINET ENCLOSURE ON ELEVATED PLATFORM DETAIL

DETAIL 1 / - (SEE NOTE 7)
3/8" = 1'-0"

NOTES:

1. SEE SHEET I-207-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO SPEC 13325-8 FOR PANEL DIMENSIONS.
3. EXPANSION JOINT FITTINGS AS REQUIRED.
4. REFER TO SERVICE RACK FOR DETAIL.
5. REFER TO STRUCTURAL DRAWINGS FOR DETAILOF PLATFORM.
6. CONDUIT TO BE MOUNTED BELOW PLATFORM GRATING.
7. ALL CONDUITS ENTERING THE CABINET SHALL BE BOTTOM ENTRY.
8. THIS GENERATOR WILL BE USED IN EMERGENCY USE ONLY.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
CONTROL PANEL ENCLOSURE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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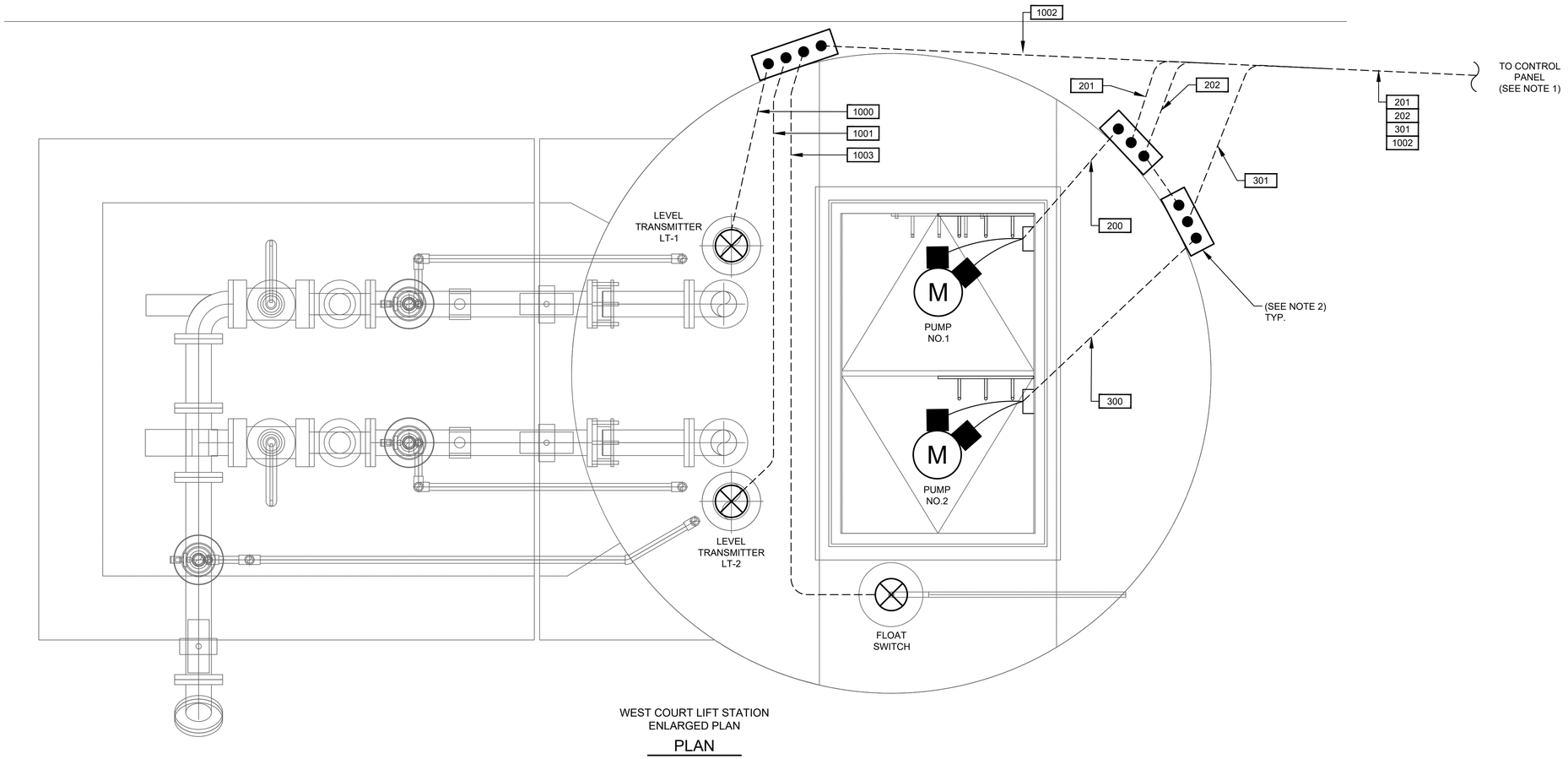
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-207-504

SHEET NO. 164 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\West Court\West Court E-207-504.dwg



WEST COURT LIFT STATION
ENLARGED PLAN

PLAN

1"=1'-0"

SCALE: 1"= 1'-0"

0' 1' 2' 3'

NOTES:

1. SEE SHEET E-207-101 FOR CONTINUATION.
2. REFER TO SHEET E-207-501.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

ELECTRICAL

WEST COURT LIFT STATION
2 WEST COURT DR.
PROPOSED PLAN VIEW

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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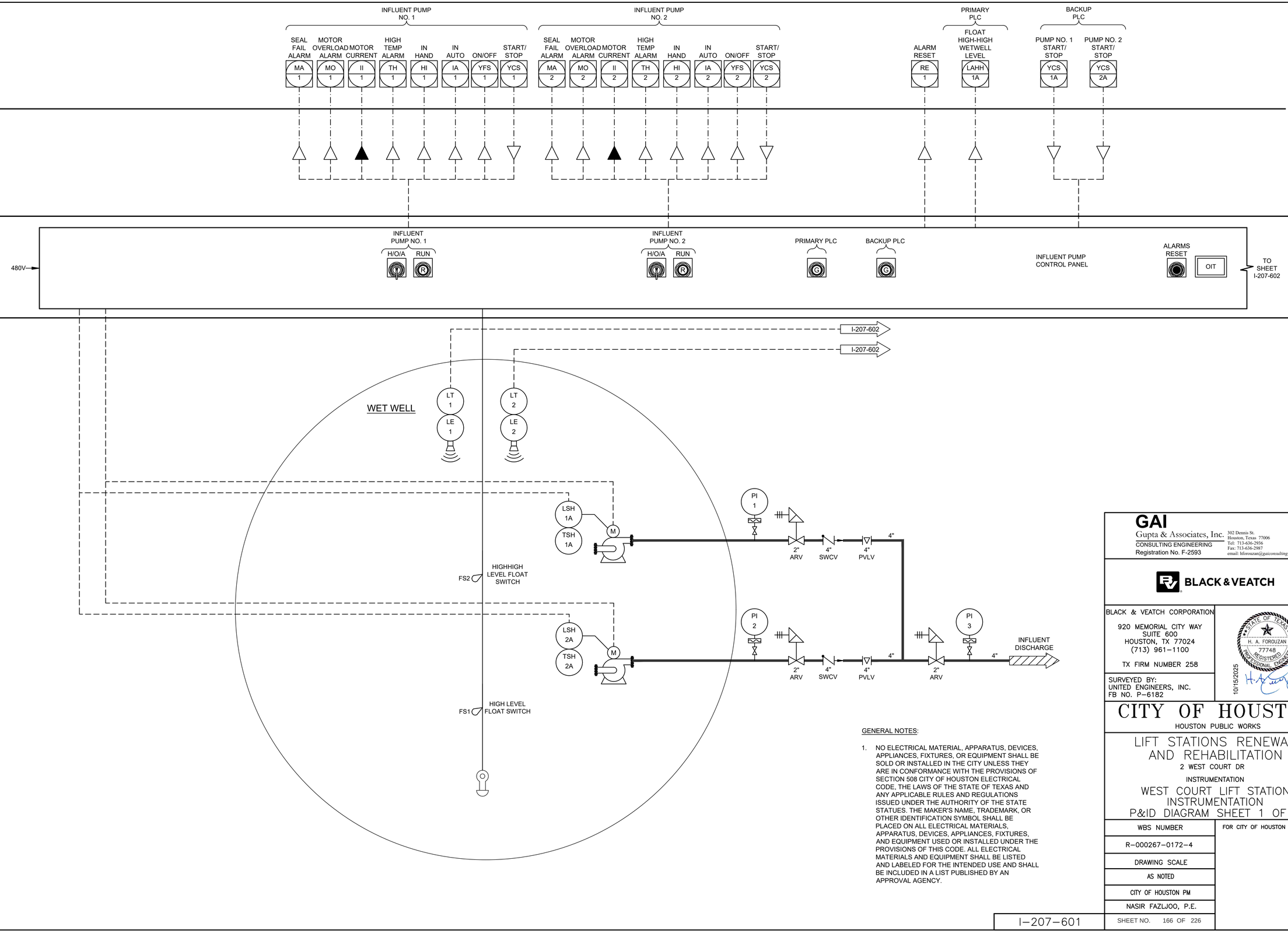
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-601.dwg

HMI

CONTROL PANEL PLC

CONTROL PANEL



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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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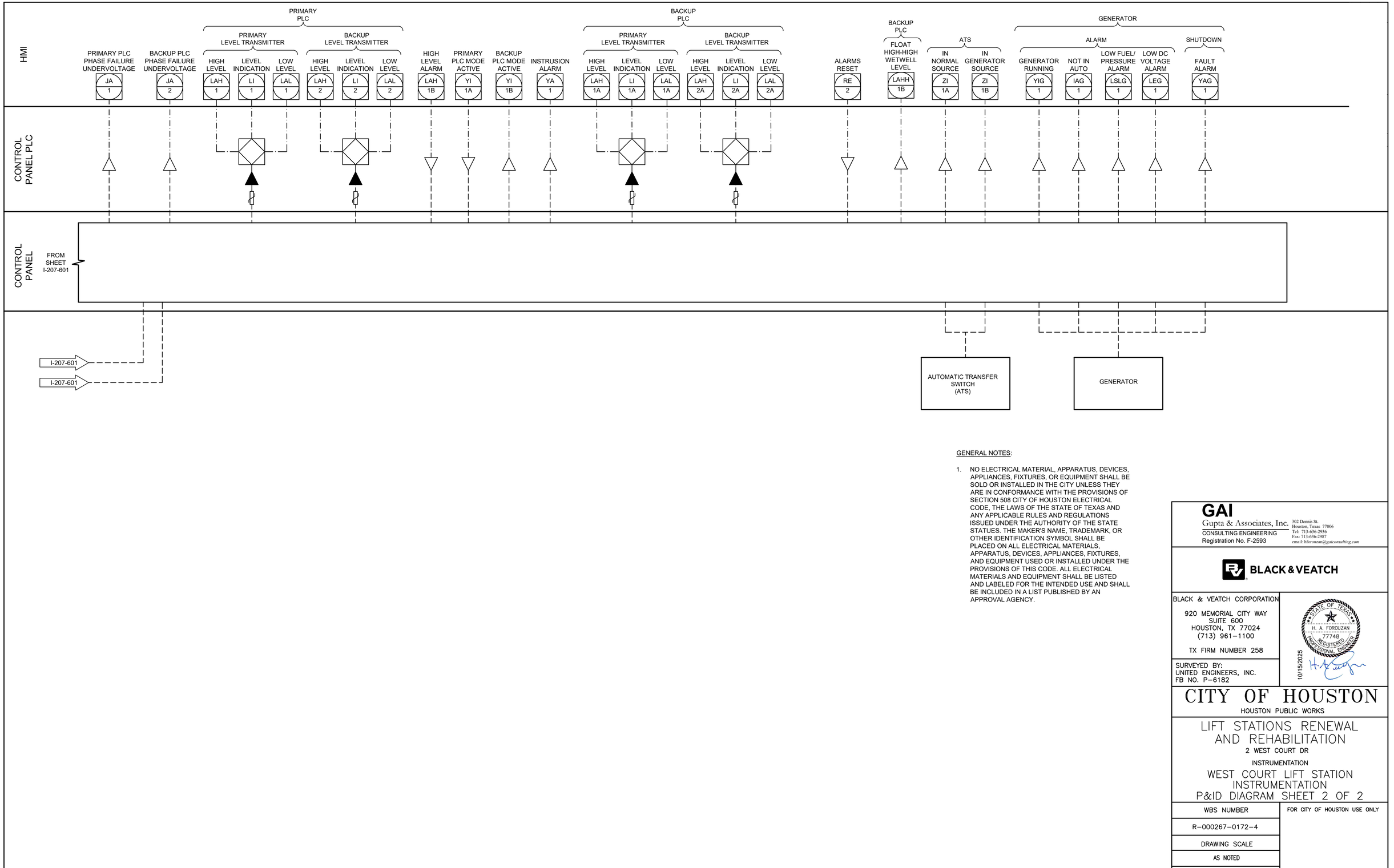
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-207-601



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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 2 OF 2

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DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 167 OF 226	

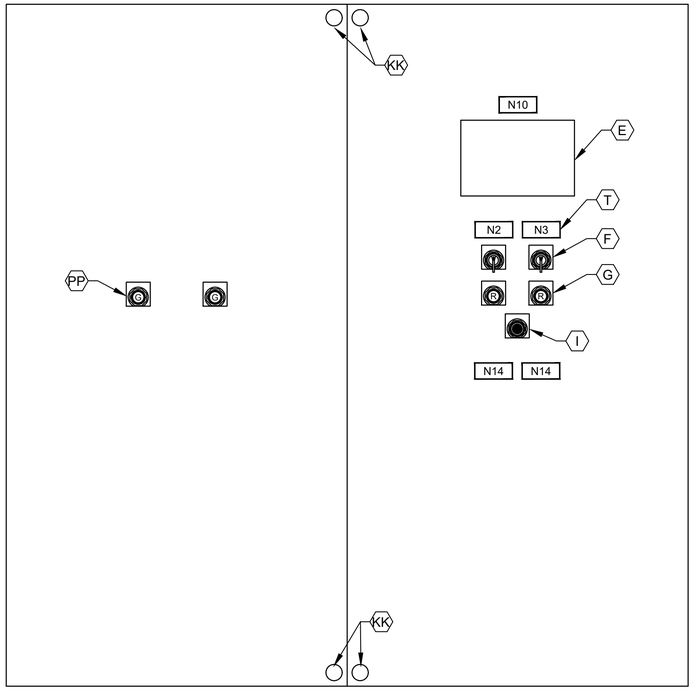
I-207-602

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-602.dwg

EQUIPMENT AND DEVICE SCHEDULE

ITEM	QUANTITY	DESCRIPTION
A	1	PANEL BOARD, 120/240V, 1 PHASE, 3 WIRE, 100A, 12 CKTS
B	2	FULL VOLTAGE, NON-REVERSING, SINGLE SPEED, AUTOMATIC MOTOR STARTER W/120 VOLT CONTROL COIL, NEMA SIZE AS SCHEDULED.
C	2	TIME DELAY RELAY WITH THREE FORM C CONTACTS, 120VAC COIL AND 11 PIN SOCKET BASE.
D	1	SINGLE CHANNEL INTRINSICALLY SAFE RELAY
E	1	PROGRAMMING SCREEN (OIT)
F	2	HAND-OFF-AUTO SWITCH, 3 POSITION, HEAVY-DUTY, OILTIGHT WITH 2 SETS OF CONTACT BLOCKS (PUMP CONTROL)
G	2	INDICATING LIGHT, HEAVY DUTY, OILTIGHT, RED, 24 VDC, LED, WITH "RUN" LEGEND
H	1	PERPETUAL POWER UNIT (PPU)
I	1	PUMP ALARM RESET PUSHBUTTON
J	2	SWITCH FOR CABINET LIGHT, 120V, 20A, SPST
K	3	DUPLEX RECEPTACLE, 120V, 20A, 2 WIRE, GROUNDED
L	2	24" LED STRIP LIGHT 120V SUITABLE FOR ZERO DEGREE OPERATION.
M	1	SURGE PROTECTOR - INCOMING POWER
N	*	NOT USED.
P	2	CURRENT TRANSFORMER, RATIO AS SCHEDULED W/4-20mA OUTPUT.
Q	12	TERMINAL BLOCKS, SIZED FOR MOTOR POWER REQUIREMENTS
R	*	RELAY WITH THREE FORM C CONTACTS, AND 11 PIN SOCKET BASE
S	*	NOT USED.
T	*	NAMEPLATES, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
U	2	SOLID STATE MOTOR OVERLOAD RELAY
V	6	FUSE HOLDER & FUSES - PHASE FAILURE
W	1	NEMA 3R GASKETED ALUMINUM ENCLOSURE WITHOUT VENTS 72"H x 48"W x 36"D
X	1	DOOR MOUNTED ROTARY HANDLE DISCONNECT SWITCH (SUITABLE FOR ENVIRONMENT)
Y	1	THERMAL-MAGNETIC MOLDED CASE MAIN CIRCUIT BREAKER, SIZE AS SCHEDULED
Z	2	ADJUSTABLE INSTANTENOUS TRIP MOTOR CIRCUIT PROTECTOR, SIZE AS SCHEDULED
AA	*	TERMINAL BLOCKS
BB	2	EXTERNAL OVERLOAD RESET PUSHBUTTON MECHANISM
CC	2	ANALOG I/O SURGE SUPPRESSOR
DD	1	WIRE DUCT 2" WIDE x 2" DEEP MINIMUM
EE	1	THERMAL-MAGNETIC MODLED CASE CIRCUIT BREAKER FOR LIGHTING TRANSFORMER, SIZE AS SCHEDULED
FF	1	GROUND BUS
GG	1	25 KVA, 480 - 240/120V,1ϕ, 3W DRY TYPE NEMA 3R ENCLOSURE TRANSFORMER (PAD MOUNTED)
HH	*	NOT USED.
II	1	120VAC - 24VAC POWER SUPPLY (AS REQUIRED)
JJ	11	CARTRIDGE FUSES & FUSE HOLDER
KK	8	QUARTER TURN CAPTIVE DOOR CLOSURE
LL	1	120VAC - 24VDC PLC POWER SUPPLY 5A
MM	2	MOTION SWITCH
NN	*	NOT USED
PP	2	INDICATING LED LIGHT, HEAVY DUTY, OILTIGHT, GREEN, 24 VDC, LED WITH " PRIMARY PLC" & "BACKUP PLC" LEGEND
QQ	*	NOT USED
RR	*	NOT USED
SS	1	COMMUNICATION ETHERNET SWITCH
TT	1	POWER SURGE PROTECTOR - CONTROL POWER
UU	2	PROGRAMMABLE LOGIC CONTROLLER WITH EXPANSION UNIT
VV	1	PHASE AND UNDER VOLTAGE MONITOR
WW	*	FUSED TERMINAL BLOCKS
XX	2	PUMP PROTECTION MODULE RATED FOR CLASS I, DIVISION I
YY	2	ANALOG SIGNAL ISOLATOR
ZZ	-	NOT USED
AB	-	NOT USED.
AC	1	POWER DISTRIBUTION BLOCK
AD	1	NEUTRAL LUG
AE	1	6" EXHAUST FAN, 120V, STAINLESS FILTERS & GRILL PACKAGE W/BUG GUARD
AF	1	T-STAT FOR EXHAUST FAN

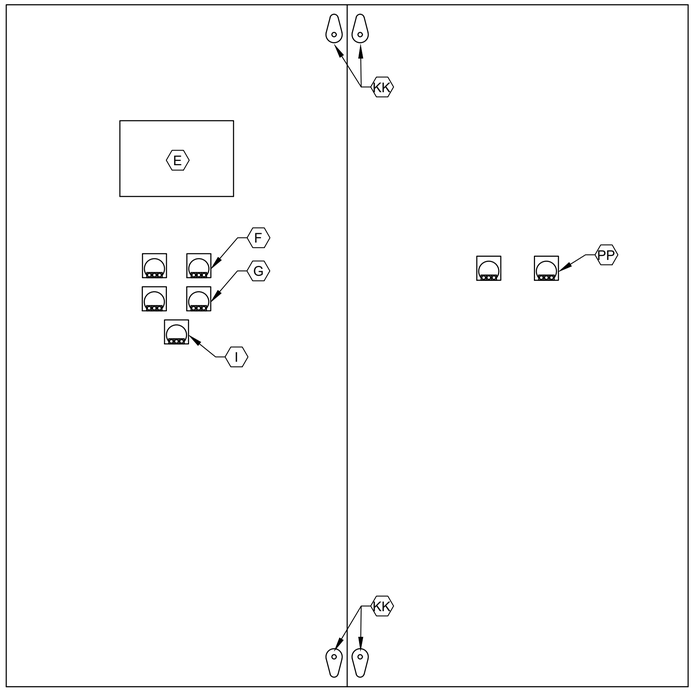
* - AS SCHEDULED



CONTROL PANEL FRONT INNER DOOR

ELEVATION

NTS



CONTROL PANEL BACK INNER DOOR

ELEVATION

NTS

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO PANELS USING STAINLESS STEEL HARDWARE.
2. REFER SPECIFICATIONS FOR ALL PANEL COMPONENTS.

GENERAL NOTES:

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FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

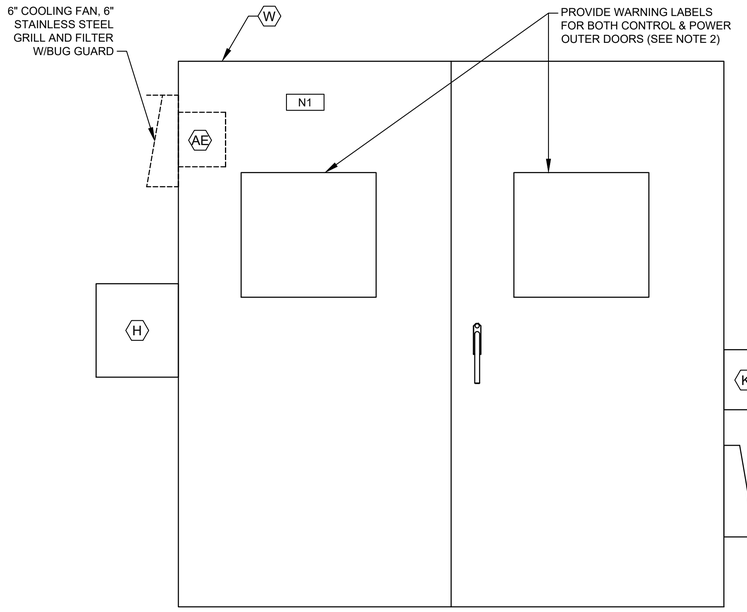
INSTRUMENTATION

WEST COURT LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT & SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-207-603

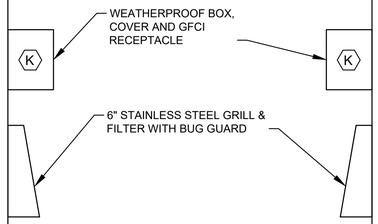
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-603.dwg

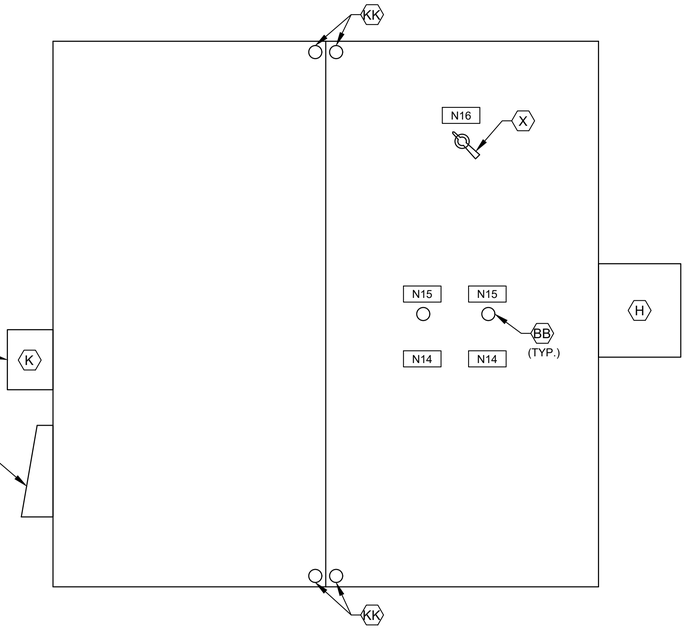


CONTROL CABINET (CONTROL SIDE)
OUTER DOOR

ELEVATION

NTS





CONTROL CABINET (POWER SIDE)
INNER DOOR

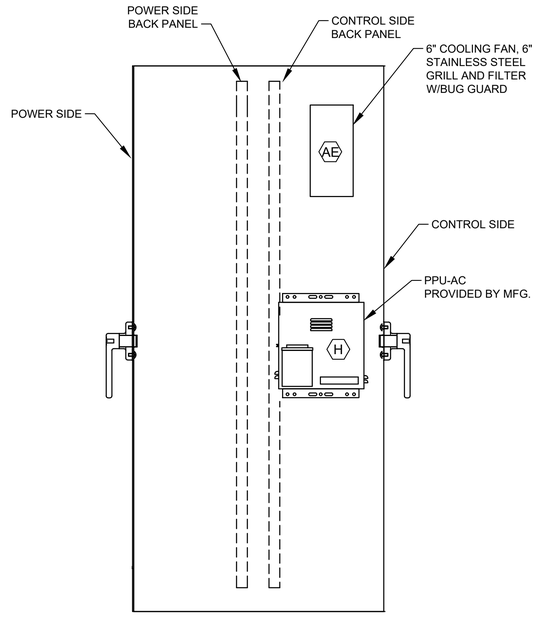
ELEVATION

NTS

(SEE NOTE 1)

NAMEPLATE SCHEDULE

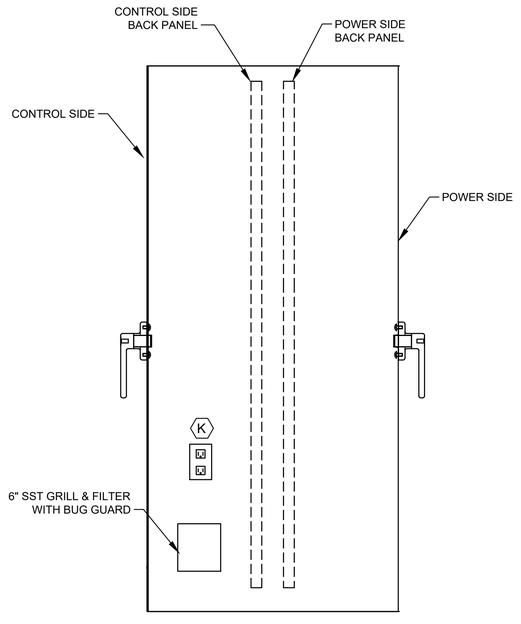
DESIGNATION	ENGRAVED
N1	PUMP STATION DESIGNATION
N2	PUMP NO. 1
N3	PUMP NO. 2
N4	NOT USED.
N5	NOT USED.
N6	NOT USED.
N7	NOT USED.
N8	NOT USED.
N9	NOT USED.
N10	PROGRAMMING SCREEN
N11	NOT USED.
N12	PRIMARY PLC
N13	BACKUP PLC
N14	MOTOR DATA
	HORSEPOWER (OUTPUT) ----------
	RPM AT FULL LOAD ----------
	TIME RATING ----------
	FREQUENCY ----------
	NUMBER OF PHASES ----------
	MODEL NUMBER ----------
	RATED VOLTAGE ----------
	SERVICE FACTOR ----------
	FULL LOAD AMPS ----------
	INSULATION CLAS ----------
	NEMA DESIGN LETTER ----------
	TEMPERATURE RISE ----------
	NEMA FRAME SIZE ----------
	DATE OF MANUFACTURE ----------
	THERMO PROTECTION (IF REQUIRED) --
	MOISTURE PROTECTION (IF REQUIRED)-
N15	EXTERNAL OVERLOAD RESET PUSH BUTTON MECHANISM
N16	MAIN BREAKER



CONTROL CABINET (LEFT SIDE VIEW)

ELEVATION

NTS



CONTROL CABINET (RIGHT SIDE VIEW)

ELEVATION

NTS

NOTES:

1. SEE SHEET I-207-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO NEC SECTIONS 110.16 & 110.21

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 1 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

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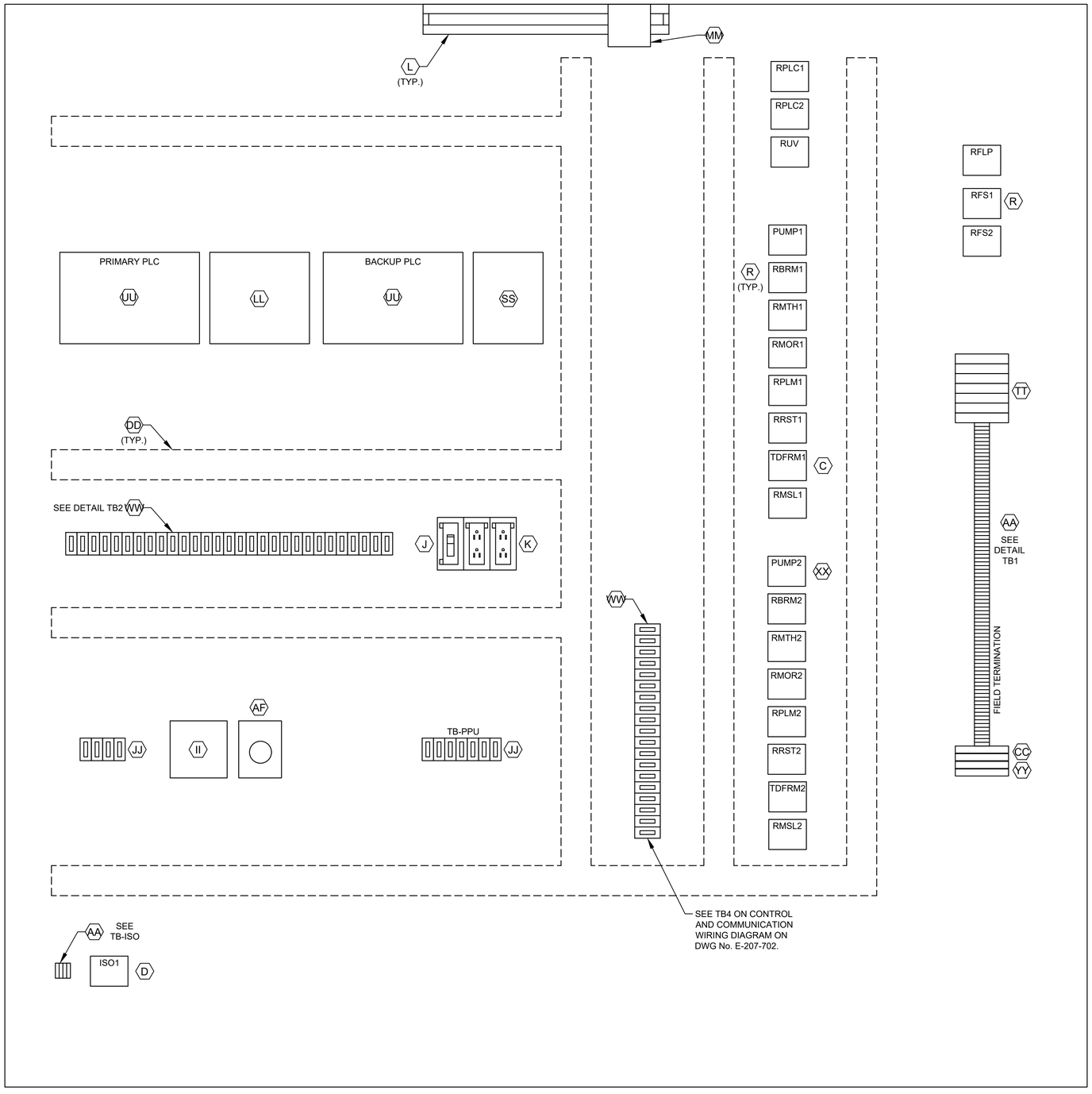


CONTROL PANEL
ELEVATION

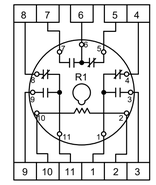
DETAIL TB1
L1A
L1N
SPARE
3
3N
49
50
51
52
53
54
1004
1
24V-
24V-
1002
2
11
1001
1002A
1003
1002A
1004
18
3N
19
20
36
36N
41
42
43
44
SPARE
L1A
L1N
103
104
105
106
107
108
110
113
115
116
119
SPARE
203
204
205
206
207
208
210
213
215
216
219

ALL L AND N FOR EACH PUMP CONTROL TO BE FUSED

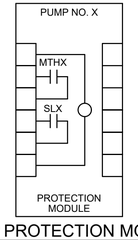
DETAIL TB2
36A
37A
50
52
54
52A
54A
L+
M
35B
38B
41B
47B
13B
13AB
13GB
L+
M
14B
14AB
14GB
L+
M
13
13A
13G
14
14A
14G
SPARE
18
SPARE
28
29
32
35B
33
42
44
SPARE
103
104
115
109
110
118
120
121
122
123
SPARE
209
210
211
218
220
222
223

DETAIL TB-ISO
1500
1501
1503
1504

LEGEND	
TAG	DESCRIPTION
RMTH	MOTOR HIGH TEMPERATURE ALARM RELAY
RPLM	PLC PUMP RUN RELAY
RRST	PUMP RESET AUX RELAY
RPLC	PLC MODE AUX RELAY
RMOR	MOTOR OVERLOAD ALARM RELAY
RBRM	BACKUP SYSTEM RUN RELAY
RUV	UNDER VOLTAGE RELAY
ISO	INTRINSICALLY SAFE RELAY
RFS	PUMP RUN FLOAT SWITCH RELAY
TDFRM	TIMER FLOAT SWITCH RUN RELAY
RMSL	MOTOR SEAL LEAK ALARM RELAY
RFLP	FLOAT LOCKOUT PUMP RELAY



RELAY DETAIL
ITEM R



PUMP PROTECTION MODULE
DETAIL, ITEM XX

NOTE: REPLACE "X" WITH APPROPRIATE PUMP NO.

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NOTES:

1. SEE SHEET I-207-603 FOR EQUIPMENT SCHEDULE.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION
CONTROL CABINET
EQUIPMENT LAYOUT SHEET 2 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
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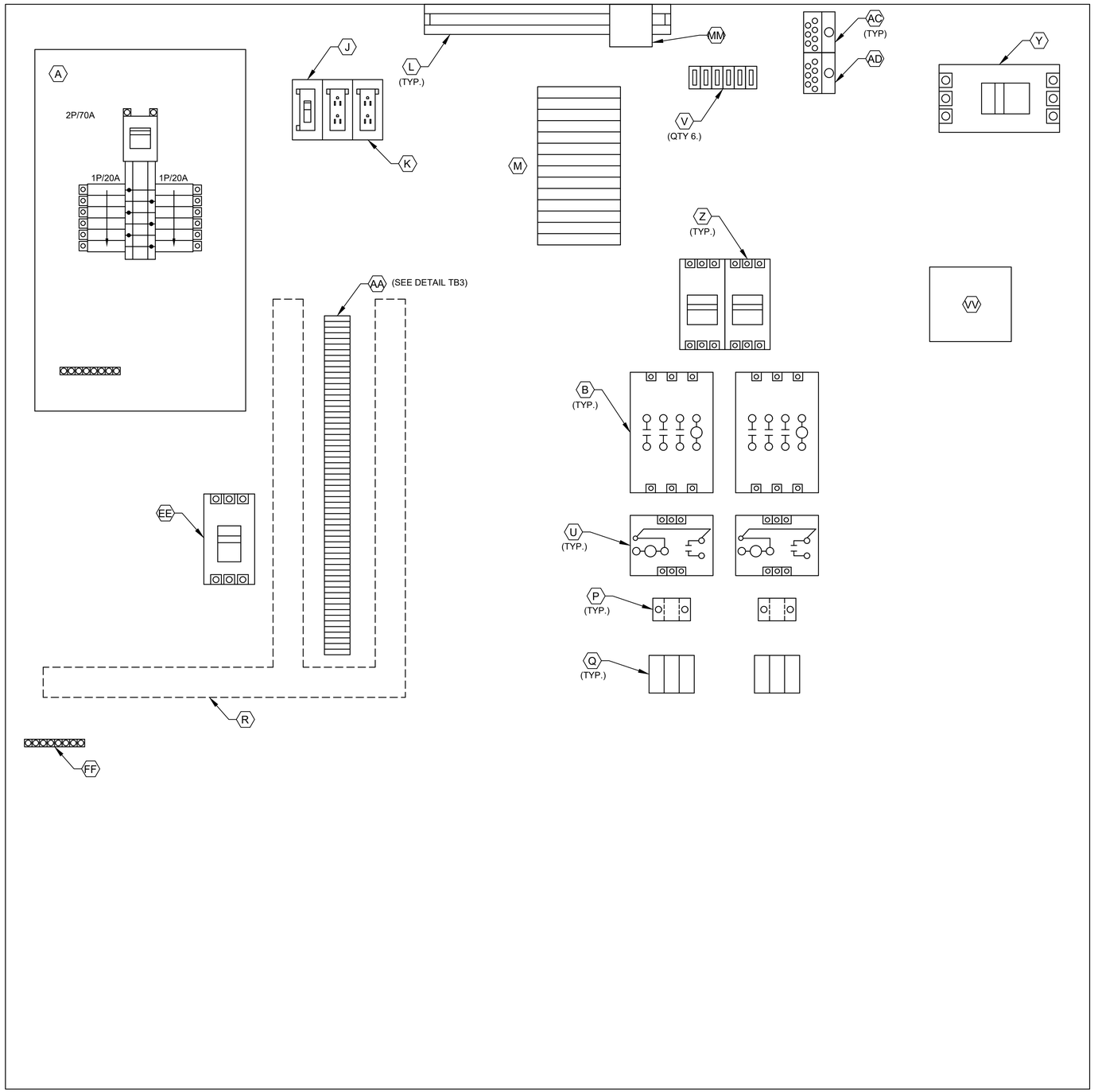
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 170 OF 226	

I-207-605

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-605.dwg



POWER PANEL
ELEVATION

3
18
L1A
L1N
SPARE
SPARE
103
104
105
106
107
108
110
113
115
116
119
SPARE
203
204
205
206
207
208
210
213
215
216
219
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE

DETAIL TB3

NOTES:

1. SEE SHEET I-207-603 FOR EQUIPMENT SCHEDULE.

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 3 OF 3

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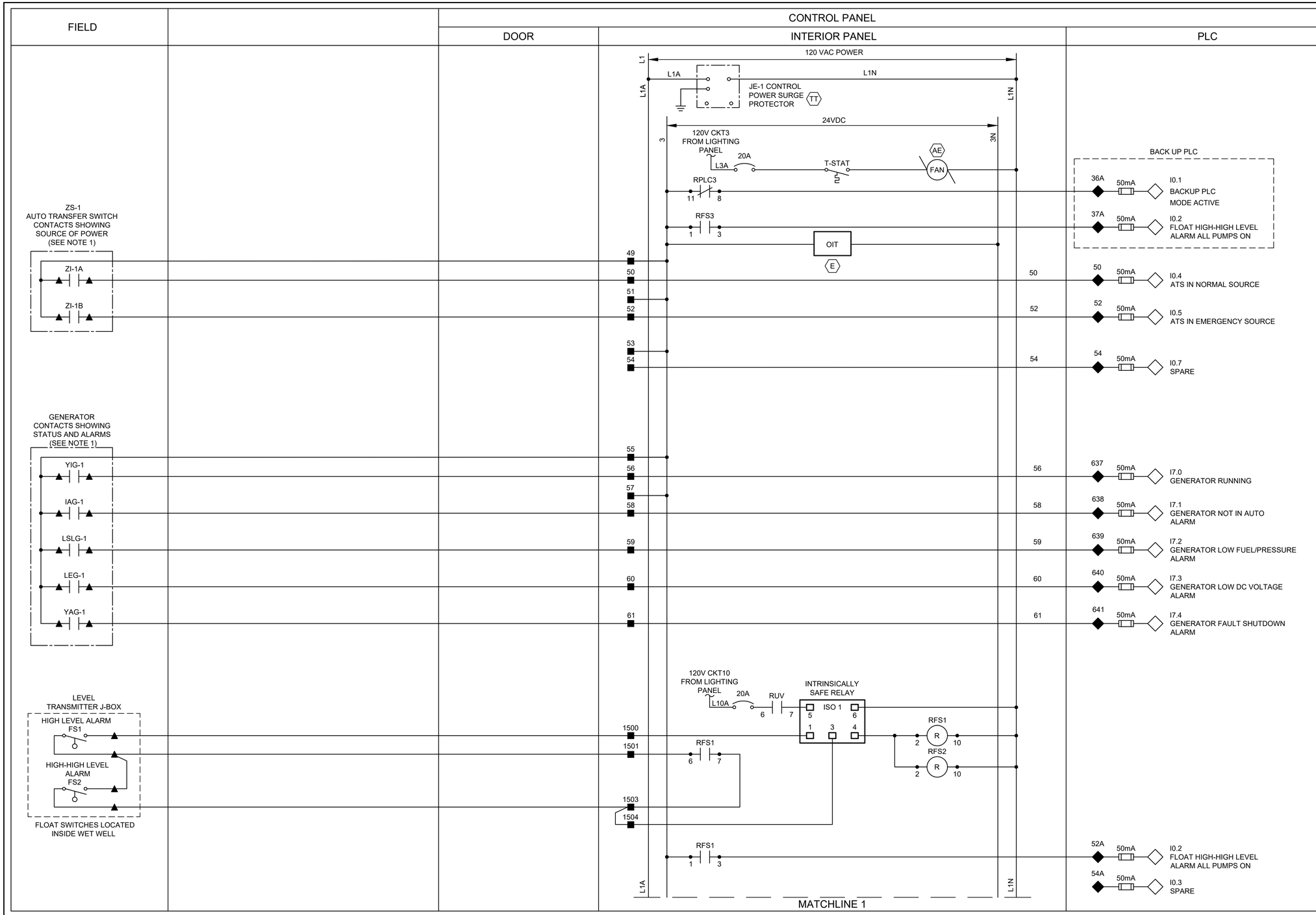

NOTES:

1. PROVIDE AUTOMATIC TRANSFER SWITCH DRY CONTACT.
2. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

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LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 1 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-207-607

SHEET NO. 172 OF 226

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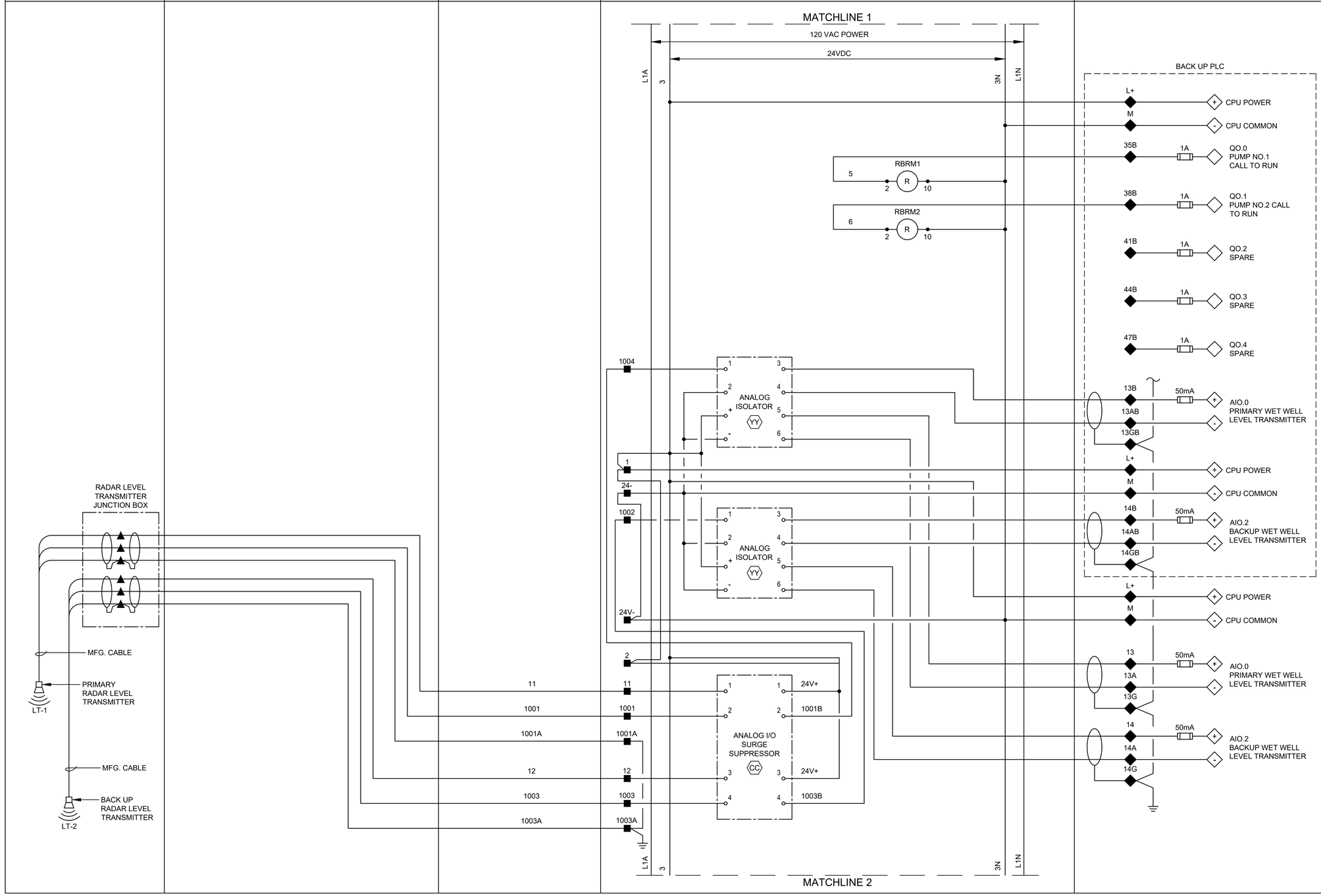
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-608.dwg

FIELD		CONTROL PANEL		
		DOOR	INTERIOR PANEL	PLC



GENERAL NOTES:

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LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

GAI
Gupta & Associates, Inc.
CONSULTING ENGINEERING
Registration No. F-2593
302 Dennis St.
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Fax: 713-636-2987
email: hforouzan@gaiconsulting.com

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

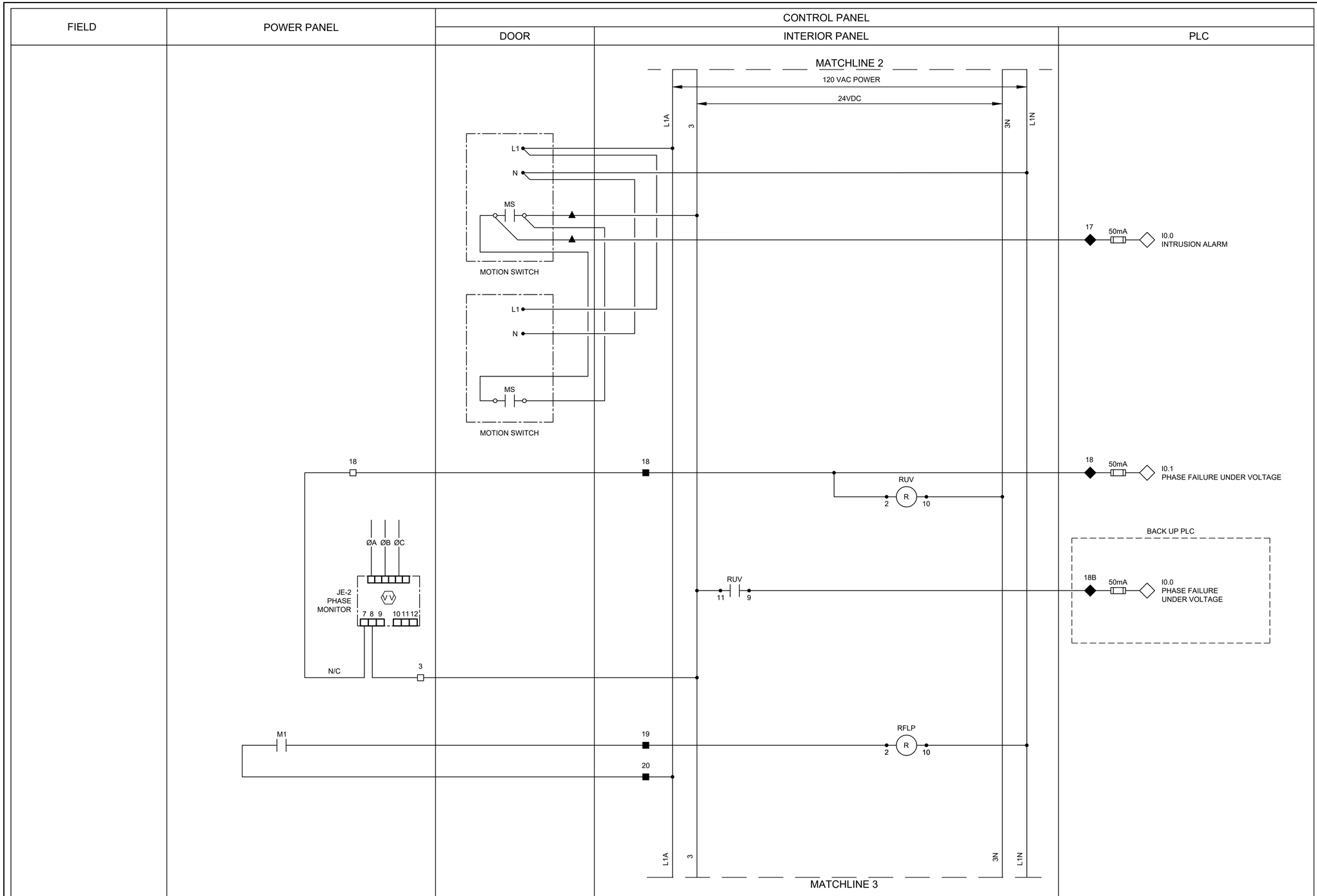
2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 2 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-207-608



NOTES:

1. PROVIDE ONE LIMIT SWITCH PER EXTERIOR CONTROL PANEL AND POWER PANEL DOOR, WIRED IN PARALLEL.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

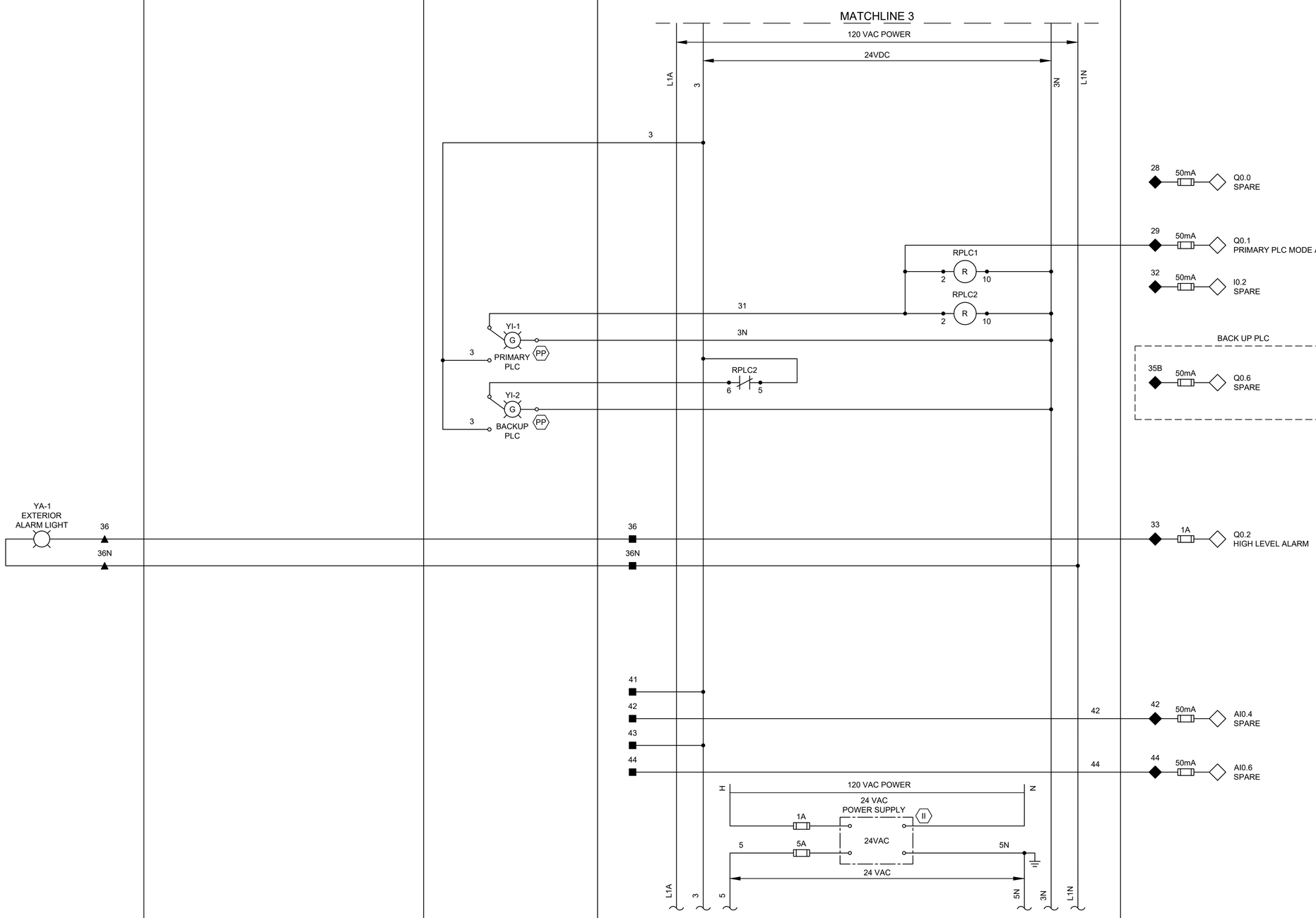
INSTRUMENTATION

WEST COURT LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 3 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\1Working\West Court\West Court I-207-609.dwg

FIELD	POWER PANEL	CONTROL PANEL	
		DOOR	INTERIOR PANEL



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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

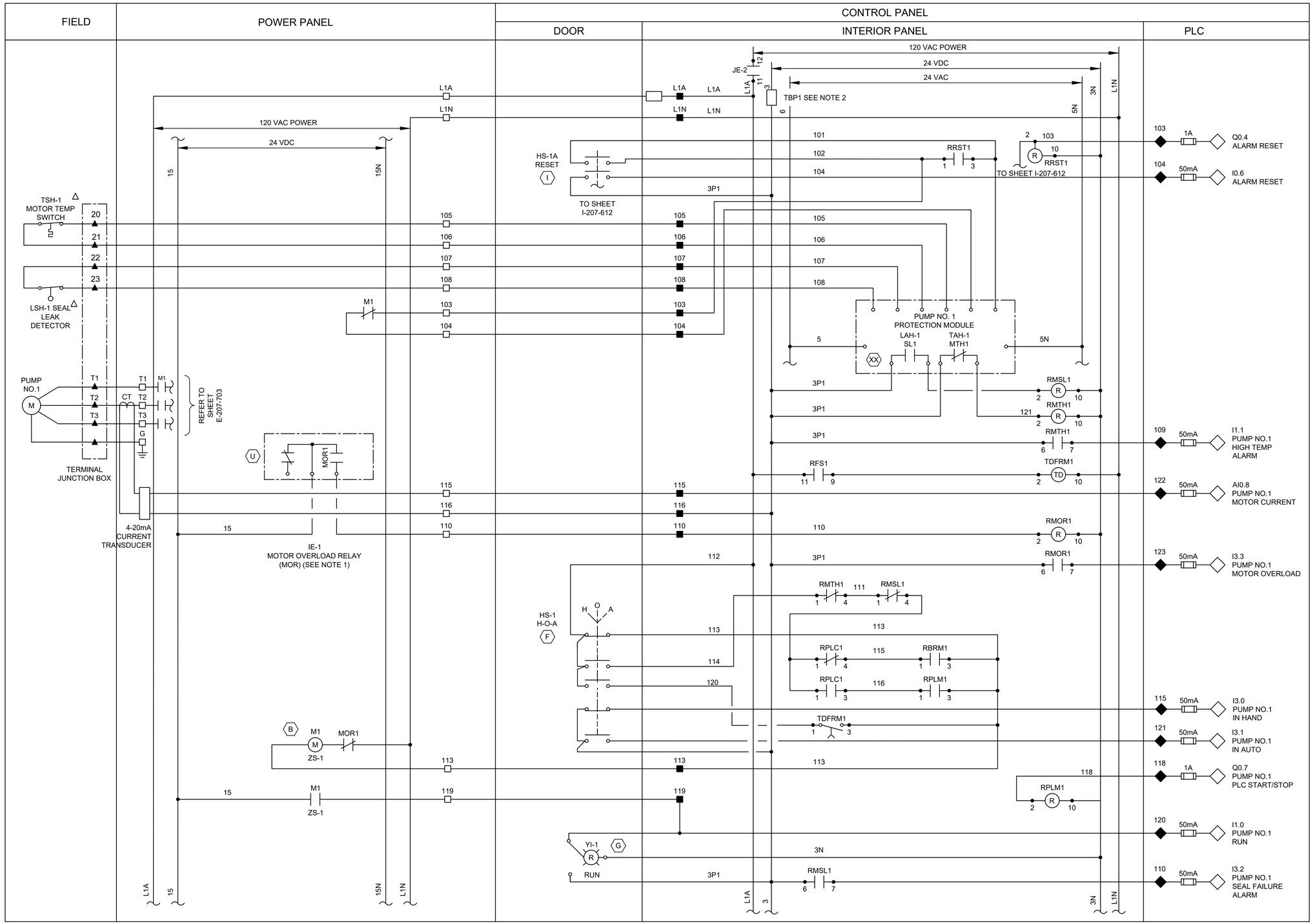
INSTRUMENTATION

WEST COURT LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 4 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
I-207-610	SHEET NO. 175 OF 226

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-610.dwg

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-611.dwg



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■ FIELD TERMINAL LOCATED AT CONTROL PANEL
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● DEVICE TERMINAL NO.
◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-207-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

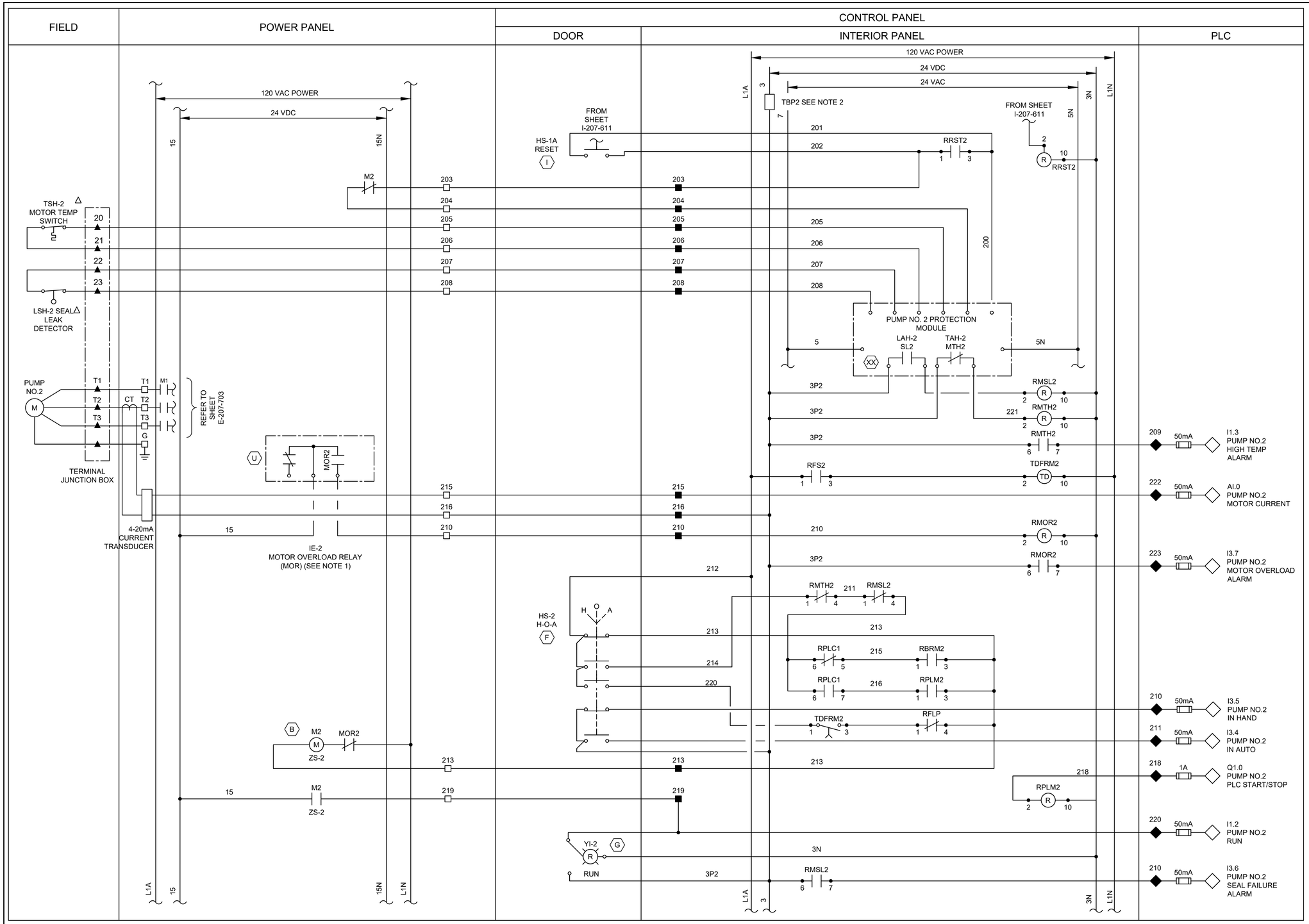
LIFT STATIONS RENEWAL AND REHABILITATION
2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION PUMP NO.1 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 176 OF 226	

I-207-611



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2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-207-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

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STATE OF TEXAS
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REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

2 WEST COURT DR

INSTRUMENTATION

WEST COURT LIFT STATION PUMP NO.2 CONTROL WIRING DIAGRAM

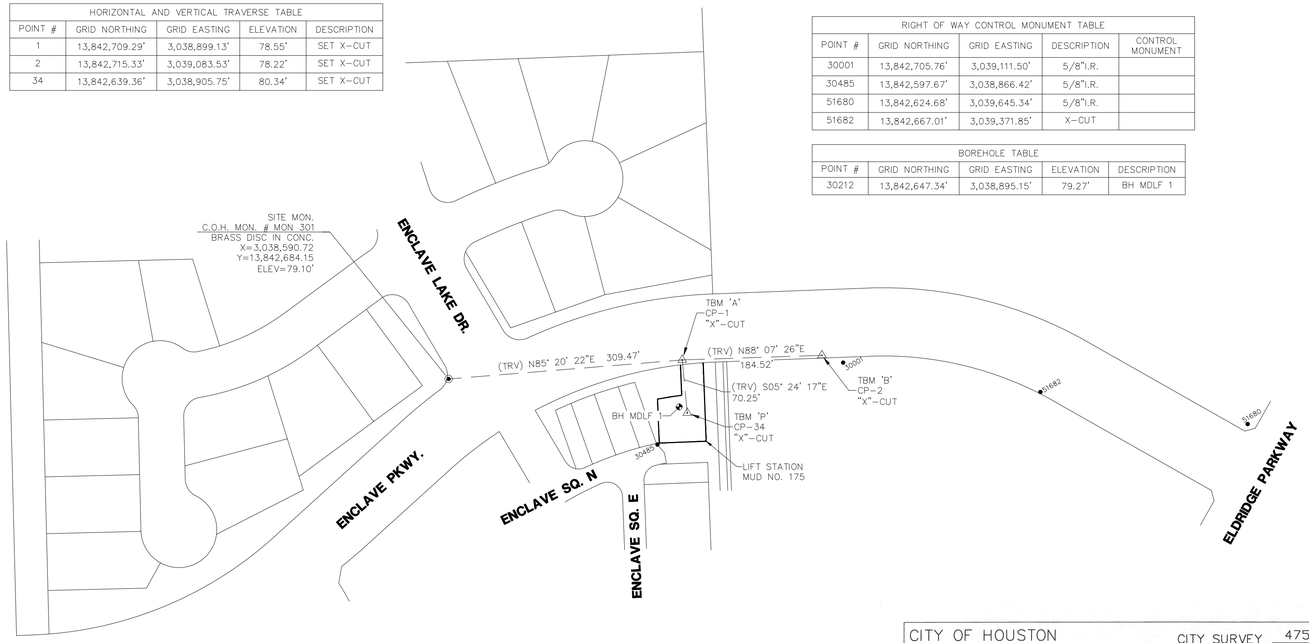
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
I-207-612	SHEET NO. 177 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\West Court\West Court I-207-612.dwg

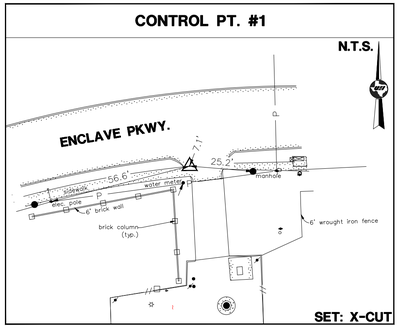
HORIZONTAL AND VERTICAL TRAVERSE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
1	13,842,709.29'	3,038,899.13'	78.55'	SET X-CUT
2	13,842,715.33'	3,039,083.53'	78.22'	SET X-CUT
34	13,842,639.36'	3,038,905.75'	80.34'	SET X-CUT

RIGHT OF WAY CONTROL MONUMENT TABLE				
POINT #	GRID NORTHING	GRID EASTING	DESCRIPTION	CONTROL MONUMENT
30001	13,842,705.76'	3,039,111.50'	5/8"I.R.	
30485	13,842,597.67'	3,038,866.42'	5/8"I.R.	
51680	13,842,624.68'	3,039,645.34'	5/8"I.R.	
51682	13,842,667.01'	3,039,371.85'	X-CUT	

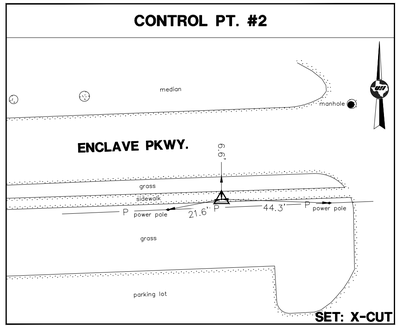
BOREHOLE TABLE				
POINT #	GRID NORTHING	GRID EASTING	ELEVATION	DESCRIPTION
30212	13,842,647.34'	3,038,895.15'	79.27'	BH MDLF 1



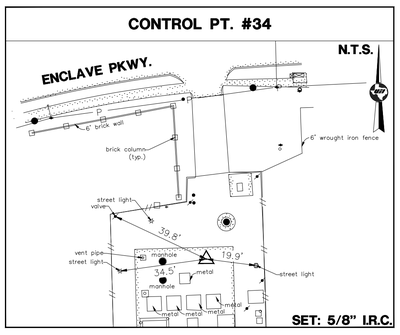
CONTROL PT. #1

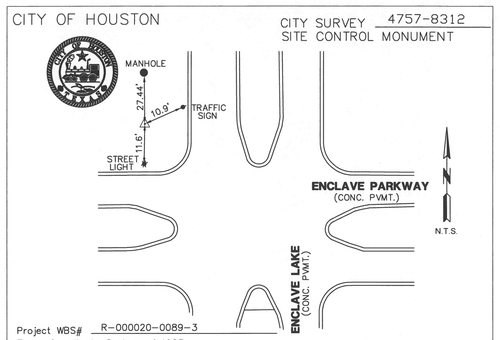


CONTROL PT. #2



CONTROL PT. #34





Project WBS# R-000020-0089-3
Texas Coordinate System of 1983, South Central Zone, U. S. Survey Feet
X= 3,038,590.73
Y= 13,842,684.15
Lat.= N 29°46'09.35"
Lon.= W 95°37'35.47"
Reference Frame Used: ITRF (EPOCH: 2010.0000)
Vertical Adjustment used: NAVD '88 (CORS '96)
General Location: NORTHWEST CNR. AT THE INTERSECTION OF ENCLAVE LAKE AND ENCLAVE PKWY
Date Set: 09-25-24 Type of Mark: ALUMINUM DISK IN CONC.
3 Nearest project control points (bearings and distances stated below):
TO CP-1, 'X' CUT IN CONC., N 85° 20' 22" E ~ 309.47'
TO CP-2, 'X' CUT IN CONC., N 86° 22' 46" E ~ 493.85'

Keymap Page: 488F
Orthometric Elevation = 79.10
Ellipsoid Height= -10.89
Geoid: GEOID 12B
Datum Source & Adjustment: NAD '83 (CORS '96)

NOTE:
1. Bearings are grid bearings.
2. Scale Factor = 0.999870017 Grid
3. Surface= S.F.

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
10-24-24

United Engineers, Inc.
9301 SOUTHWEST FREEWAY, SUITE 500 HOUSTON, TEXAS 77074
TEL: (713) 271-2900 FAX (713) 271-2999
ENGINEERING FIRM # F-00142 SURVEY FIRM # 10178-00

Date Observed: September 30, 2024
City of Houston, Harris County, Texas

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM No.:	210190	**Reference Mark Status**	
Stream Number:	W100-00-00	**Date:**	6/4/2013
		Condition:	Recovered
County: Harris	**State:** Texas	**Established By:**	CDS/Muery & Pate Eng.
Key Map No.:	488F	**Date Established:**	5/14/2003
NGS Classification(1):	Range VI	**Watershed:**	Buffalo Bayou
RM's Directly Tied:	210395,210415,210185	**Survey Method Horz:**	GPSOBS
Units of Measure:	US Survey Foot	**Survey Method Vert:**	GPSOBS
Horizontal Datum:	NAD83	**Vertical Datum:**	NAVD88
Horizontal Adj.(2):	2001 Adjustment	**Vertical Adj.(3):**	2001 Adjustment
Projection Zone:	Texas South Central 4204	**Geoid Model Used:**	GEOID99 (CONUS)
Station Name:	210190	**Contractor PID:**	8034
Marker:	ALUM ROD	**Rod Depth:**	24.00
Stamping:	210190	**Sleeve Depth:**	3.00
Mark Logo:	Floodplain Ref. Mark	**Geoid Height:**	-89.60
Latitude:	29° 46' 20.96712" N	**Northing:**	13843795.82
Longitude:	95° 37' 59.63796" W	**Easting:**	3036428.42
Ellipsoid Height:	3.57	**Elevation(4):**	93.43
Convergence:	1° 38' 58"	**Scale Factor:**	0.9998923
Satellite Observable:	YES	**Elevation Factor:**	0.99999983
NGS PID (if applic):	NA	**Combined Factor:**	0.99989214

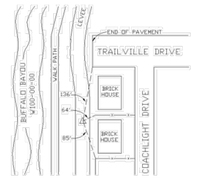
Notes:
1. This is NGS' new classification system. Range VI indicates that this position meets the 0.02m-0.05m Accuracy Standard for Horizontal Position, Ellipsoidal Height, and Orthometric Height (elevation) at the 95% confidence level (m=meters).
2. Horizontal Adjustment - This survey is constrained to the NGS Published Horizontal positions of the geodetic stations adjusted by NGS in 2001.
3. Vertical Adjustment - This survey is constrained to the NGS Published Elevation for Northeast 2250 CORS ARP adjusted by NGS in 2001 and as published in PID AJ6430. Epoch Date 1997.00.
4. The elevation shown equals the Ellipsoid Height minus Geoid Height (from GEOID99) plus a constant of 0.253 feet.
5. The elevation is established by differential leveling techniques, utilizing the published elevations from nearby Reference Marks.

Station Recovery Data: Report an Issue with a Reference Mark - submit to Harris County Flood Control

HARRIS COUNTY FLOODPLAIN REFERENCE MARKS

Floodplain RM Number: 210190
Stream Number: W100-00-00
Northing: 13843795.82 **Easting:** 3036428.42 **Elevation:** 93.43

Location:
Trailville Drive and Coachlight Drive



To Reach Description
From the intersection of Coachlight Drive and Trailville, take a left on Trailville to dead end. Monument located at top of levee.

Photo 1-Station Detail:

Photo 2-Station Area Picture:

TSARP CONVERSION REFERENCE MONUMENT

(TSARP) HARRIS COUNTY FLOODPLAIN REFERENCE MARK NUMBER 210190
FLOOD PLAIN REFERENCE MARK, BRASS DISC, STAMPED 210190.
FROM THE INTERSECTION OF COACHLIGHT DRIVE AND TRAILVILLE, TRAVEL WEST ON TRAILVILLE TO DEAD END. MONUMENT IS LOCATED ON TOP OF LEVEE.
PUBLISHED ELEV= 93.43' (NAVD 1988, 2001 ADJUSTMENT)
OBSERVED ELEV= 92.96' (NAVD 1988, (CORS '96) COMPUTED USING GEOID 12B)

TBM LIST:

TBM 'A', CP-1, X-CUT IN CONCRETE. (SEE RECOVERY SKETCH)
ELEV=78.55'

TBM 'B', CP-2, X-CUT IN CONCRETE. (SEE RECOVERY SKETCH)
ELEV=78.22'

TBM 'P', CP-34, X-CUT IN CONCRETE. (SEE RECOVERY SKETCH)
ELEV=80.34'

CERTIFICATION:

I HEREBY CERTIFY THAT: (1) THIS PLAT WAS PREPARED FROM AN ON THE GROUND SURVEY MADE UNDER MY SUPERVISION; (2) THAT THIS PLAT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF SURVEY; (3) THAT THIS PLAT AND THE SURVEY IT REPRESENTS, CONFORMS TO THE REQUIREMENTS OF THE LAND SURVEYING PRACTICES ACT IN EFFECT AT THE TIME OF THE SURVEY FOR THE TYPE OF PROFESSIONAL SERVICE SO STATED.

TYPE OF PROFESSIONAL SERVICE: TOPOGRAPHIC AND R.O.W. SURVEY

CHRISTIN M. NORRIS, R.P.L.S. 6207 — DATE 10-24-24

STATE OF TEXAS REGISTERED CHRISTIN MICHAEL NORRIS 6207 PROFESSIONAL LAND SURVEYOR
10-24-24

C-281-101

SCALE: 1" = 100'

LEGEND:

- HCAD PROPERTY LINE
- ~10' U.E. — EASEMENT
- RIGHT-OF-WAY PROPERTY LINE
- (TRV.) N 00° 00' 00" E. — TRAVERSE LINE
- (BL.) N 00° 00' 00" E. — BASELINE
- ● 10859 — CONTROL MONUMENTS

GENERAL NOTES:
CP= indicates Traverse Point
BP# indicates Baseline Point
(TRV.) indicates Traverse Line
(BL) indicates Baseline Line
CM indicates Control Monument
Fnd. indicates Found
RT indicates Right
LT indicates Left
XC indicates "X" Cut
I.P. indicates Iron Pipe
I.R. indicates Iron Rod
I.R.C. indicates Iron Rod w/Cap
P.I.P. indicates Pinch Iron Pipe
MAG indicates MAG Nail
U.T.S. indicates unable to set
PC indicates Point of Curve
PCC indicates Point of Compound Curvature
PT indicates Point of Tangent
TBM indicates Temporary Benchmark
#XXXX indicates Address
W.L.E. indicates Water Line Easement
U.E. indicates Utility Easement
S.S.E. indicates Sanitary Sewer Easement
S.E. indicates Storm Sewer Easement
B.L. indicates Building Line
M.R.H.C., TX. indicates Map Records Harris County, Texas
D.R.H.C., TX. indicates Deed Records Harris County, Texas
H.C.C.F. indicates Harris County Clerk's File
O.P.R.R.P.H.C., TX. indicates Official Public Records Real Property Harris County, Texas

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE TIED TO THE NSRS AND EXPRESSED IN THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, NAD 83' (2011), ITRF (EPOCH 2010.0000), NAVD '88 (GEOID 12B).
2. ALL DISTANCES SHOWN HEREON ARE SURFACE VALUES. ALL COORDINATES SHOWN HEREON ARE GRID VALUES UNLESS OTHERWISE NOTED. TO CONVERT SURFACE VALUES TO GRID VALUES MULTIPLY BY THE SCALE FACTOR OF 0.999870017.
3. THE RIGHT OF WAY SHOWN HEREON IS BASED ON THE BEST AVAILABLE EVIDENCE FOUND IN THE FIELD AT THE TIME OF THE SURVEY COUPLED WITH THE DOCUMENTS OF RECORD IN THE COUNTY CLERK'S OFFICE PROVIDED BY COURTHOUSE SPECIALIST.
4. TO CONVERT PROJECT TO TSARP DATUM (GD99) ADD 0.47 FEET TO ALL ELEVATIONS.

United Engineers, Inc.
CIVIL ENGINEERING • LAND DEVELOPMENT
CONSTRUCTION MANAGEMENT
SURVEYING • UTILITY ENGINEERING
ENGINEERING FIRM # F-00142 SURVEY FIRM # 10178-00
10375 RICHMOND AVE., SUITE 1325 HOUSTON, TEXAS 77042
TEL: (713) 271-2900 FAX (713) 271-2999

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATION RENEWAL AND REHABILITATION

MUD 175 LIFT STATION
SURVEY CONTROL MAP
SHEET 1 OF 1
SURVEY

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
H: 1"=100'	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 178 OF 226	

K:\CIV\224-076 - Four LS Black and Veatch\Survey\Dwg\SURVEY CONTROL MAP\SCM MASTER 4LS.dwg Aug 08 2025

EXISTING STORM SEWER MANHOLE
RIM EL = 80.44'
24" (S) FL = 66.69'
24" (E) FL = 66.49'

EXISTING 24" STORM SEWER

EXISTING 36" STORM SEWER

EXISTING STORM SEWER MANHOLE
RIM EL = 80.36'
24" (W) FL = 66.16'
36" (S) FL = 64.76'
36" (N) FL = 65.36'
54" (E) FL = 64.51'

EXISTING 36" STORM SEWER

EXISTING 8" SANITARY SEWER

EXISTING WATER METER (CONTRACTOR TO FIELD VERIFY)

EXISTING 1" WATER LINE

Enclave Parkway

CAUTION!!! OVERHEAD ELECTRICAL LINES

EXISTING SANITARY SEWER MANHOLE
RIM EL = 78.94'
48" (W) FL = 54.79'
8" (N) FL = 68.54'
48" (SW) FL = 54.49'

EXISTING 48" SANITARY SEWER

EXISTING AT&T TEXAS/SWBT BURIED CABLE

EXISTING SANITARY SEWER MANHOLE
RIM EL = 78.98'
48" (W) FL = 55.03'
48" (E) FL = 54.97'

EXISTING 14" FORCEMAIN (FROM MUD 107)

EXISTING 30" FORCEMAIN

EXISTING 36" STORM SEWER

EXISTING 30" FORCEMAIN

12'-0" S.S.E.

15'-0" FILL ESMT.

10'-0" S.S.E.

25'-0" B.L. & PARKING LINE

40'-0" B.L.

EXISTING DOUBLE SWING GATE

EXISTING BACKFLOW PREVENTER & ENCLOSURE

EXISTING HOSE BIB

EXISTING FORCE MAIN BYPASS BOX

EXISTING LIGHT

EXISTING 14" SANITARY SEWER

CAUTION!!! OVERHEAD ELECTRICAL LINES

EXISTING 6' TALL BRICK WALL

EXISTING 48" SANITARY SEWER

Existing 5' Sanitary Sewer Manhole
Rim EL = 79.87'
48" (NE) FL = 54.47'
14" (E) FL = 68.37'
48" (SW) FL = 54.42'

EXISTING LIGHT

EXISTING LIFT STATION PAD

EXISTING ABOVE GROUND 6" FORCE MAIN

EXISTING LIFT STATION VENT

EXISTING LIGHT

EXISTING ELECTRICAL CONTROLS

EXISTING CHAIN LINK FENCE

EXISTING PERMEABLE PAVEMENT

EXISTING DRY PIT ACCESS HATCH

EXISTING LIFT STATION

EXISTING METAL HATCHES (TYP 4)

16'-0" HL&P ESMT

SCALE: 1"= 10'
0' 10' 20' 30'

LEGEND

EXISTING TREE

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\MUD 175\DWG\EXISTING SITE PLAN.dwg

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

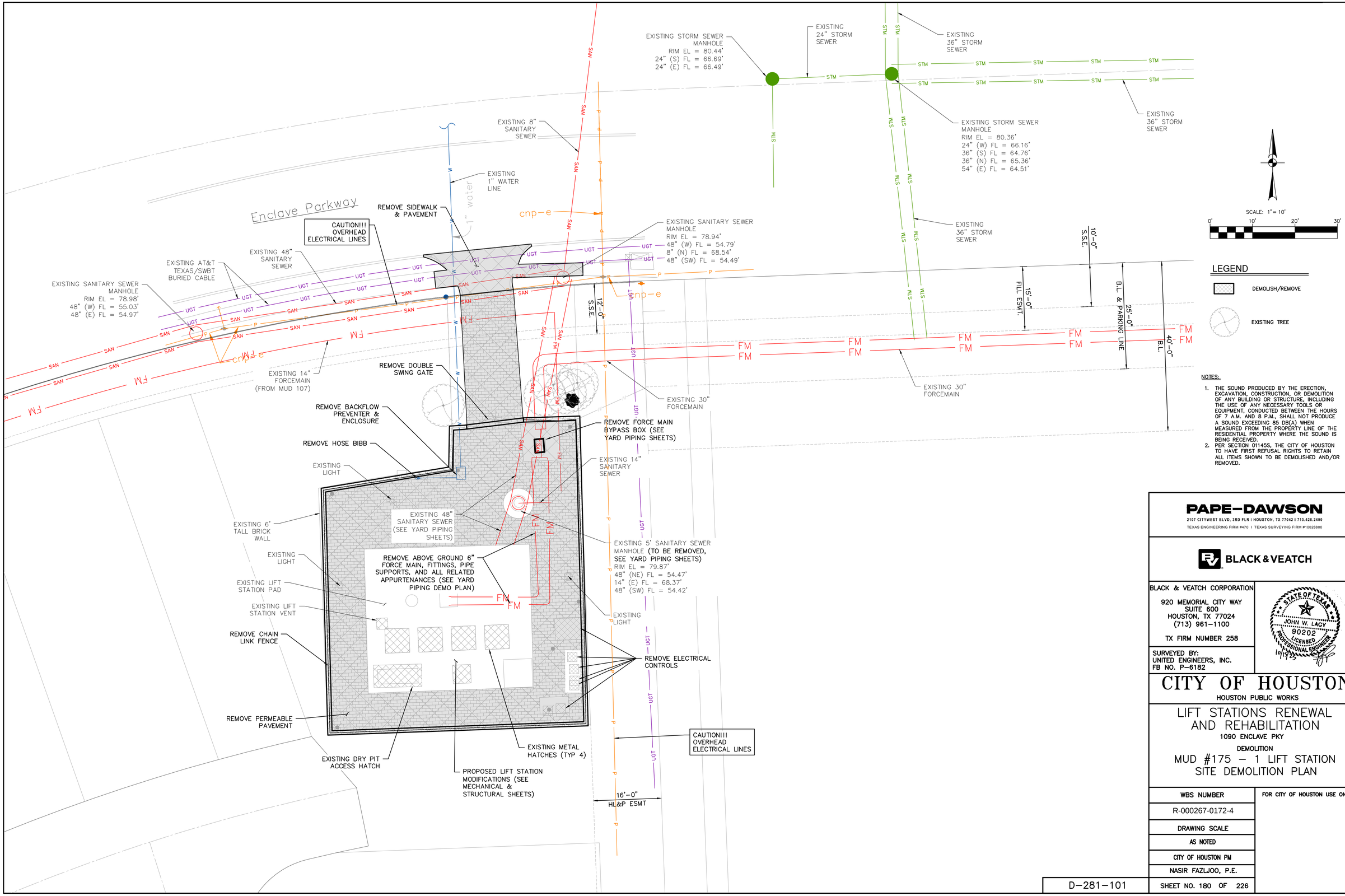
1090 ENCLAVE PKY

CIVIL

MUD #175 – 1 LIFT STATION EXISTING SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 179 OF 226	

C-281-102



NOTES:

1. THE SOUND PRODUCED BY THE ERECTION, EXCAVATION, CONSTRUCTION, OR DEMOLITION OF ANY BUILDING OR STRUCTURE, INCLUDING THE USE OF ANY NECESSARY TOOLS OR EQUIPMENT, CONDUCTED BETWEEN THE HOURS OF 7 A.M. AND 8 P.M., SHALL NOT PRODUCE A SOUND EXCEEDING 85 DB(A) WHEN MEASURED FROM THE PROPERTY LINE OF THE RESIDENTIAL PROPERTY WHERE THE SOUND IS BEING RECEIVED.
2. PER SECTION 01145S, THE CITY OF HOUSTON TO HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR | HOUSTON, TX 77042 | 713.428.2400
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

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SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/19/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

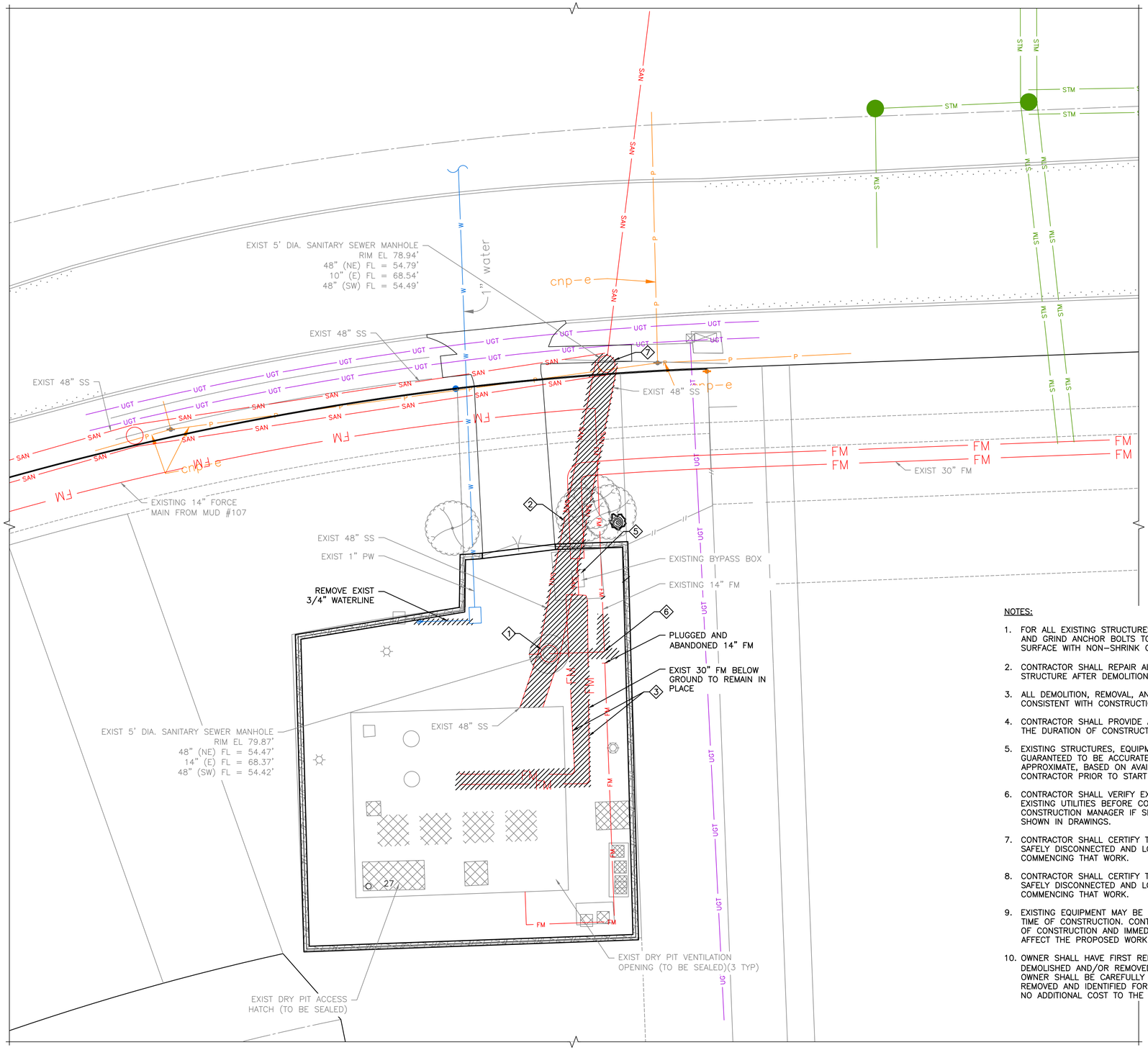
DEMOLITION

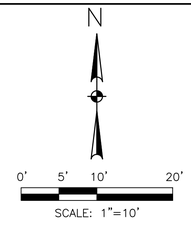
MUD #175 – 1 LIFT STATION SITE DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 180 OF 226	

D-281-101

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\MUD 175\DWG\SITE DEMOLITION PLAN_.dwg





LEGEND

TO BE DEMOLISHED

TO BE ABANDONED–IN–PLACE

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING 5' DIA. SANITARY SEWER MANHOLE, ALL ASSOCIATED CONNECTIONS AND SUPPORTS.
2	DEMOLISH THE EXISTING 48" SANITARY SEWER PIPING, FITTINGS, VALVES, SUPPORTS, AND ALL ASSOCIATED HARDWARE FROM THE EXISTING OFFSITE INFLUENT MANHOLE TO THE EXISTING ONSITE INFLUENT MANHOLE.
3	DEMOLISH ABOVEGROUND EXISTING TEMPORARY BYPASS PIPING, FITTINGS, VALVES, SUPPORTS, AND ALL ASSOCIATED HARDWARE FROM THE EXISTING LIFT STATION TO THE EXISTING BYPASS BOX.
5	DEMOLISH THE EXISTING BYPASS BOX AND ASSOCIATED HARDWARE.
6	DEMOLISH THE EXISTING 14" FORCE MAIN PIPING, FITTINGS, SUPPORTS AND ASSOCIATED HARDWARE FROM THE EXIST 5' DIA. SANITARY MH TO THE LIMITS REQUIRED TO COMPLETE THE CONNECTION WITH THE PROPOSED 5' DIA. FORCE MAIN DISCHARGE MH.
7	DEMOLISH THE EXISTING 4' DIA. SANITARY SEWER MANHOLE, ALL ASSOCIATED CONNECTIONS AND SUPPORTS.

NOTES:

1. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED, THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON–SHRINK GROUT.
2. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STRUCTURE AFTER DEMOLITION OF ITEMS OF WORK HAVE BEEN COMPLETED.
3. ALL DEMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONSTRUCTION PHASING PLANS.
4. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
5. EXISTING STRUCTURES, EQUIPMENT, ELEVATIONS, AND DETAILS SHOWN ARE NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE. EXISTING INFORMATION SHOWN IS APPROXIMATE, BASED ON AVAILABLE RECORD DRAWINGS, AND SHOULD BE VERIFIED BY CONTRACTOR PRIOR TO START OF CONSTRUCTION.
6. CONTRACTOR SHALL VERIFY EXACT LOCATIONS, ROUTING, AND DEPTH OF ALL ON–SITE EXISTING UTILITIES BEFORE COMMENCEMENT OF CONSTRUCTION ACTIVITIES. NOTIFY CONSTRUCTION MANAGER IF SIGNIFICANT DISCREPANCIES ARE DISCOVERED FROM ITEMS SHOWN IN DRAWINGS.
7. CONTRACTOR SHALL CERTIFY THAT EQUIPMENT DESIGNATED FOR DEMOLITION IS SAFELY DISCONNECTED AND LOCKED OUT OF ALL SERVICES AND UTILITIES PRIOR TO COMMENCING THAT WORK.
8. CONTRACTOR SHALL CERTIFY THAT EQUIPMENT DESIGNATED FOR DEMOLITION IS SAFELY DISCONNECTED AND LOCKED OUT OF ALL SERVICES AND UTILITIES PRIOR TO COMMENCING THAT WORK.
9. EXISTING EQUIPMENT MAY BE MISSING, NOT SHOWN, OR NOT FUNCTIONAL AT THE TIME OF CONSTRUCTION. CONTRACTOR SHALL VERIFY FIELD CONDITIONS AT THE START OF CONSTRUCTION AND IMMEDIATELY NOTIFY THE OWNER OF ANY VARIATIONS THAT AFFECT THE PROPOSED WORK.
10. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOW TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.

BLACK & VEATCH

BLACK & VEATCH CORPORATION
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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

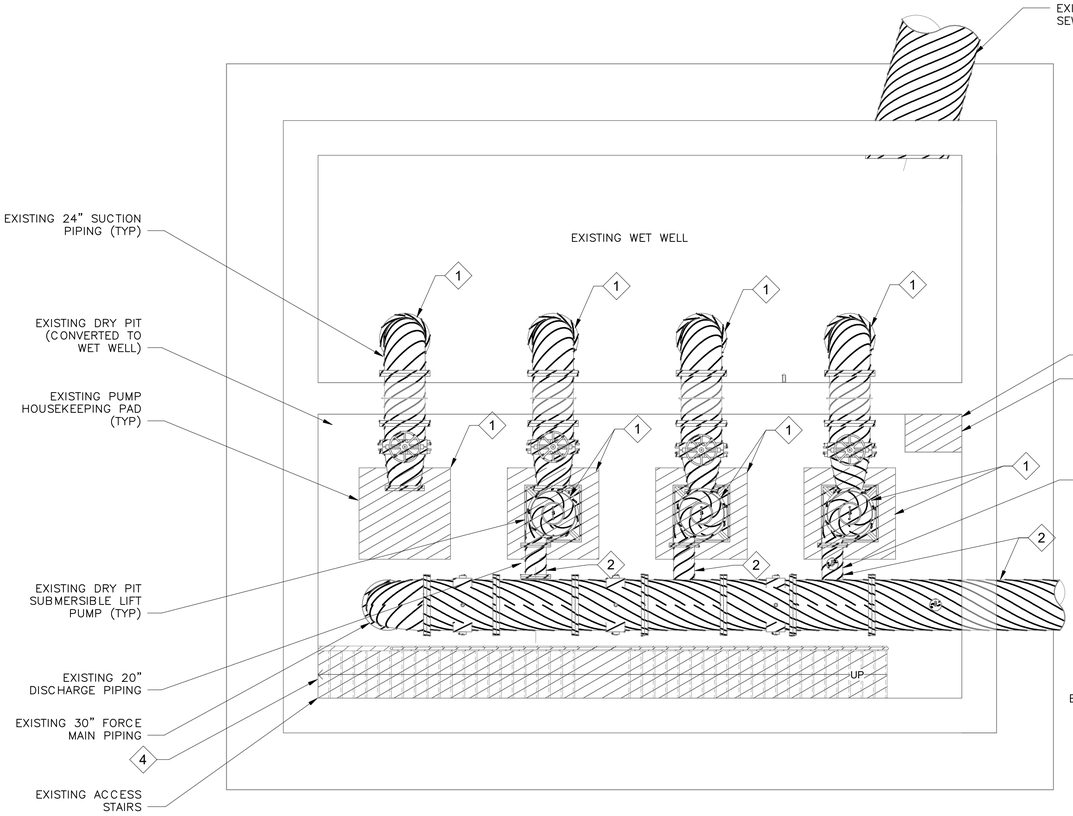
CIVIL

M.U.D. #175 LIFT STATION YARD PIPING DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 181 OF 226	

D–281–102

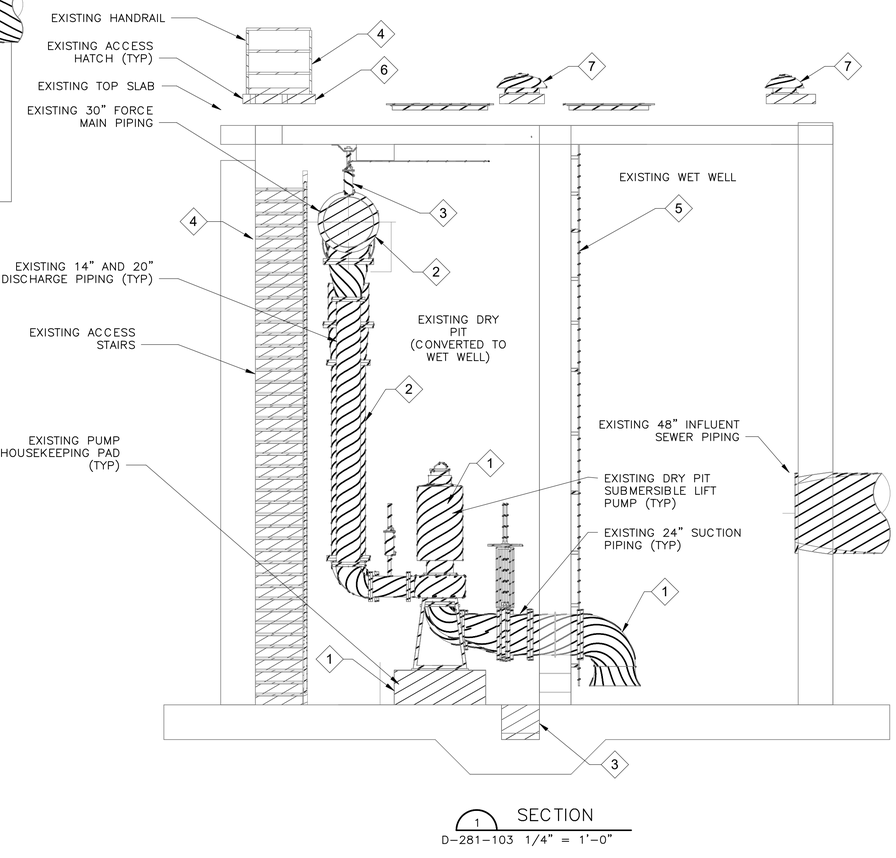
FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 – COH Lift Station Renew–Replace\Project Files\5.0 Design Files – B&V\5.0.5 Civil 3D\D–281–102.dwg



LOWER LEVEL – DEMOLITION PLAN

1/4" = 1'-0"

ITEMS OF WORK	
NO.	DESCRIPTION
1	DEMOLISH THE EXISTING SUBMERSIBLE PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE.
2	DEMOLISH ALL DISCHARGE PIPING, FITTINGS, VALVES, SUPPORTS, AND ASSOCIATED HARDWARE LOCATED INSIDE THE EXISTING VALVE VAULT.
3	DEMOLISH THE EXISTING SUMP PUMPS, ASSOCIATED PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE. FILL THE EXISTING SUMP WITH NON-SHRINK GROUT FLUSH WITH THE DRY PIT'S FLOOR ELEVATION.
4	DEMOLISH THE EXISTING DRY PIT ACCESS STAIRS, LADDERS, LANDINGS, HANDRAIL, GRATING PANELS, PLATFORMS PIPING, FITTINGS, VALVES, SUPPORTS, AND HARDWARE. FILL THE EXISTING SUMP WITH NON-SHRINK GROUT FLUSH WITH THE DRY PIT'S FLOOR ELEVATION.
5	DEMOLISH THE EXISTING AIR CELL SYSTEM, ASSOCIATED SUPPORTS, GUIDES, ASSEMBLY ITEMS, AND HARDWARE.
6	DEMOLISH THE EXISTING DRY PIT SUMP AND EQUIPMENT ACCESS HATCHES, ASSOCIATED SUPPORTS, HARDWARE, AND CABLE HOLDER ASSEMBLY.
7	DEMOLISH THE EXISTING DRY AND WET WELL VENTING ASSOCIATED HARDWARE.



1 D-281-103

SECTION

D-281-103 1/4" = 1'-0"

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

3/8" = 1'-0"

N

LEGEND

TO BE DEMOLISHED

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. FOR ALL EXISTING STRUCTURES TO BE DEMOLISHED THE CONTRACTOR SHALL CUT AND GRIND ANCHOR BOLTS TO BE FLUSH WITH CONCRETE SURFACE AND SEAL THE SURFACE WITH NON-SHRINK GROUT.
3. CONTRACTOR SHALL REPAIR ALL CRACKING AND/OR SURFACE DAMAGES ON THE STRUCTURE AFTER DEMOLITION ITEMS OF WORK HAVE BEEN COMPLETED.
4. ALL DEMOLITION, REMOVAL, AND RELOCATION WORK SHALL BE COMPLETED CONSISTENT WITH CONSTRUCTION PHASING PLANS.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE FACILITY AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.
6. OWNER SHALL HAVE FIRST REFUSAL RIGHTS TO RETAIN ALL ITEMS SHOWN TO BE DEMOLISHED AND/OR REMOVED. OWNER WILL RETAIN THE RIGHT TO SALVAGE ANY MATERIALS. ITEMS IDENTIFIED FOR SALVAGE BY THE OWNER SHALL BE CAREFULLY REMOVED TO PROTECT FROM DAMAGE. ANY MATERIAL REMOVED AND IDENTIFIED FOR DISPOSAL SHALL BE REMOVED FROM THE JOB SITE AT NO ADDITIONAL COST TO THE OWNER.
7. REFER TO SPECIFICATIONS FOR DIVERSION PUMPING REQUIREMENTS.

BLACK & VEATCH

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TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

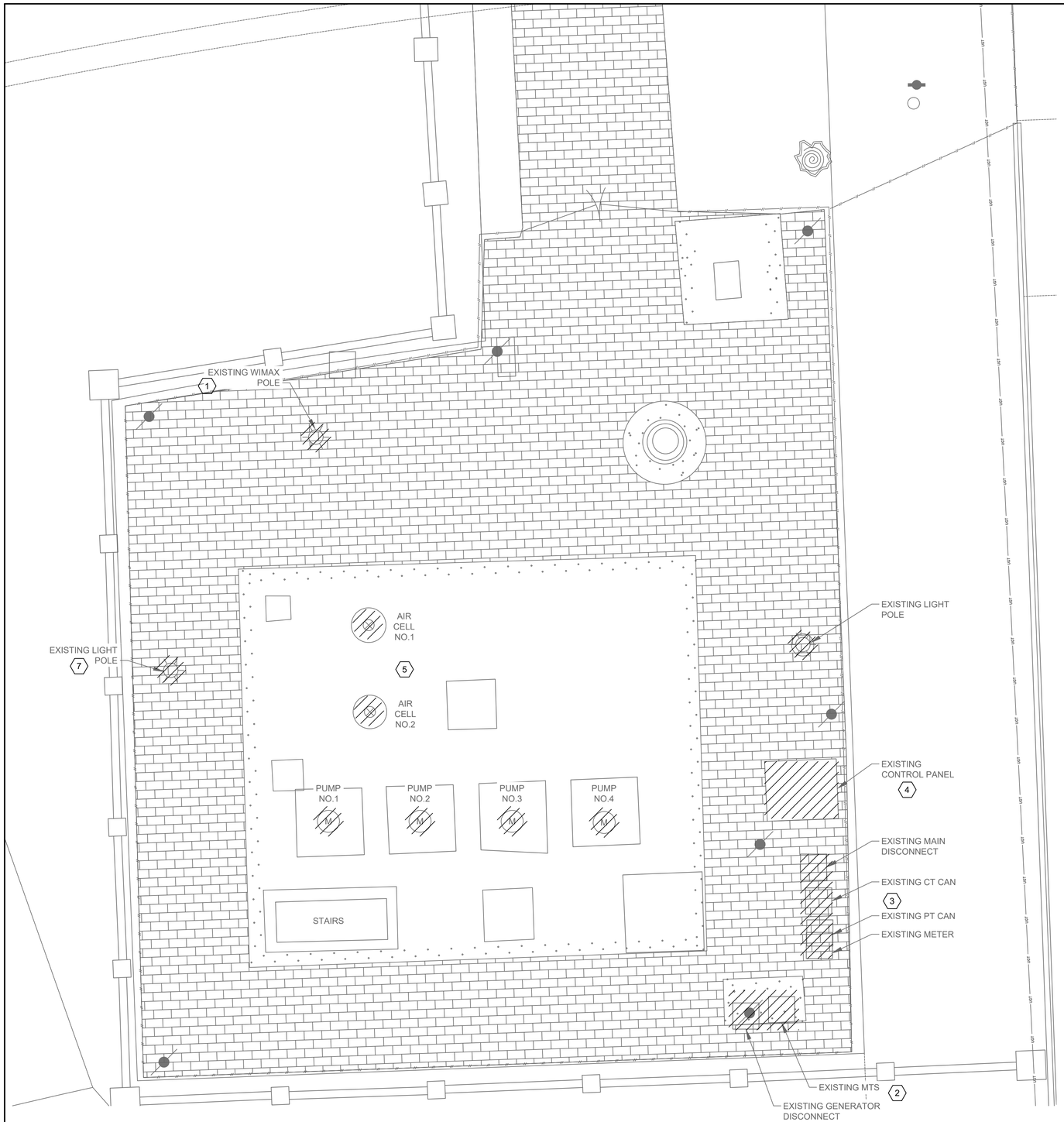
DEMOLITION

M.U.D. #175-1 LIFT STATION DEMOLITION PLAN AND SECTION – LOWER LEVEL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 182 OF 226	

D-281-103

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



MUD 175 LIFT STATION
ELECTRICAL DEMOLITION SITE

PLAN

1"= 5'-0"

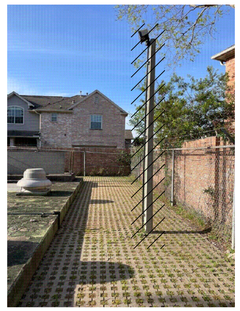
SCALE: 1"= 5'

0' 5' 10' 15'

8 EXISTING AIR CELL NO.1 AND NO.2 TO BE DEMOLISHED AND REMOVED.

NOTES BY SYMBOL "#":

1. EXISTING WIMAX POLE TO BE DEMOLISHED AND REMOVED.
2. EXISTING MTS AND GENERATOR DISCONNECT SWITCH TO BE REMOVED AND RETURNED TO THE WASTEWATER FACILITY MAINTENANCE DEPARMENT OF THE CITY.
3. EXISTING SERVICE POLE, METER, AND SERVICE DISCONNECT TO BE DEMOLISHED AND REMOVED.
4. EXISTING LIFT STATION CONTROL CABINET TO BE DEMOLISHED AND REMOVED.
5. EXISTING AIR CELL NO.1 & NO.2 TO BE DEMOLISHED AND REMOVED.
6. EXISTING PUMP LOCAL DISCONNECT SWITCHES AND ASSOCIATED CONDUITS AND WIREWAY TO BE DEMOLISHED AND REMOVED.
7. EXISTING YARD LIGHT TO BE DEMOLISHED AND REMOVED.



EXISTING LIGHT POLE TYPICAL 7

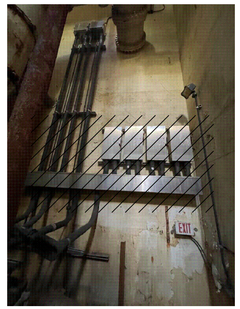
PHOTOGRAPH A - NTS

EXISTING WIMAX POLE 1

PHOTOGRAPH B - NTS

EXISTING MTS & GENERATOR DISCONNECT SWITCH 2

PHOTOGRAPH C - NTS



EXISTING DISCONNECT SWITCH IN PIT 6

PHOTOGRAPH D - NTS

EXISTING CONTROL PANEL 4

PHOTOGRAPH E - NTS

EXISTING MAIN DISCONNECT, CT CAN PT AND METER 3

PHOTOGRAPH F - NTS

EXISTING AIR CELL NO.1 & NO.2 5

PHOTOGRAPH G - NTS

LEGEND:

ITEMS TO BE DEMOLISHED.

GAI
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CONSULTING ENGINEERING
Registration No. F-2593

302 Dennis St.
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SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

ELECTRICAL

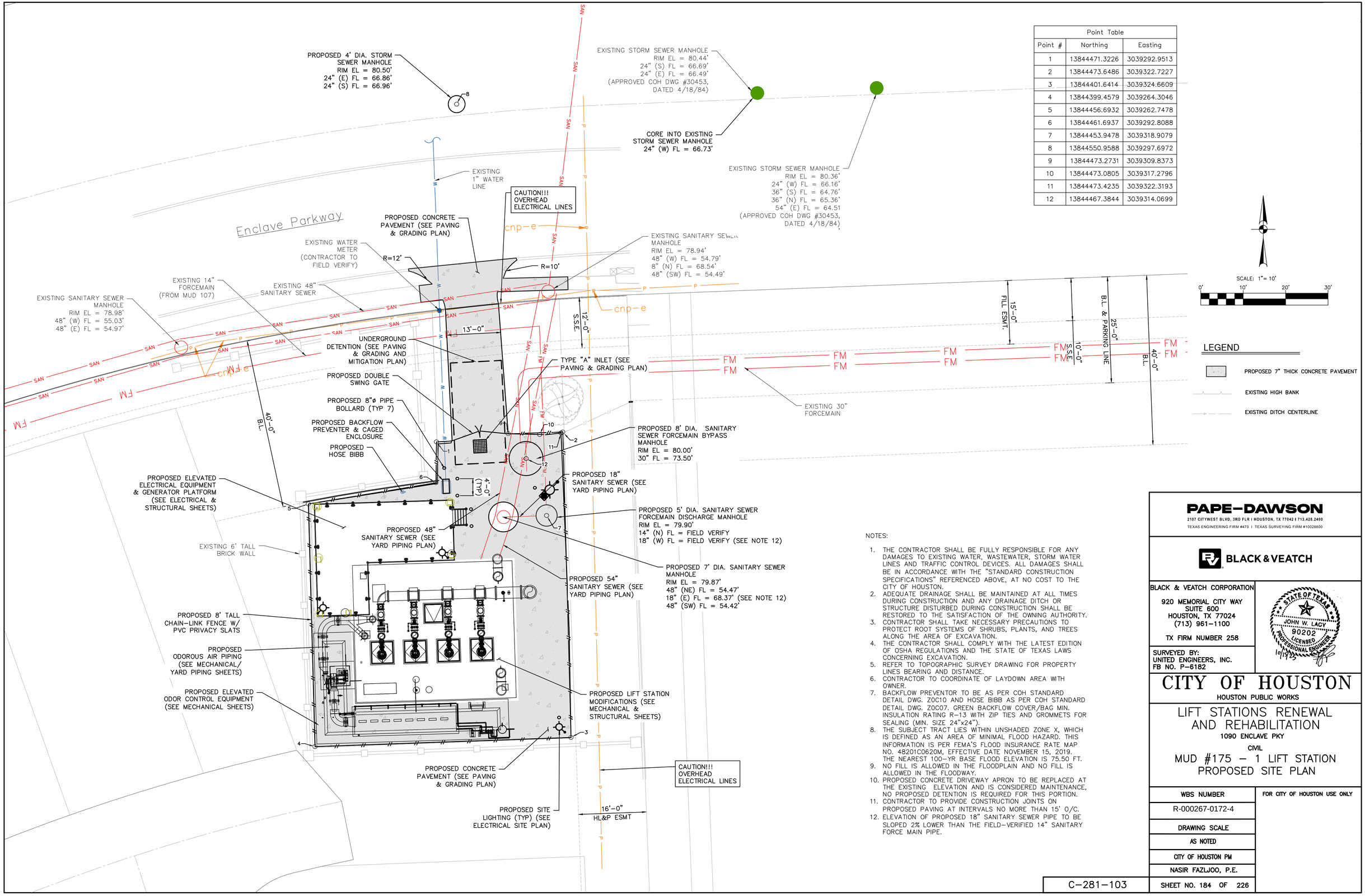
M.U.D. #175 LIFT STATION 1090 ENCLAVE PARKWAY DEMOLITION SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

D-281-104

SHEET NO. 183 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 D-281-104.dwg



Point Table		
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3	13844401.6414	3039324.6609
4	13844399.4579	3039264.3046
5	13844456.6932	3039262.7478
6	13844461.6937	3039292.8088
7	13844453.9478	3039318.9079
8	13844550.9588	3039297.6972
9	13844473.2731	3039309.8373
10	13844473.0805	3039317.2796
11	13844473.4235	3039322.3193
12	13844467.3844	3039314.0699

NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. BACKFLOW PREVENTOR TO BE AS PER COH STANDARD DETAIL DWG. ZOC10 AND HOSE BIBB AS PER COH STANDARD DETAIL DWG. ZOC07. GREEN BACKFLOW COVER/BAG MIN. INSULATION RATING R-13 WITH ZIP TIES AND GROMMETS FOR SEALING (MIN. SIZE 24"x24").
8. THE SUBJECT TRACT LIES WITHIN UNSHADED ZONE X, WHICH IS DEFINED AS AN AREA OF MINIMAL FLOOD HAZARD. THIS INFORMATION IS PER FEMA'S FLOOD INSURANCE RATE MAP NO. 48201C0620M, EFFECTIVE DATE NOVEMBER 15, 2019. THE NEAREST 100-YR BASE FLOOD ELEVATION IS 75.50 FT.
9. NO FILL IS ALLOWED IN THE FLOODPLAIN AND NO FILL IS ALLOWED IN THE FLOODWAY.
10. PROPOSED CONCRETE DRIVEWAY APRON TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.
11. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.
12. ELEVATION OF PROPOSED 18" SANITARY SEWER PIPE TO BE SLOPED 2% LOWER THAN THE FIELD-VERIFIED 14" SANITARY FORCE MAIN PIPE.

PAPE-DAWSON
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SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

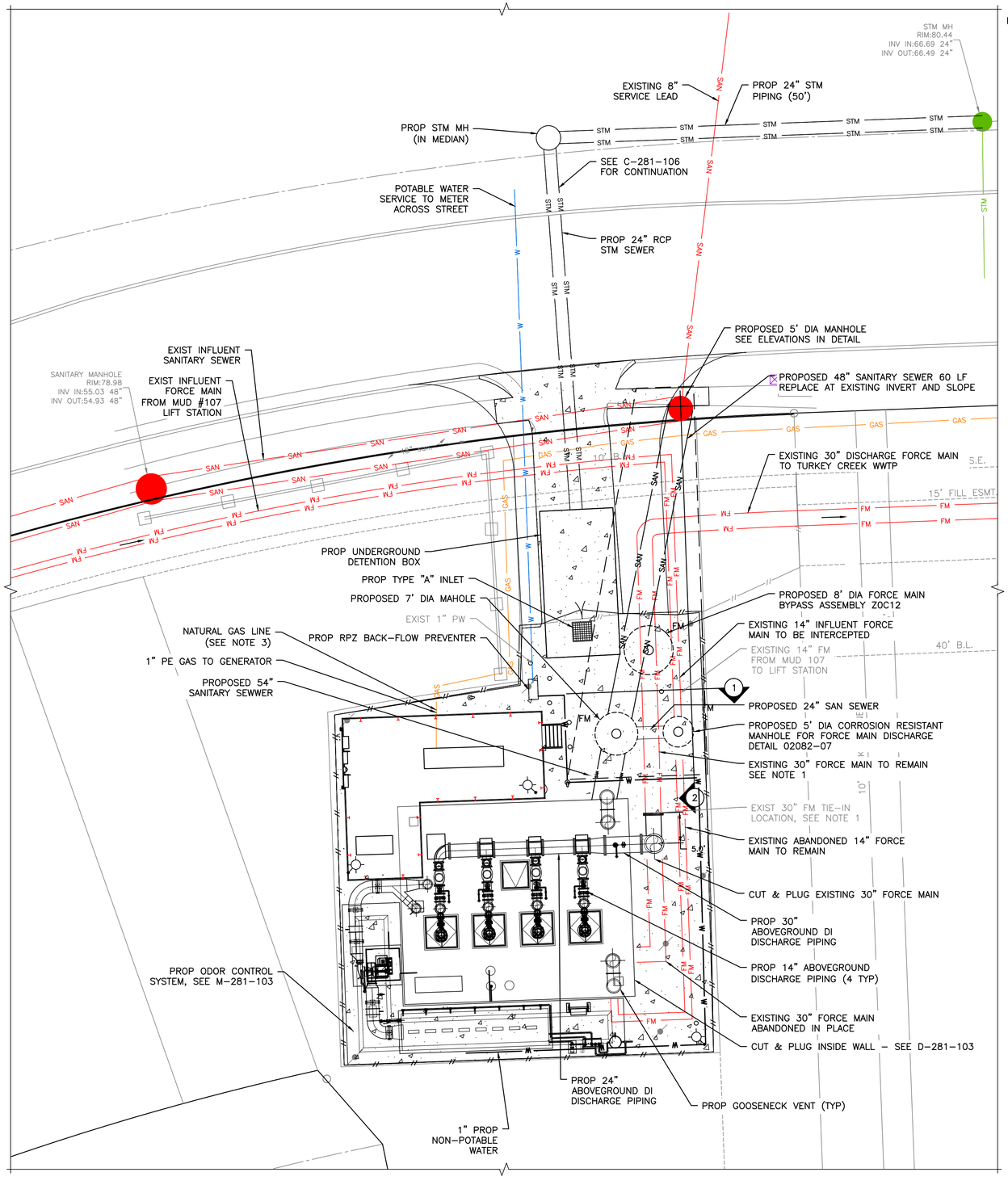
CIVIL

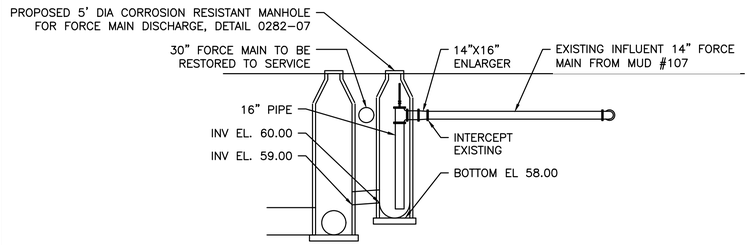
MUD #175 – 1 LIFT STATION PROPOSED SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 184 OF 226	

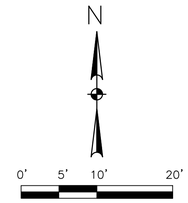
C-281-103

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\MUD 175\DWG\PROPOSED SITE PLAN.dwg



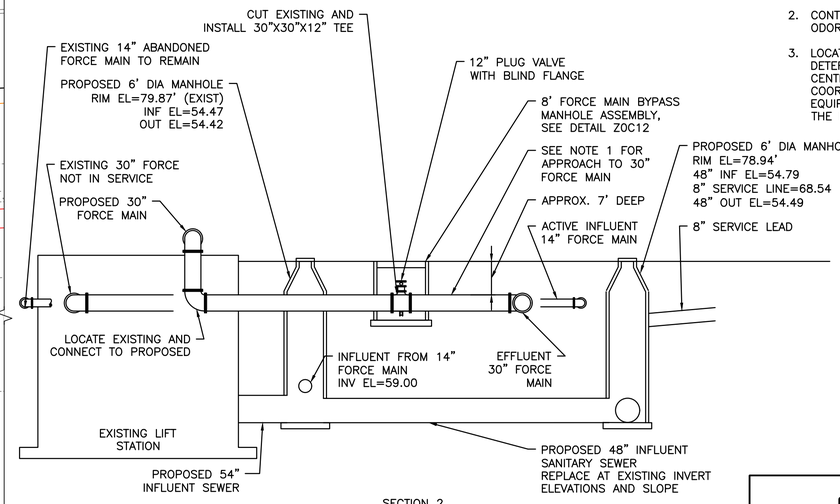


SECTION 1
INFLUENT SANITARY FORCE MAIN
SCHEMATIC ELEVATION



NOTES:

1. CONTRACTOR SHALL CONFIRM THE LOCATION AND DEPTH OF THE EXISTING 30" FORCE MAIN. FORCE MAIN APPROXIMATELY 7 FEET BELOW GRADE. FORCE MAIN CURRENTLY NOT IN SERVICE BUT TO BE RETURNED TO SERVICE. CONTRACTOR TO SUPPORT OR REMOVE 30" FORCE MAIN AS REQUIRED TO CONSTRUCT PROPOSED 48" SANITARY SEWER BELOW.
2. CONTRACTOR SHALL FIELD ROUTE WATER LINE TO ODOR CONTROL CONNECTION.
3. LOCATION OF NATURAL GAS LINE TO BE DETERMINED AFTER COORDINATION WITH CENTERPOINT GAS. CONTRACTOR SHALL COORDINATE CONNECTION TO PROPOSED EQUIPMENT AS DETERMINED BY THE LOCATION OF THE NATURAL GAS.



SECTION 2
INFLUENT SANITARY SEWER AND EFFLUENT FORCE MAIN
SCHEMATIC ELEVATION

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

CIVIL

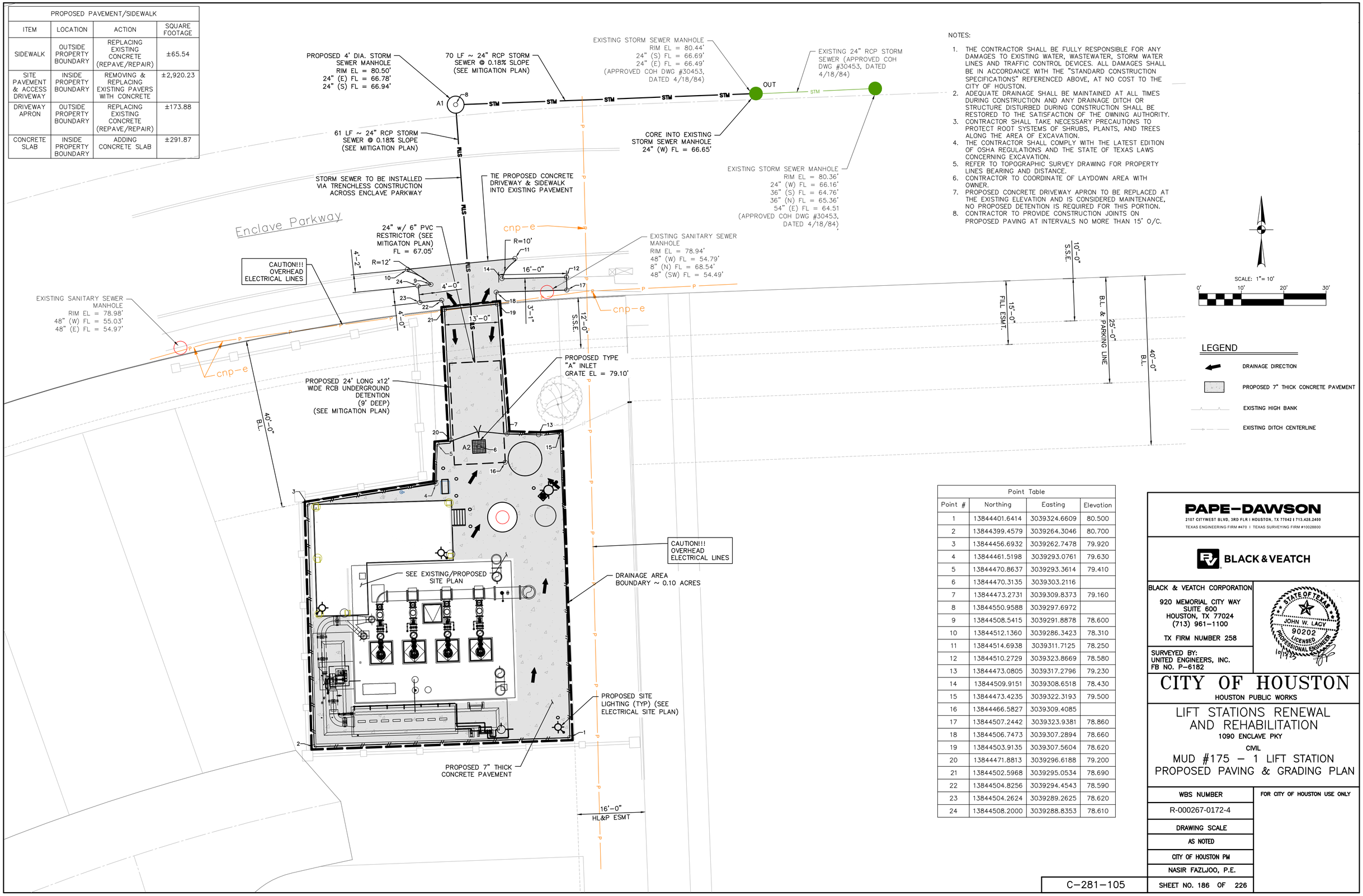
MUD #175-1 LIFT STATION PROPOSED YARD PIPING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 185 OF 226	

C-281-104

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 - COH Lift Station Renew-Replace\Project Files\5.0 Design Files - B&V\5.0.5 Civil 3D\C-281-104.dwg

PROPOSED PAVEMENT/SIDEWALK			
ITEM	LOCATION	ACTION	SQUARE FOOTAGE
SIDEWALK	OUTSIDE PROPERTY BOUNDARY	REPLACING EXISTING CONCRETE (REPAVE/REPAIR)	±65.54
SITE PAVEMENT & ACCESS DRIVEWAY	INSIDE PROPERTY BOUNDARY	REMOVING & REPLACING EXISTING PAVERS WITH CONCRETE	±2,920.23
DRIVEWAY APRON	OUTSIDE PROPERTY BOUNDARY	REPLACING EXISTING CONCRETE (REPAVE/REPAIR)	±173.88
CONCRETE SLAB	INSIDE PROPERTY BOUNDARY	ADDING CONCRETE SLAB	±291.87



NOTES:

1. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. ALL DAMAGES SHALL BE IN ACCORDANCE WITH THE "STANDARD CONSTRUCTION SPECIFICATIONS" REFERENCED ABOVE, AT NO COST TO THE CITY OF HOUSTON.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY.
3. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS, AND TREES ALONG THE AREA OF EXCAVATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.
5. REFER TO TOPOGRAPHIC SURVEY DRAWING FOR PROPERTY LINES BEARING AND DISTANCE.
6. CONTRACTOR TO COORDINATE OF LAYDOWN AREA WITH OWNER.
7. PROPOSED CONCRETE DRIVEWAY APRON TO BE REPLACED AT THE EXISTING ELEVATION AND IS CONSIDERED MAINTENANCE, NO PROPOSED DETENTION IS REQUIRED FOR THIS PORTION.
8. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS ON PROPOSED PAVING AT INTERVALS NO MORE THAN 15' O/C.

Point Table			
Point #	Northing	Easting	Elevation
1	13844401.6414	3039324.6609	80.500
2	13844399.4579	3039264.3046	80.700
3	13844456.6932	3039262.7478	79.920
4	13844461.5198	3039293.0761	79.630
5	13844470.8637	3039293.3614	79.410
6	13844470.3135	3039303.2116	
7	13844473.2731	3039309.8373	79.160
8	13844550.9588	3039297.6972	
9	13844508.5415	3039291.8878	78.600
10	13844512.1360	3039286.3423	78.310
11	13844514.6938	3039311.7125	78.250
12	13844510.2729	3039323.8669	78.580
13	13844473.0805	3039317.2796	79.230
14	13844509.9151	3039308.6518	78.430
15	13844473.4235	3039322.3193	79.500
16	13844466.5827	3039309.4085	
17	13844507.2442	3039323.9381	78.860
18	13844506.7473	3039307.2894	78.660
19	13844503.9135	3039307.5604	78.620
20	13844471.8813	3039296.6188	79.200
21	13844502.5968	3039295.0534	78.690
22	13844504.8256	3039294.4543	78.590
23	13844504.2624	3039289.2625	78.620
24	13844508.2000	3039288.8353	78.610

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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
10/15/25

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

CIVIL

MUD #175 – 1 LIFT STATION PROPOSED PAVING & GRADING PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 186 OF 226	

C-281-105

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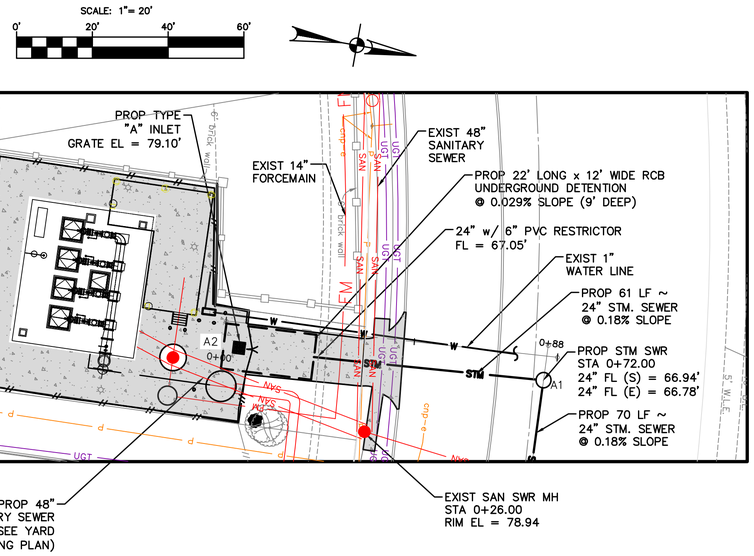

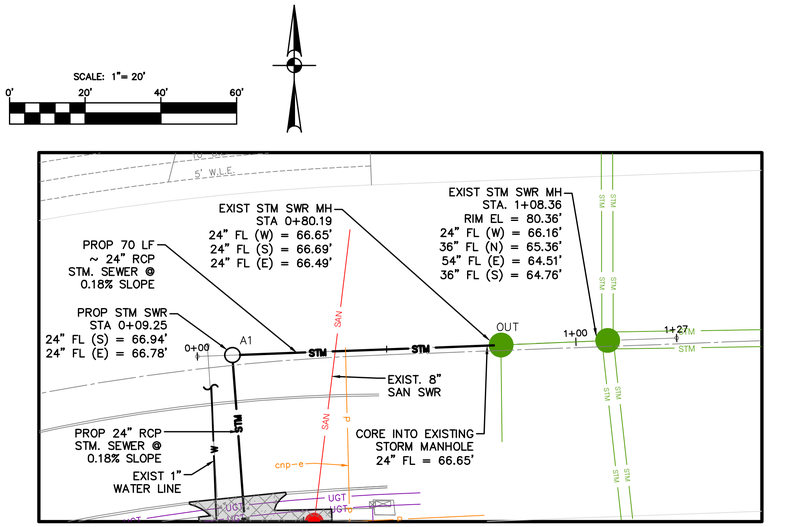

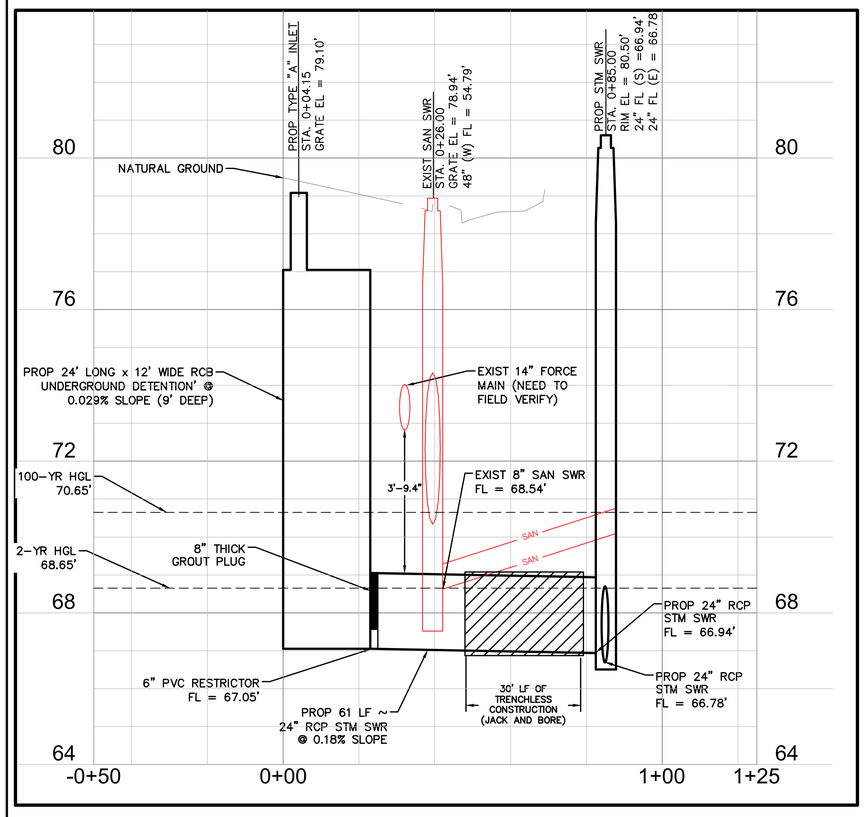

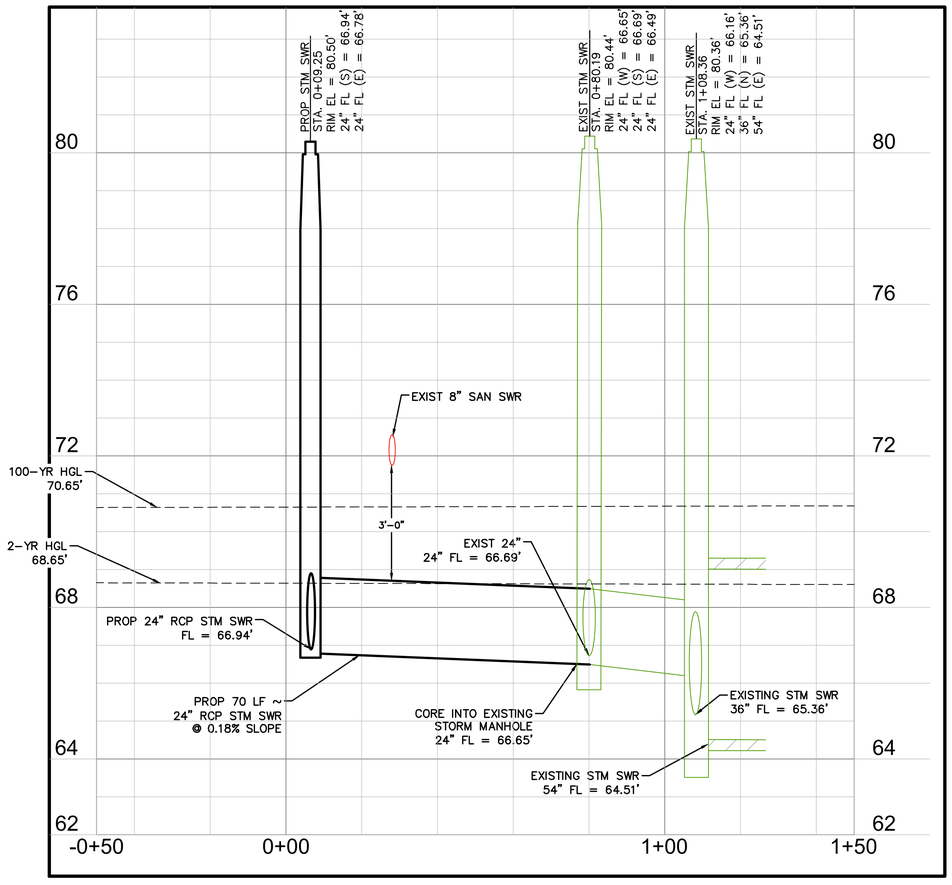

NOTES:

1. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
2. CONTRACTOR TO REHABILITATE ALL DISTURBED SITE & LANDSCAPING TO PRE-CONSTRUCTION OR BETTER CONDITIONS.
3. ALL BORE & JACK WORK TO INCLUDE BORE PITS FOR OPERATIONS.
4. STORMWATER DETENTION BOX TO BE MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.
5. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/ OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/ GEOTECHNICAL/ SAFETY/ EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS — JOHN W. LACY — 90202 — LICENSED PROFESSIONAL ENGINEER — 10/1/23

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

CIVIL

MUD #175 – 1 LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS – SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
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C-281-106

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Detention Rate (R_d)	0.80	ac-ft/ac	
Proposed (final) Impervious Area (A_p) =	0.0754	ac	
Existing Impervious Area To Be Removed (A_e) =	0.0048	ac	
Required Detention Volume =	(Ap * Rd) - (Ae * 0.40 ac-ft/ac)		
Total Required Detention Volume =	0.0584	ac-ft	
Provided Detention Volume =	12' x 9' x 24' (W x D x L)	=	0.0595 ac-ft

RESTRICTORS:

Low Level Restrictor (25% Flow)

Total Drainage Area =	0.1000	ac
Outflow Rate Allowed for Low Flow QL1 =	0.0500	cfs
Head HL1 (water surface differential) for Low Flow =	2	ft
Calculated Low Level Restrictor Size DL =	1.00	in
Provided/Designed Low Level Restrictor Size DL1 =	6	in

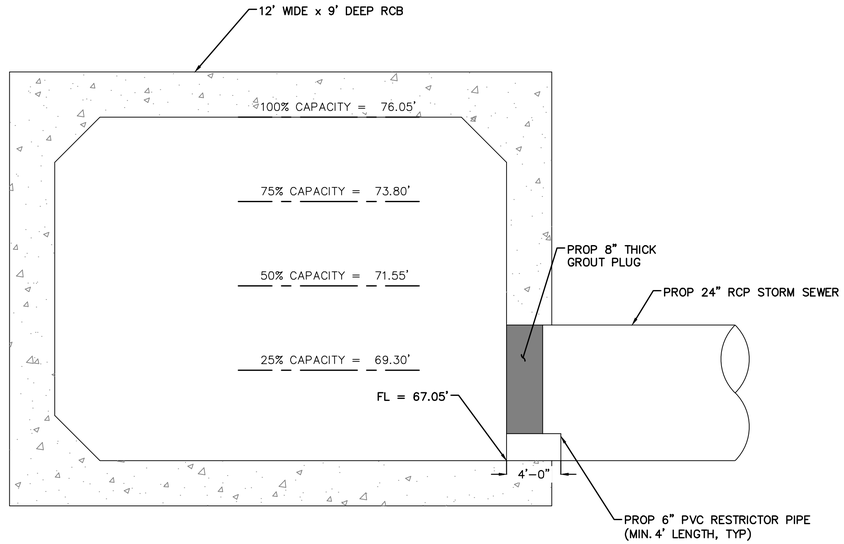
High Level Restrictor (75% Flow)

Total Drainage Area =	0.1000	ac
Total Outflow Rate (100%) Q =	0.2000	cfs
Re-calculated Head HL2 (water surface differential) for Low Level Restrictor =	6.5	ft
Re-calculated Low Flow Q L2 for Low Level Restrictor =	3.214	cfs
Outflow Rate Allowed for High Flow Qh1 (75%) =	-3.0138	cfs
Head Hh2 (water surface differential) for High Level Restrictor =	2	ft
Calculated High Level Restrictor Size Dh =	#NUM!	in
Provided/Designed High Level Restrictor Size Dh1 (75%) =	N/A	in

No need for High Level Restrictor

NOTES:

1. STORMWATER DETENTION BOX TO BE MAINTAINED BY THE CITY OF HOUSTON PUBLIC WORKS WASTEWATER OPERATIONS.
2. SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.



RCB/RESTRICTOR SECTION DETAIL
N.T.S.

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2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
10/19/23

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

CIVIL

MUD #175 - 1 LIFT STATION MITIGATION PLAN & DRAINAGE CALCULATIONS - SHEET 2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 188 OF 226	

C-281-107

FILE PATH: K:\Projects\423\05\00\2-0 Design\2-1 Civil\2-1-4 Plans\MUD 175\DWG\MITIGATION PLAN AND DRAINAGE CALCULATIONS - SHEET 2 OF 2.dwg

DESIGN STORM SEWER CALCULATIONS (2-YEAR)

Project Name: MUD 175 LS IMPROVEMENTS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 2 year
Design Multiplier: 1.00
Starting W.S. Elev.: 68.65 feet

Rainfall Coeff.
b = 75.0
d = 16.2
e = 0.832

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.00	0.10	0.90	0.09	0.0	21.7	3.65	0.00	0.33	RCP	70	24	1	0.180	0.013	9.6	3.1	0.13	N/A	66.78	66.65	0.10	0.000	0.00	68.65	68.65	68.65	68.65	80.50	No Curb	80.50	0.0 in.
A2	A1	0.10	0.10	0.90	0.09	21.7	21.7	3.65	0.33	0.33	RCP	61	24	1	0.180	0.013	9.6	3.1	0.11	0.16	67.05	66.94	0.12	0.000	0.00	68.65	68.65	68.65	68.65	79.10	No Curb	79.10	0.0 in.

EXTREME EVENT STORM SEWER CALCULATIONS (100-YEAR)

Project Name: MUD 175 LS IMPROVEMENTS - EXTREME EVENT ANALYSIS
Project No: 42305-00
Prepared By: WB Date: 8/6/2025
Checked By: Date:

Jurisdiction: CITY OF HOUSTON
Design Storm: 100 year
Design Multiplier: 1.00
Starting W.S. Elev.: 70.65 feet

Rainfall Coeff.
b = 125.4
d = 21.8
e = 0.750

Storm Sewer Design Calculations

Manhole No. From	Manhole No. to	Drainage Area to Inlet(s) (acres)	Total Drainage Area (acres)	Runoff Coeff. C	Sum Of C · A	Inlet Time of Conc. (min)	System Time of Conc. (min)	Rainfall Intensity I (in/hr)	Drainage Area Flow (cfs)	Sum Of Flows (cfs)	Pipe Type	Reach Length (ft)	Diameter (in) or Rise (ft)	Number of Barrels	Slope %	Manning's Roughness Coeff. "n"	Design Capacity (cfs)	Design Velocity (ft/sec)	Fall (ft)	Manhole Drop (ft)	Flowline Elevations Upstream Elev. (ft)	Flowline Elevations Downstream Elev. (ft)	Actual Velocity (ft/sec)	Hydraulic Gradient %	Change in Head (ft)	Energy Grade Line Upstream Elev. (ft)	Energy Grade Line Downstream Elev. (ft)	Hydraulic Grade Line Upstream Elev. (ft)	Hydraulic Grade Line Downstream Elev. (ft)	Upstream Top of Curb / Pvmt (ft)	Curb Height (in)	Gutter Elevation Upstream (ft)	Ponding Depth (in)
A1	OUT	0.00	0.10	0.90	0.09	0.0	21.7	7.41	0.0	0.7	RCP	70	24	1	0.180	0.013	9.6	3.1	0.13	N/A	66.78	66.65	0.21	0.001	0.00	70.65	70.65	70.65	70.65	80.50	No Curb	80.50	0.0 in.
A2	A1	0.10	0.10	0.90	0.09	21.7	21.7	7.41	0.7	0.7	RCP	61	24	1	0.180	0.013	9.6	3.1	0.11	0.16	67.05	66.94	0.21	0.001	0.00	70.65	70.65	70.65	70.65	79.10	No Curb	79.10	0.0 in.

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10/17/25

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY
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MUD #175 – 1 LIFT STATION
STORM SEWER CALCULATIONS

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DRAWING SCALE	
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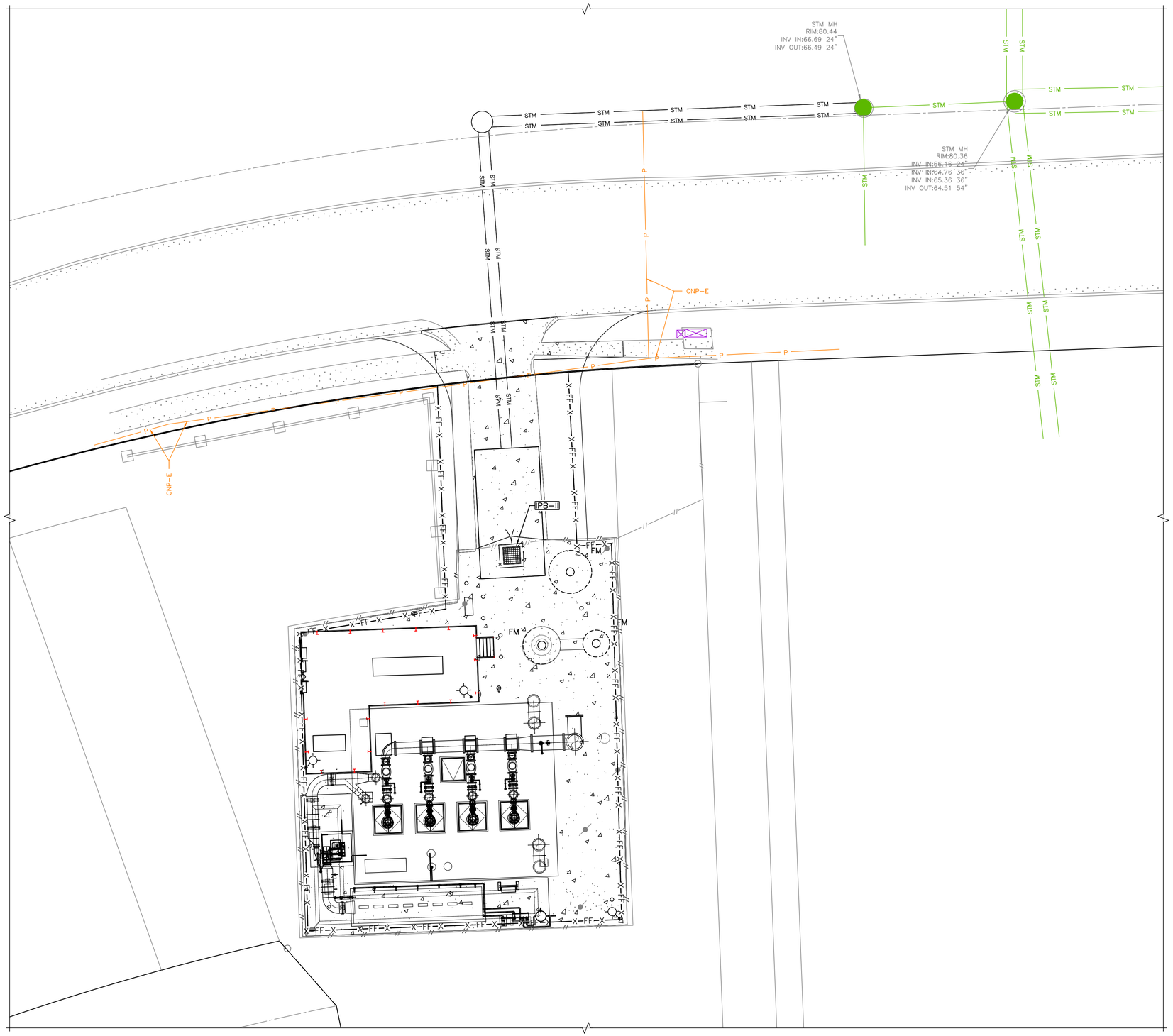
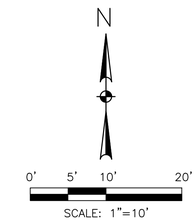
NASIR FAZLJOO, P.E.	

C-281-108





NOTES:

1. CONTRACTOR SHALL DECIDE WHICH AREA NEEDS TO HAVE POLLUTION PREVENTION ACCORDING TO CONSTRUCTION SEQUENCE.
2. FILTER FABRIC FENCE SHALL NOT BE PLACED ACROSS DRIVEWAYS OR SIDEWALKS ACCESSING PRIVATE PROPERTY.
3. CONTRACTOR SHALL PROTECT THE GRATE INLET ON THE DRIVEWAY ADJACENT TO THE LIFT STATION FROM ANY WATER ENCOUNTER DURING THE PROGRESS OF WORK.
4. CONTRACTOR SHALL REMOVE AND REPLACE INLET PROTECTION BARRIER PER REQUEST BY THE CITY RELATED TO SEVERE WEATHER EVENTS.

–X–FF–X–– FILTER FABRIC FENCE

IPB–II TYPE 2 INLET PROTECTION BARRIER

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961–1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P–6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

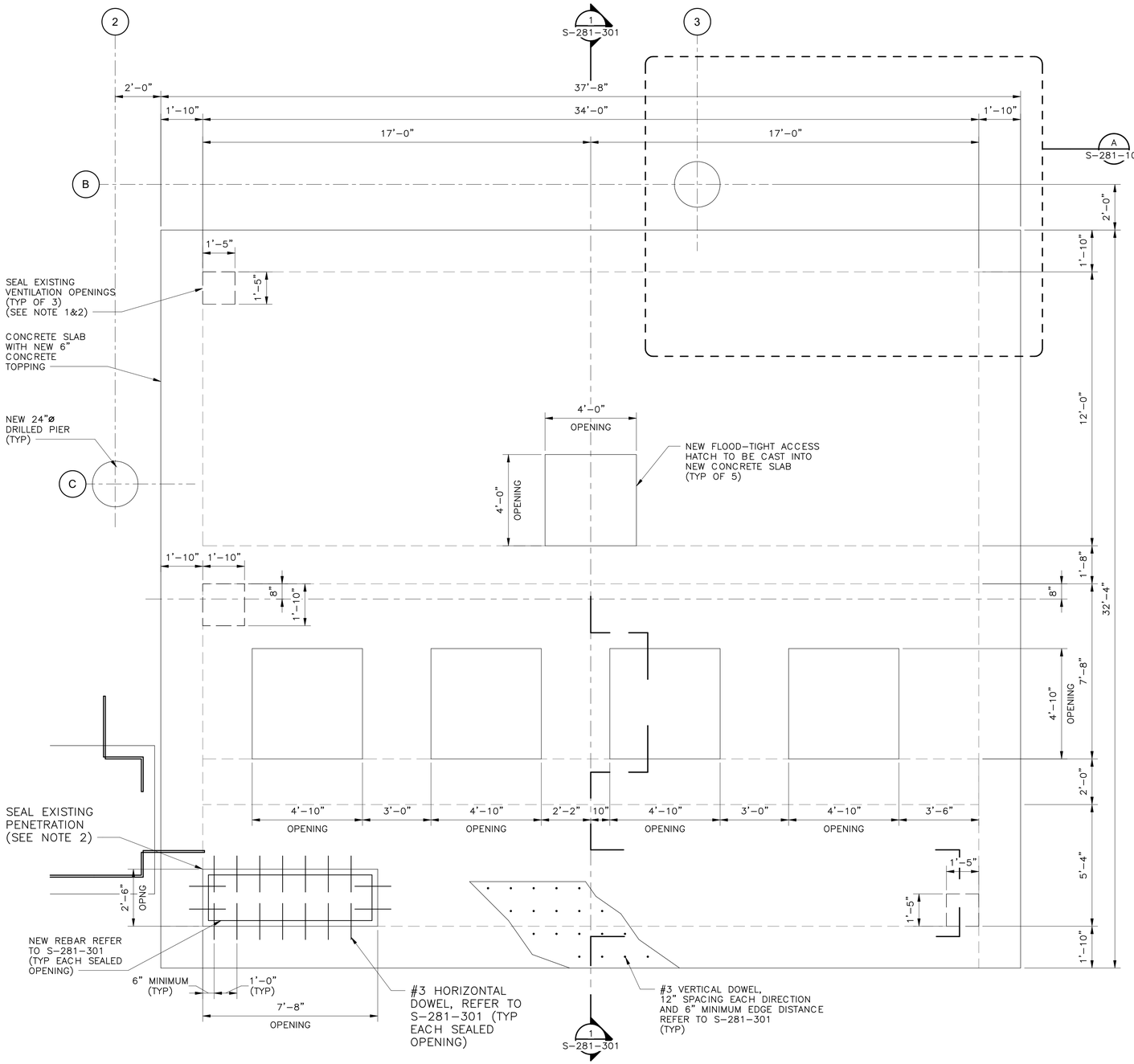
CIVIL

MUD #175–1 LIFT STATION STORM WATER POLLUTION PREVENTION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO P.E.	
SHEET NO. 190 OF 226	

C–281–109

FILE PATH: C:\DC\ACCDocs\Black & Veatch Corp\419473 – COH Lift Station Renew–Replace\Project Files\5.0 Design Files – B&V\5.0.5 Civil 3D\C–281–109.dwg



LIFT STATION PLAN @ GRADE

3/8" = 1'-0"

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

3/8" = 1'-0"

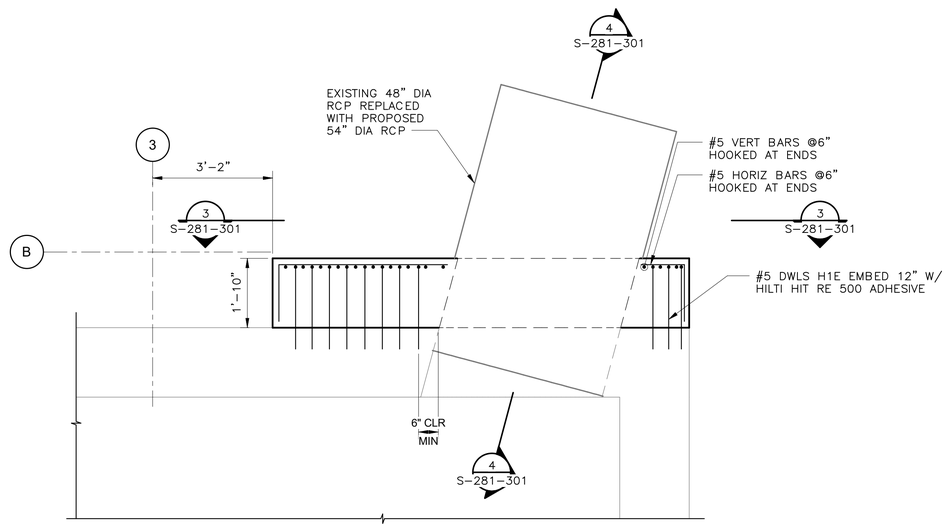
12' 6' 0' 1' 2' 3' 4' 5'

1/2" = 1'-0"

N

NOTES:

1. ADDITIONAL MANHOLES WITH CONCRETE CURB AND VENTILATION STRUCTURE WITH CONCRETE CURB HAVE BEEN INSTALLED SINCE THE ORIGINAL DESIGN OF THIS LIFT STATION. CONTRACTOR TO FIELD VERIFY SIZE AND LOCATION OF THESE ITEMS AND CONFIRM CONSTRUCTABILITY OF ALL SCOPE.
2. ALL EXISTING VENTILATION STRUCTURES AND PERSONNEL ACCESS HATCH WITH GUARDRAILS TO BE REMOVED INCLUDING DEMOLITION OF ASSOCIATED CONCRETE CURBS. EXISTING MANHOLES WITH CONCRETE CURB TO REMAIN.



A ENLARGED DETAIL

S-281-101 1/2" = 1'-0"

BLACK & VEATCH

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133589
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10/20/2025

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

STRUCTURAL

M.U.D. #175-1 LIFT STATION
LIFT STATION PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 191 OF 226	

S-281-101

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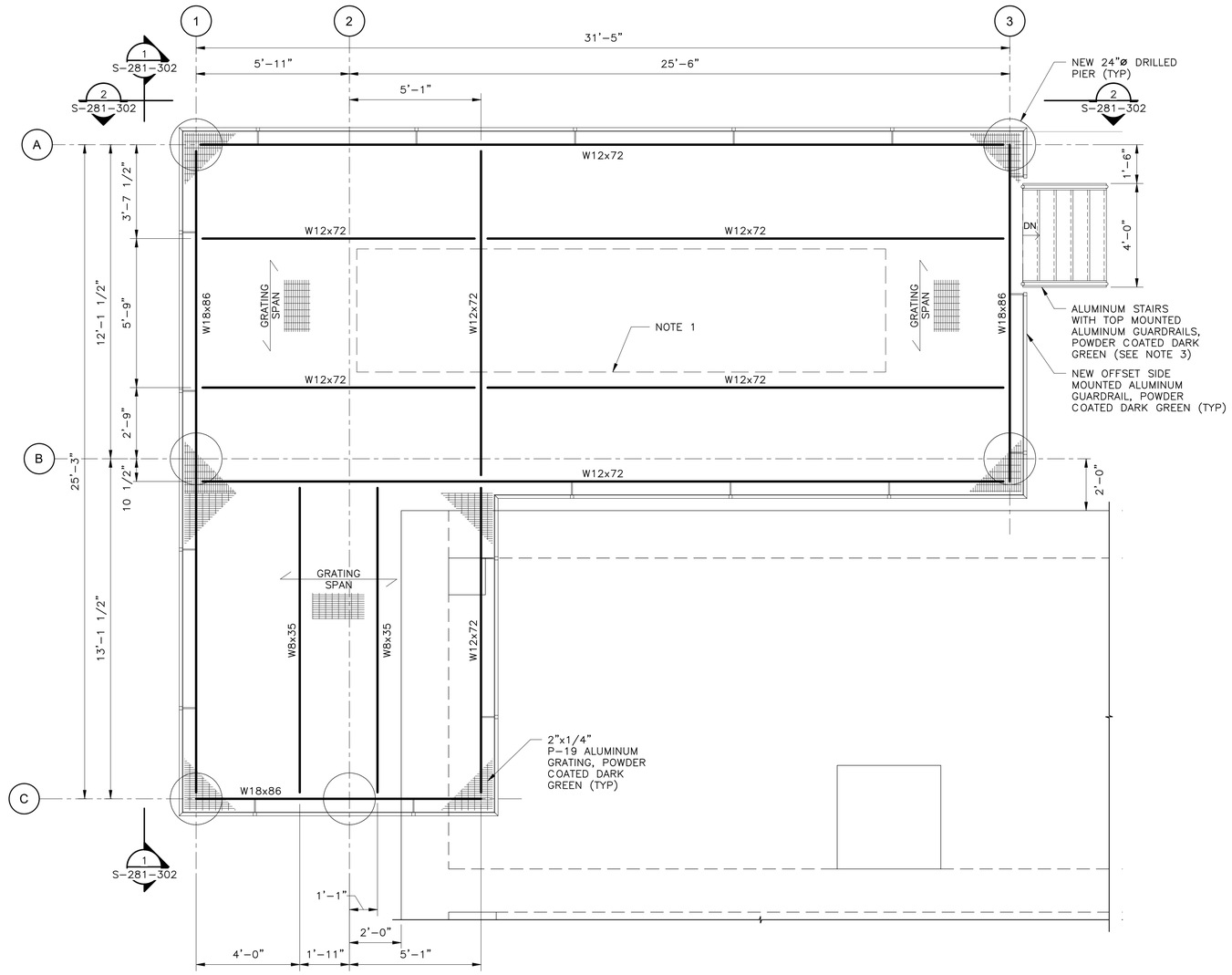

PLATFORM PLAN @ TOS EL 84.25'

3/8" = 1'-0"

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

3/8" = 1'-0"

N

NOTES:

1. COORDINATE STRUCTURAL SUPPORT MEMBERS AND ANCHORAGE WITH EQUIPMENT MANUFACTURER PRIOR TO FABRICATION. SEE ELECTRICAL AND MECHANICAL DRAWINGS FOR EQUIPMENT LAYOUT.
2. ALL PLATFORM BEAMS TO BE HDG STEEL.
3. THE RISER HEIGHTS SHALL NOT BE LESS THAN 4 INCHES OR GREATER THAN 7 INCHES. THE MINIMUM TREAD DEPTH IS 11 INCHES. STAIR TREADS AND RISERS SHALL BE OF UNIFORM SIZE AND SHAPE. THE TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTH SHALL NOT EXCEED 3/8 INCH IN A STAIRWAY FLIGHT.

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

STRUCTURAL
M.U.D. #175-1 LIFT STATION
EQUIPMENT PLATFORM PLAN

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 192 OF 226	

S-281-102

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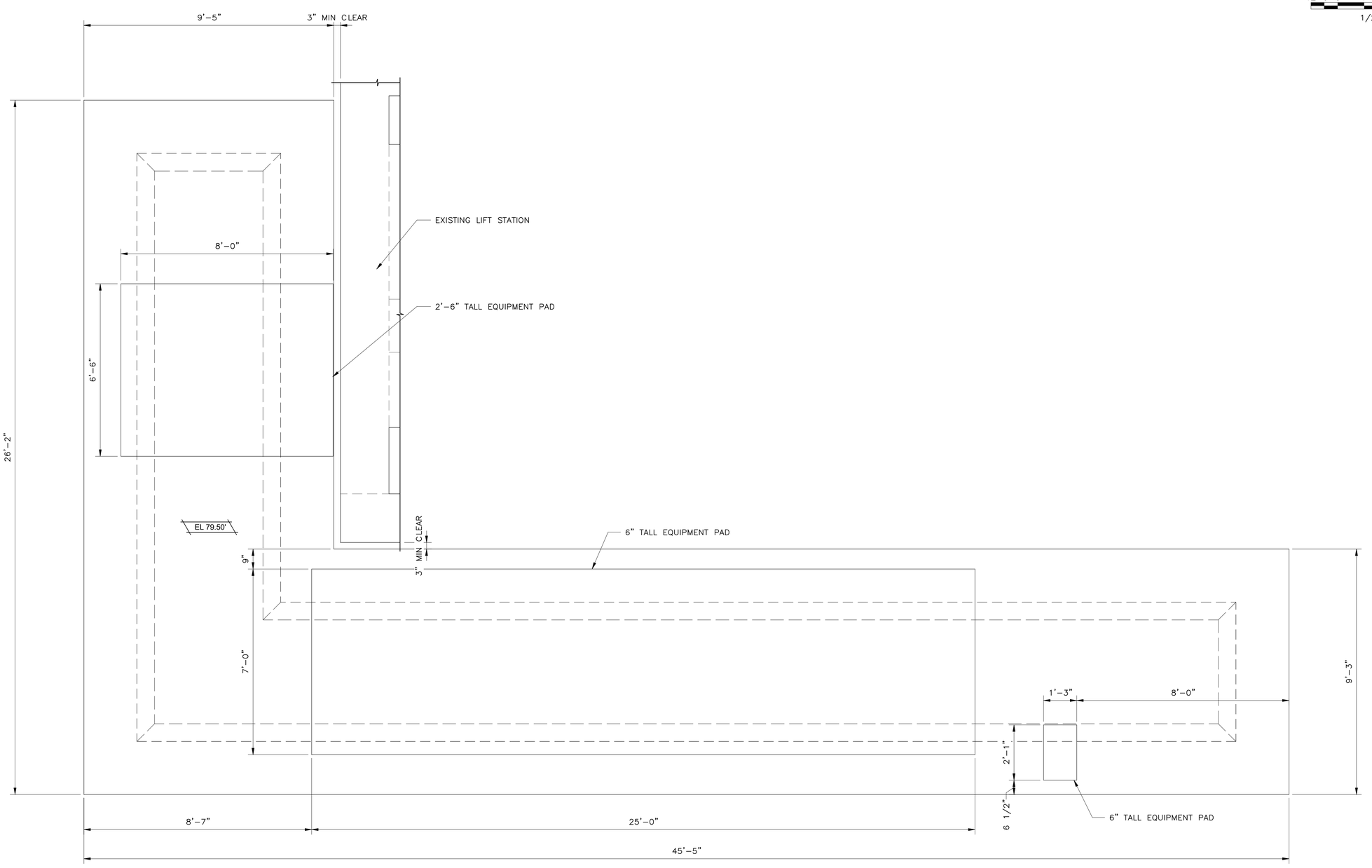

ODOR CONTROL FOUNDATION PLAN @ EL 80.50'

1/2" = 1'–0"

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

1/2" = 1'–0"

N

NOTES:

1. CONTRACTOR TO FIELD VERIFY EQUIPMENT BASE SIZES BASED ON THE EQUIPMENT FURNISHED. FOUNDATION PLAN DIMENSIONS SHOWN HERE ARE MINIMUM VALUES. FINAL CONFIGURATION TO BE REVIEWED AND APPROVED BY EOR.
2. FOR EQUIPMENT BASE DETAILS REFER TO DETAIL A ON SHEET S–000–506 AS REQUIRED.

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
1090 ENCLAVE PKY

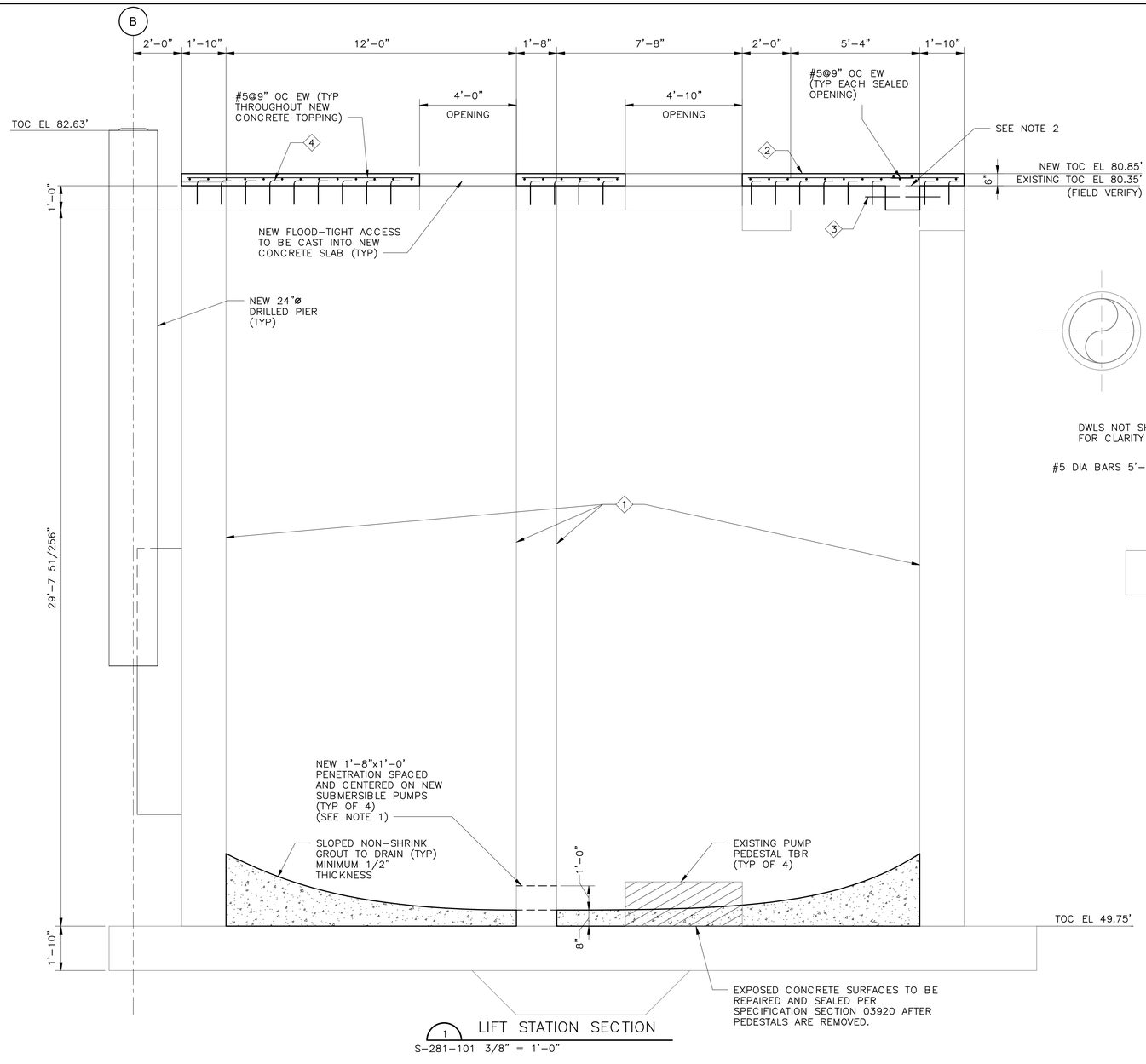
STRUCTURAL

M.U.D. #175–1 LIFT STATION
ODOR CONTROL FOUNDATION PLAN

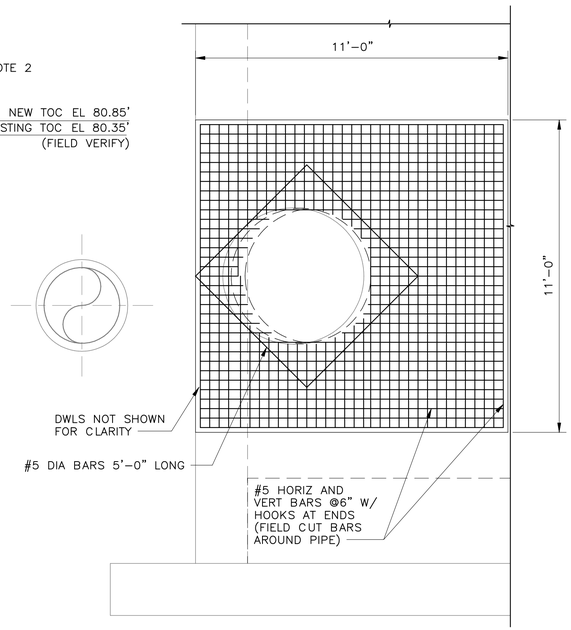
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R–000267–0172–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 193 OF 226	

S–281–103

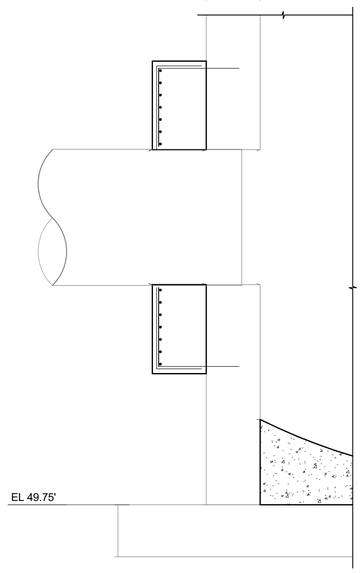
FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



1 LIFT STATION SECTION
S-281-101 3/8" = 1'-0"



3 SECTION
S-281-101 3/8" = 1'-0"



4 SECTION
S-281-101 3/8" = 1'-0"

NOTES:

1. CONCRETE OPENINGS TO BE MADE PER DETAIL B ON SHEET S-000-505. AFTER OPENING IS CUT, EXPOSED CONCRETE SURFACES TO BE REPAIRED AND SEALED PER SPECIFICATION SECTION 03920.
2. ALL EXISTING VENTILATION STRUCTURES AND PERSONNEL ACCESS HATCH WITH GUARDRAILS TO BE REMOVED INCLUDING DEMOLITION OF ASSOCIATED CONCRETE CURBS AND ANY NEWLY EXPOSED CONCRETE SURFACES TO BE REPAIRED AND SEALED PER SPECIFICATION SECTION 03920. EXISTING MANHOLES WITH CONCRETE CURB TO REMAIN.
3. EXISTING ANGLE FRAMING AROUND INSIDE PERIMETER OF EXISTING CONCRETE OPENINGS TO BE SAWCUT AND REMOVED PRIOR TO INSTALLATION OF WATERPROOFING, DOWELS, REBAR, NEW CONCRETE, AND/OR NEW FLOOD-TIGHT ACCESS HATCH. EXISTING CONCRETE STUDS ATTACHING TO ANGLE FRAMING TO BE CUT AND LEFT IN PLACE WHERE CONCRETE IS TO REMAIN. ANY EXISTING CONCRETE CURBS TO BE DEMOLISHED TO MAKE WAY FOR NEW CONCRETE TOPPING AND ANY NEWLY EXPOSED CONCRETE TO BE REPAIRED AND SEALED PER SPECIFICATION SECTION 03920.

ITEMS OF WORK	
NO.	DESCRIPTION
1	INTERIOR SURFACE OF WET WELL, DRY WELL, AND ACCESSIBLE PORTIONS OF INFLUENT MANHOLE TO BE CLEANED AND ALL SIGNS OF SURFACE DAMAGE AND/OR CRACKS TO BE REPAIRED. REFER TO SHEET S-000-513 AND SPECIFICATIONS SECTIONS 03920 AND 03930. SURFACES TO BE COATED PER COH STANDARDS.
2	ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE AND INSTALL ADDITIONAL 6 INCHES OF CONCRETE OVER LIFT STATION TOP SLAB.
3	#3 HORIZONTAL DOWEL CENTERED WITHIN THICKNESS OF EXISTING CONCRETE SLAB, MINIMUM 7" EPOXIED EMBEDMENT INTO EXISTING CONCRETE AND CAST 12" INTO NEW CONCRETE (TYP).
4	#3 VERTICAL DOWELS WITH STANDARD 90 DEGREE HOOK @12" OC EW, MINIMUM 7" EMBEDMENT INTO EXISTING CONCRETE WITH 6" MINIMUM CONCRETE EDGE DISTANCE (TYP).

12" 0' 1' 2' 3' 4' 5' 6' 7'
3/8" = 1'-0"

BLACK & VEATCH

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FB NO. P-6182

STATE OF TEXAS
ELIAS A. POURLADIAN
133589
LICENSED PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

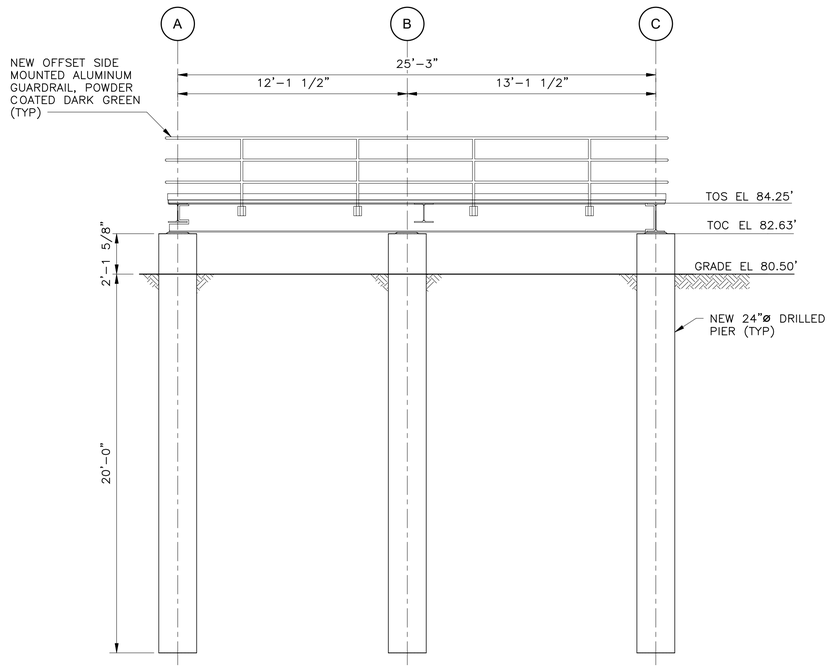
LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

STRUCTURAL

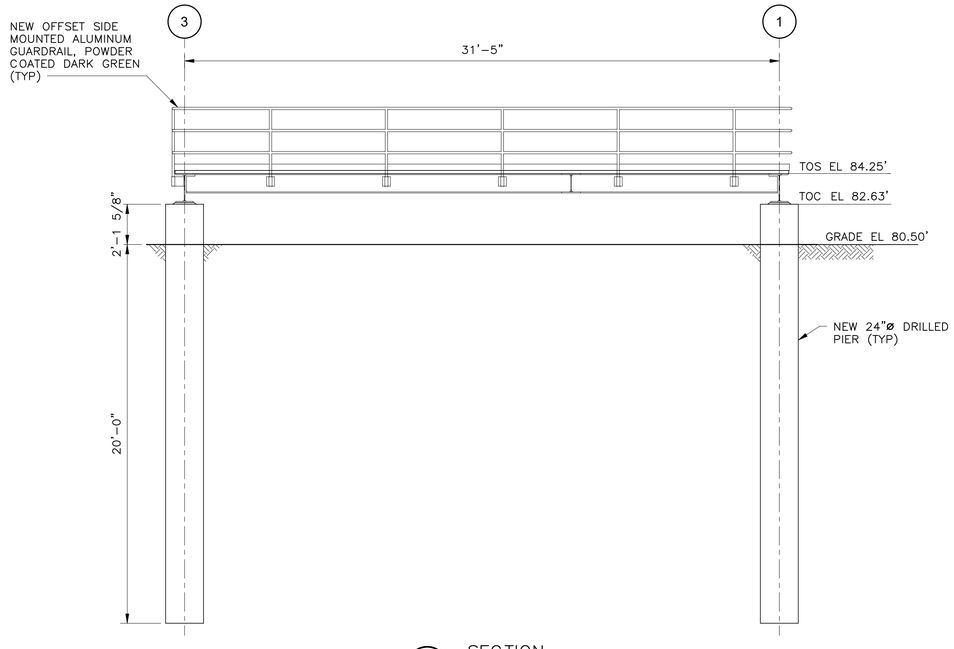
M.U.D. #175-1 LIFT STATION
LIFT STATION SECTION

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
S-281-301	SHEET NO. 194 OF 226

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



1 SECTION
S-281-102 1/4" = 1'-0"



2 SECTION
S-281-102 1/4" = 1'-0"

4' 2' 0' 4' 8'
1/4" = 1'-0"

S-281-302

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt

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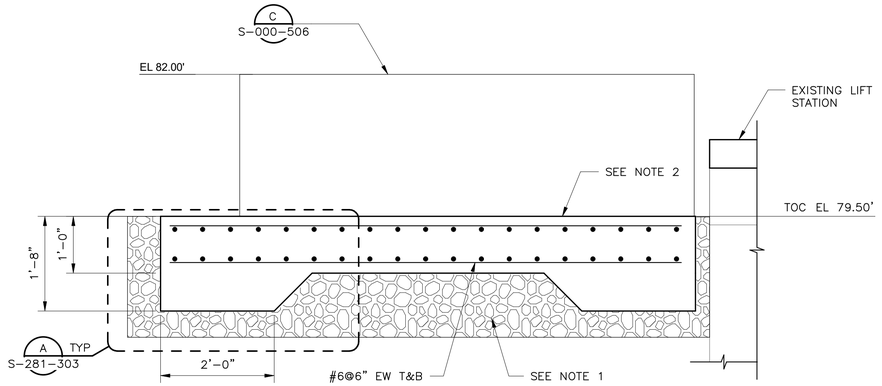
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

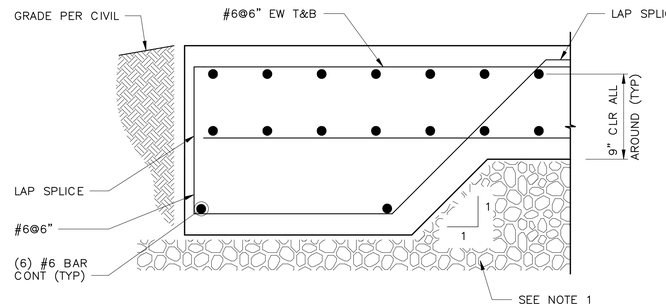
STRUCTURAL

M.U.D. #175-1 LIFT STATION EQUIPMENT PLATFORM SECTIONS

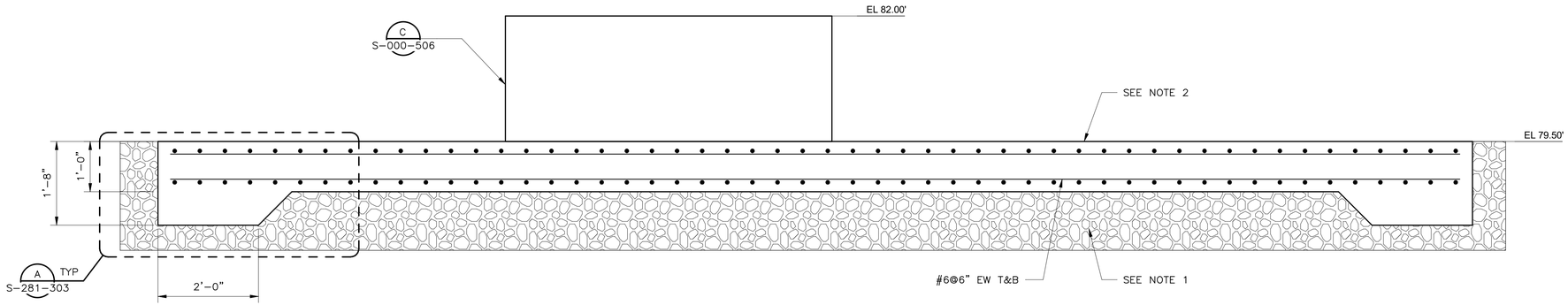
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 195 OF 226	



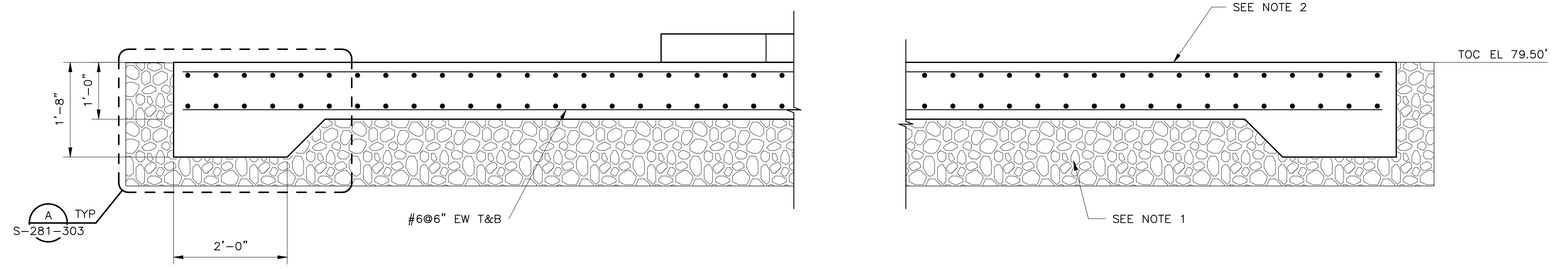
1 SECTION
3/4" = 1'-0"



A DETAIL
S-281-303 1 1/2" = 1'-0"



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



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

NOTES:

1. FOUNDATION SUBGRADE TO BE PREPARED ACCORDING TO SECTION 7.4 OF GEOTECHNICAL REPORT PREPARED BY HVJ ASSOCIATES, DATED JANUARY 10, 2025.
2. CONCRETE SURFACE PLANE TOLERANCES SHALL MEET EQUIPMENT MANUFACTURER REQUIREMENTS. ADDITIONAL CONCRETE EQUIPMENT BASES TO BE PROVIDED AS REQUIRED BY EQUIPMENT MANUFACTURER, REFER TO DETAIL A ON SHEET S-000-506.

12" 9" 6" 3" 0" 1'
1 1/2" = 1'-0"

12" 6" 0" 1' 2' 3'
3/4" = 1'-0"

BLACK & VEATCH

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10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

STRUCTURAL

M.U.D. #175-1 LIFT STATION ODOR CONTROL FOUNDATION SECTIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
S-281-303	SHEET NO. 196 OF 226

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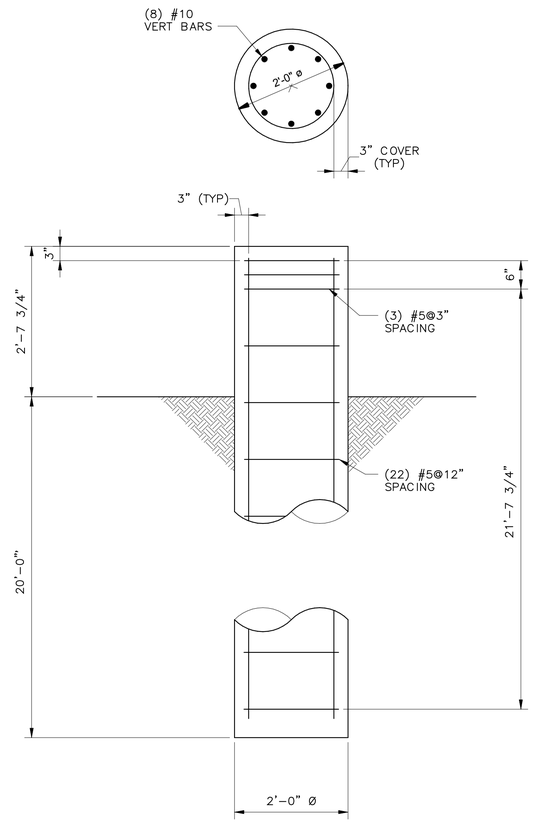

A DRILLED PIER DETAIL
3/4" = 1'-0"

12" 6" 0' 1' 2' 3'
3/4" = 1'-0"

S-281-501

BLACK & VEATCH

BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
1090 ENCLAVE PKY

STRUCTURAL
M.U.D. #175-1 LIFT STATION
EQUIPMENT PLATFORM DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 197 OF 226	

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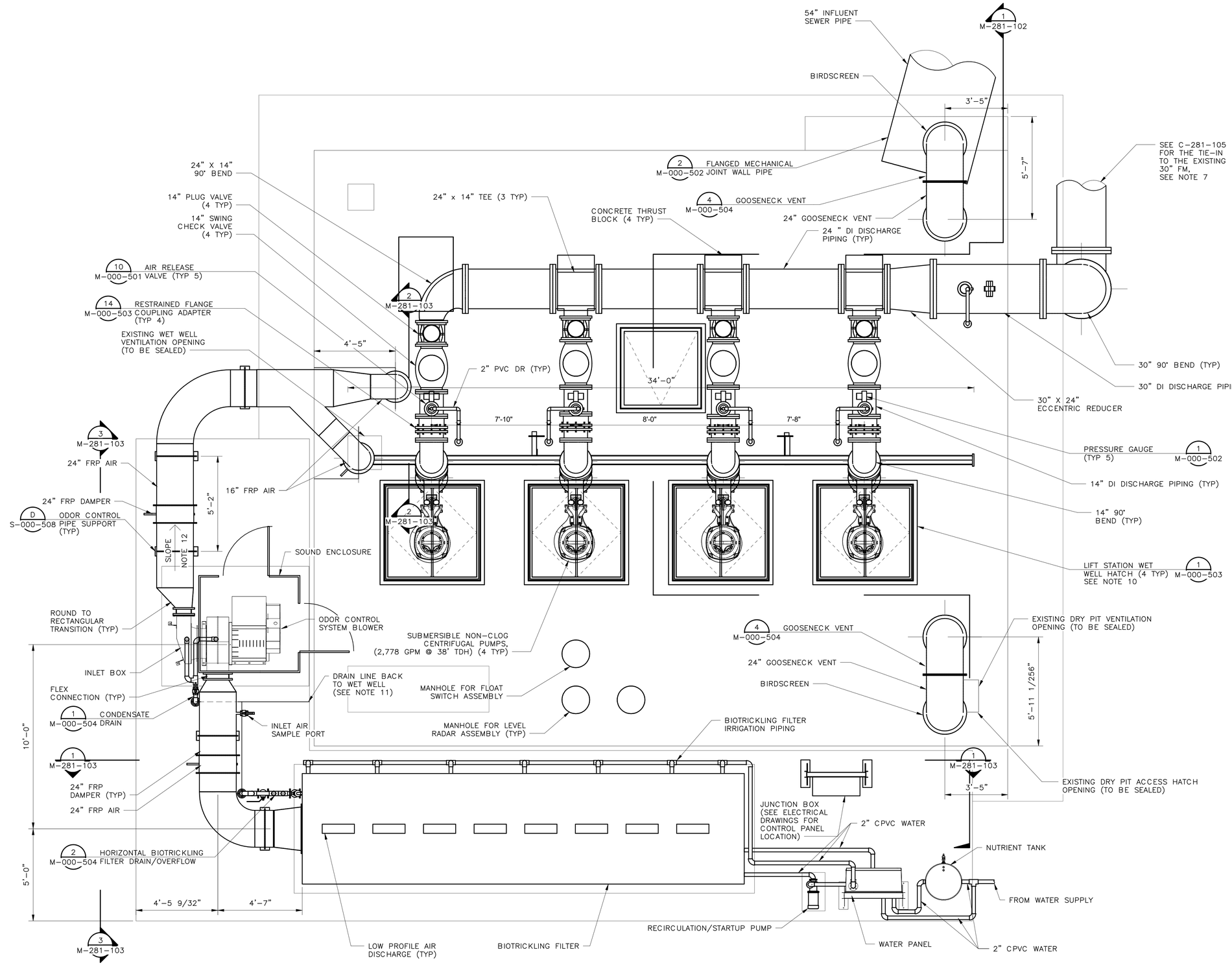

LIFT STATION PLAN

3/8" = 1'-0"

N

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

3/8" = 1'-0"

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. INSTALL PLUG VALVES TO OPEN UPWARD AND TO CLOSE TO A SEATING POSITION.
4. INSTALL CHECK VALVES SO THAT THE WEIGHT LEVEL IS APPROXIMATELY 45° BELOW THE VALVE HORIZONTAL CENTER LINE IN THE CLOSED POSITION; AND APPROXIMATELY 45° ABOVE THE VALVE HORIZONTAL CENTER LINE IN THE FULL OPEN POSITION.
5. SLEEVED OR CORED DISCHARGE PIPE OPENINGS SEALED WITH LINK-SEAL (OR APPROVED EQUAL), MAY BE SUBSTITUTED FOR POURED IN PLACE WALL PIPES TO ACCOMMODATE CONSTRUCTION METHOD.
6. LABEL HATCHES WITH THE CORRESPONDING PUMP NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING WELDED TO THE HATCH. LABEL VALVE NUMBER USING A 12-INCH BY 12-INCH 316SS PLATE ENGRAVED WITH 6-INCH LETTERING ADHERED TO THE TOP OF THE CHECK VALVE.
7. CONTRACTOR SHALL CONFIRM THE LOCATION, ALIGNMENT, AND DEPTH OF THE EXISTING 14" AND 30" FORCE MAINS AT THE LIFT STATION STRUCTURE PRIOR TO INSTALLING THE PROPOSED ABOVE GROUND DISCHARGE PIPING.
8. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO THE ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO THE HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
9. GOOSENECK VENTS SHALL BE FURNISHED WITH A STAINLESS STEEL BIRD SCREEN.
10. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.
11. CONTRACTOR SHALL FIELD ROUTE DRAIN LINE BACK TO LIFT STATION WET WELL. PIPE SHALL BE SLOPED BACK TO THE WET WELL AT A CONSTANT ANGLE.
12. ODOR CONTROL AIR PIPING SHALL BE SLOPED 2 PERCENT TOWARDS THE WET WELL TO ENSURE CONDENSATE IS DRAINED AWAY FROM THE FAN.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

PROCESS MECHANICAL

M.U.D. #175-1 LIFT STATION
LIFT STATION PLAN

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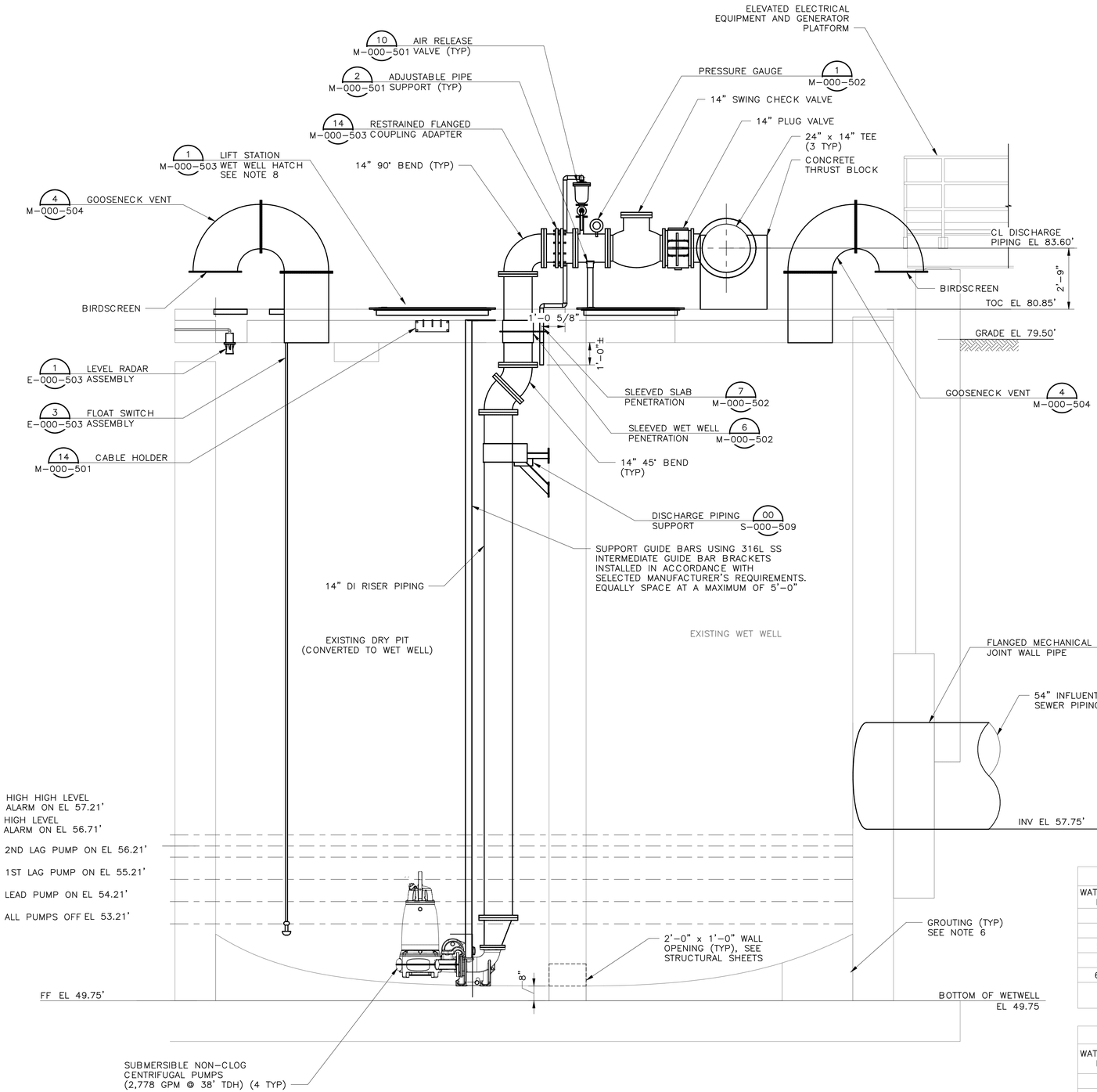
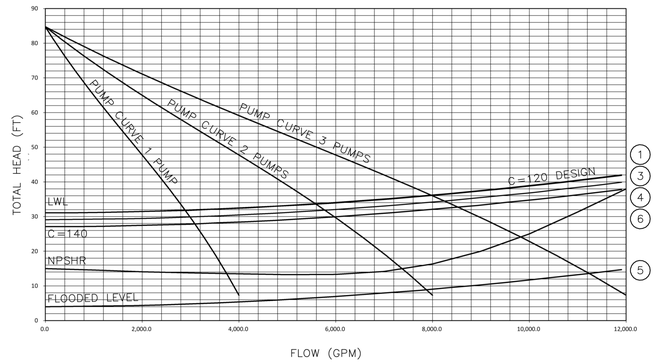
SHEET NO. 198 OF 226	

M-281-101

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



1 M-281-101 LIFT STATION SECTION
3/8" = 1'-0"



PUMP OPERATION CURVES

PUMP CURVE NOTES:

1. LOW NORMAL OPERATING LEVEL C=120 – DESIGN.
2. HIGH NORMAL OPERATING LEVEL C=100 – INFORMATION ONLY (TNRCC).
3. HIGH NORMAL OPERATING LEVEL C=120 – DESIGN.
4. HIGH NORMAL OPERATING LEVEL C=140 – INFORMATION ONLY
5. EMERGERNCY FLOODED OPERATING LEVEL C=140 – MAXIMUM DISCHARGE
6. NET POSITIVE SUCTION HEAD REQUIRED (NPSHR) BASED ON NORMAL OPERATING WATER LEVELS.
7. PUMP CURVES ARE MODIFIED FOR STATION LOSSES.

PUMP DATA TABLE

PUMP CHARACTERISTICS	PUMP NO. 1	PUMP NO. 2	PUMP NO. 3	PUMP NO. 4
MOTOR DATA NOMINAL SIZE (HP) MAX SPEED (RPM)	44.0 1,180	44.0 1,180	44.0 1,180	44.0 1,180
SOLIDS PASSAGE MIN SPHERE (IN)	3.0	3.0	3.0	3.0
CAPACITY (GPM) DESIGN	2,778	2,778	2,778	2,778
DISCHARGE HEAD (FT) DESIGN	30	32	34	34
EFFICIENCY (%) DESIGN	65	65	65	65
NPSHR (FT) DESIGN	15	15	15	15
PUMP CYCLE TIME (MIN)	10	10	10	10
CUMULATIVE CAPACITY (GPM)	3,000	5,778	8,255	NA*

*NOTE: CUMULATIVE CAPACITY PROVIDED FOR PUMP FIRM CAPACITY (N-1)

STATION OPERATION TABLES

RISING LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
3'-5"	53.21'	PUMPS OFF LEVEL – NO ACTION	ALL PUMPS ARE OFF
4'-5"	54.21'	LEAD PUMP TURNS ON	LEAD PUMP ON
5'-5"	55.21'	SECOND PUMP TURNS ON	LEAD & SECOND PUMPS ON
6'-5"	56.21'	THIRD PUMP TURNS ON	LEAD, SECOND, & THIRD PUMPS ON
6'-11"	56.71'	HIGH WATER ALARM ON	HIGH WATER ALARM SOUNDS
7'-5"	57.21'	HIGH HIGH LEVEL ALARM (FLOAT ON LEVEL)	DUTY PUMPS ON (FLOAT)

FALL LEVEL CYCLE

WATER LEVEL DEPTH	WATER LEVEL ELEVATION	ACTION	ALL DUTY PUMP(S) ON
–	–	FLOAT OFF LEVEL	ALL PUMPS OFF (FLOATS)
6'-5"	56.21'	HIGH WATER LEVEL ALARM OFF	LEAD, SECOND, & THIRD PUMPS ON
5'-5"	55.21'	LEAD PUMP TURNS OFF	SECOND & THIRD PUMPS ON
4'-5"	54.21'	SECOND PUMP TURNS OFF	THIRD PUMP ON
3'-5"	53.21'	THIRD PUMP TURNS OFF	ALL PUMPS OFF – STANDBY PUMP SWITCHES TO LEAD PUMP
2'-6"	52.25'	LOW LEVEL ALARM	–

12" 0' 1' 2' 3' 4' 5' 6' 7'
3/8" = 1'-0"

NOTES:

1. SEE DETAIL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
2. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
3. PUMP ANCHOR BOLTS ARE TO BE ADHESIVE TYPE, AND EMBEDDED IN CONCRETE SLAB. CONTRACTOR TO SUBMIT DESIGN OF PUMP ANCHOR BOLTS AND PATTERN INCLUDING CALCULATIONS, DURING SHOP DRAWINGS SUBMISSION.
4. CONTRACTOR TO PROVIDE ADHESIVE ANCHORS IN LIEU OF WEDGE ANCHORS FOR ALL SUBMERGED CONDITIONS. AND SUBMIT DESIGN OF ANCHOR BOLTS DURING SHOP DRAWINGS SUBMISSION.
5. ALL PIPING IN THE WET WELL SHALL BE FLANGED, NO FLANGED COUPLING ADAPTORS, OR VICTAULIC STYLE COUPLINGS SHALL BE PERMITTED INSIDE THE WET WELL.
6. CONTRACTOR SHALL COORDINATE WITH SUPPLIED PUMPS TO ENSURE GROUT IN WET WELL IS OUTSIDE THE MINIMUM REQUIRED CLEARANCE AREA FOR THE PUMPS IF THE EXISTING GROUT CONICIDES WITH THE MANUFACTURER'S MINIMUM CLEAR AREA REQUIRED AROUND THE PROPOSED PUMPS. THE EXISTING GROUT SHALL BE DEMOLISHED AND REPLACED SUCH THAT THE GROUT IS OUTSIDE THE MINIMUM CLEAR AREA AT NO ADDITIONAL COST TO OWNER.
7. CONTRACTOR TO PROVIDE PROTECTIVE COATING TO THE ACCESS HATCHES PER SPECIFICATION 09901. CONTRACTOR TO PROVIDE INTERIOR AND EXTERIOR PROTECTIVE COATINGS TO THE HEADER PIPE, VALVES, AND FITTINGS PER SPECIFICATION 09901.
8. FOR PUMP ACCESS HATCH PROVIDE AN ALUMINUM SAFETY GRATING SYSTEM, 3" MAXIMUM CLEARANCE WITH OPENING EDGE.

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UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
THOMAS P. WILSHUSEN
79350
LICENSED
PROFESSIONAL ENGINEER
10/20/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

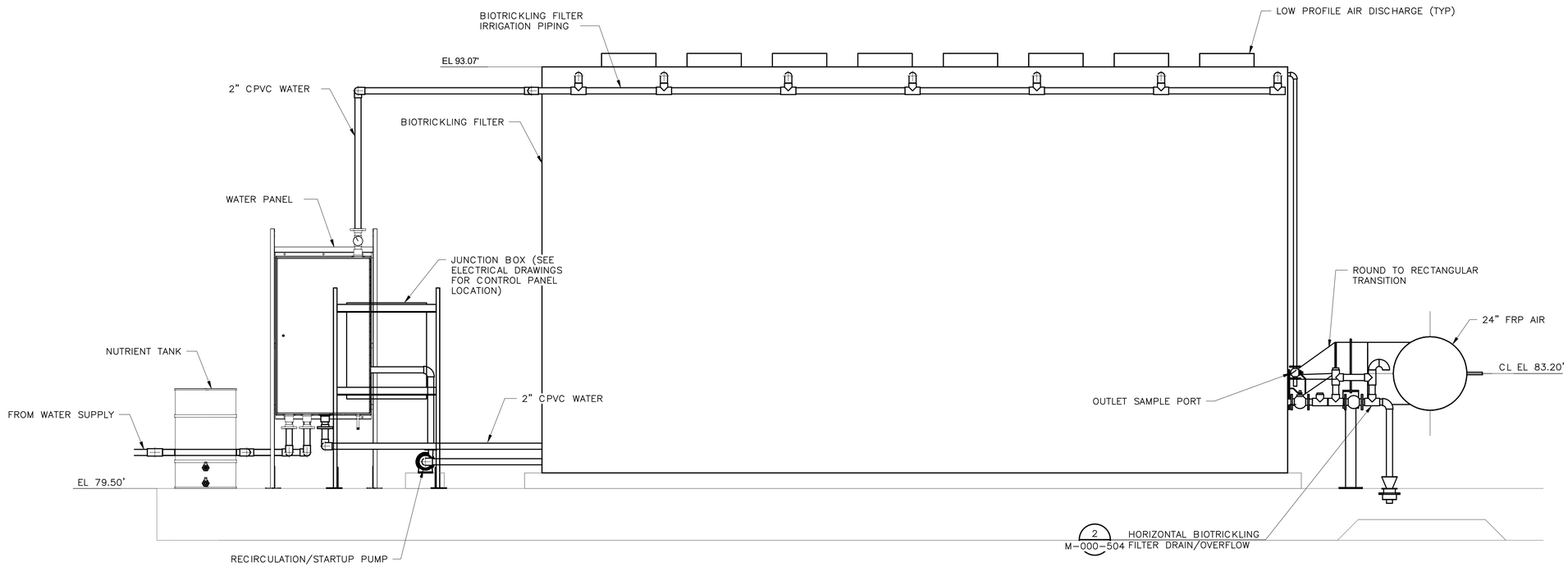
LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

PROCESS MECHANICAL
M.U.D. #175-1 LIFT STATION
LIFT STATION SECTION

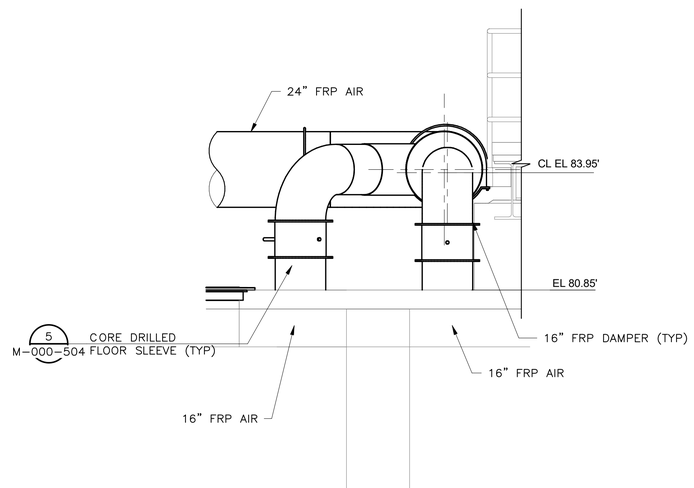
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 199 OF 226	

M-281-102

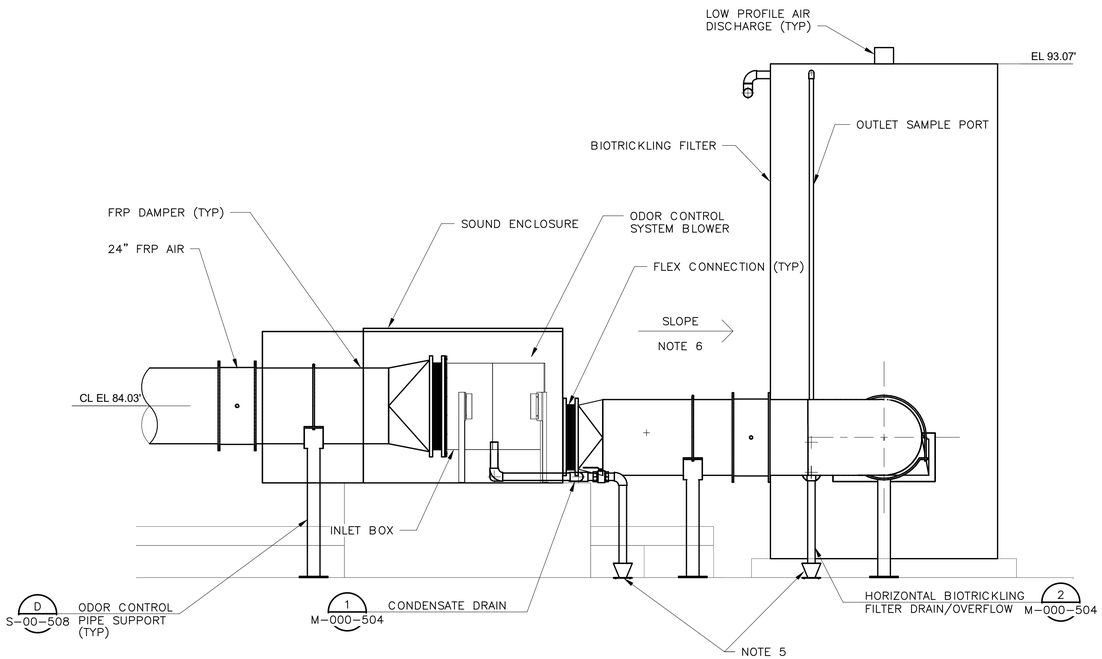
FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



1 M-281-101 BIOSCRUBBER SECTION 1/2" = 1'-0"



2 M-281-101 ODOR CONTROL SYSTEM TAKEOFF SECTION 1/2" = 1'-0"



3 M-281-101 ODOR CONTROL SYSTEM SECTION 1/2" = 1'-0"

NOTES:

1. FOUNDATION PAD SHALL BE FABRICATED UNIFORM IN TEXTURE AND APPEARANCE AND MEET A SURFACE PLANE TOLERANCE OF 1/8" IN 10'.
2. REACTOR TO BE SET ON MINIMUM TWO (2X) LAYERS OF TYPE II (NO. 30) ASTM D226 FELT PAPER PROVIDED BY THE CONTRACTOR.
3. THE LAYOUT SHOWN IS BASED ON ONE ODOR CONTROL MANUFACTURER. CONTRACTOR SHALL ADJUST THE FOUNDATION, PIPING, SUPPORTS, AND ALL THE ASSOCIATED ITEMS AS NEEDED PER THE SELECTED ODOR CONTROL SYSTEM MANUFACTURER AND PROVIDE SUBMITTALS FOR THE EQUIPMENT AT NO ADDITIONAL COST.
4. FASTEN AND SUPPORT ALL PIPING 4" DIA AND SMALLER USING STAINLESS STEEL HARDWARE MOUNTED TO THE CONCRETE FLOORS, PADS, DECKS, AND WALLS.
5. CONTRACTOR SHALL FIELD ROUTE DRAIN TO LIFT STATION WET WELL.
6. PIPING BETWEEN THE ODOR CONTROL SYSTEM BLOWER AND BIOTRICKLING FILTER SHALL BE SLOPED TOWARDS THE BIOTRICKLING AT 2%.

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LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

PROCESS MECHANICAL

M.U.D. #175-1 LIFT STATION SECTION

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R-000267-0172-4	
DRAWING SCALE	
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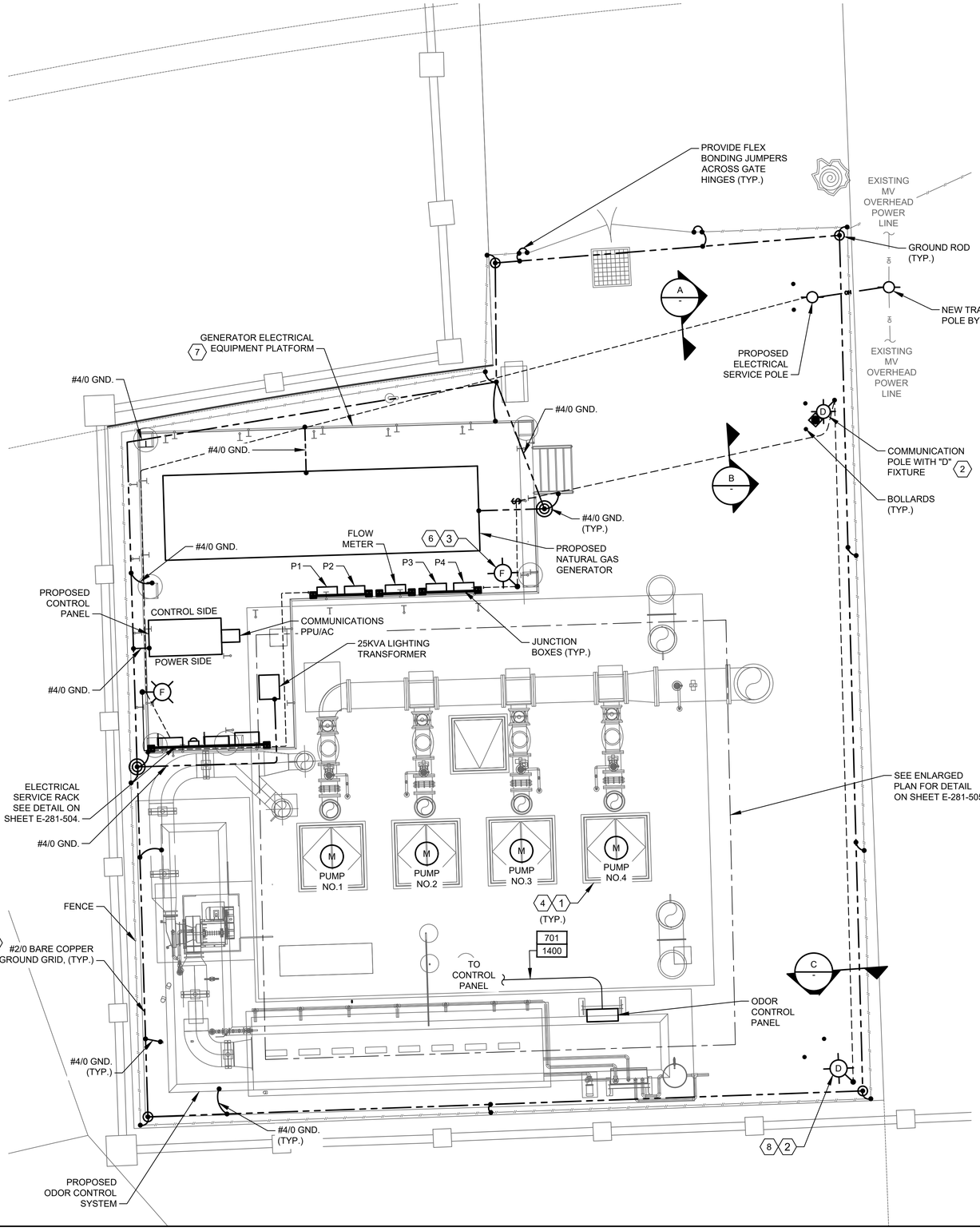
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 200 OF 226	

M-281-103

FILE PATH: Autodesk Docs://419473 - COH Lift Station Renew/419473-281-MUD#175_LS-BV.rvt



MUD 175 LIFT STATION
ELECTRICAL PROPOSED SITE

PLAN

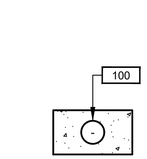
1" = 5'-0"

SCALE: 1"= 5'

0' 5' 10' 15'

NOTES BY SYMBOL "⟨#⟩":

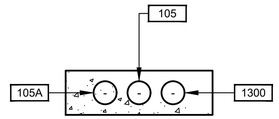
1. THE ELECTRICAL INSTALLATION IN THE WET WELL SHALL BE EXPLOSION PROOF, IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR CLASS I, DIVISION 1 LOCATIONS.
2. YARD LIGHT CONTROLLED BY LIGHTING SWITCH.
3. DUSK TO DAWN PHOTOCELL CONTROL.
4. INSIDE WETWELL RATED NEMA CLASS 1, DIV. 1. OUTSIDE ABOVE GROUND, AROUND WETWELL RATED CLASS 1, DIV. 2 ACCORDING TO NFPA 820.
5. GROUNDING LOOP SHALL BE BURIED 30" BELOW FINISHED GRADE.
6. AREA LIGHTING MOUNTED ON PLATFORM. REFER TO SHEET E-000-504 FOR THE INSTALLATION OF THE LIGHT.
7. REFER TO SHEET E-281-504 FOR ELECTRICAL EQUIPMENT LAYOUT DETAIL.
8. TYPE "B' FIXTURE TO BE INSTALLED ON THE POLE PROVIDING WIRES FOR THE "B" LIGHT.



DUCTBANK

SECTION A

NTS



DUCTBANK

SECTION B

NTS

DUCTBANK

SECTION C

NTS

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

ELECTRICAL

M.U.D. #175 LIFT STATION
1090 ENCLAVE PARKWAY
PROPOSED SITE PLAN

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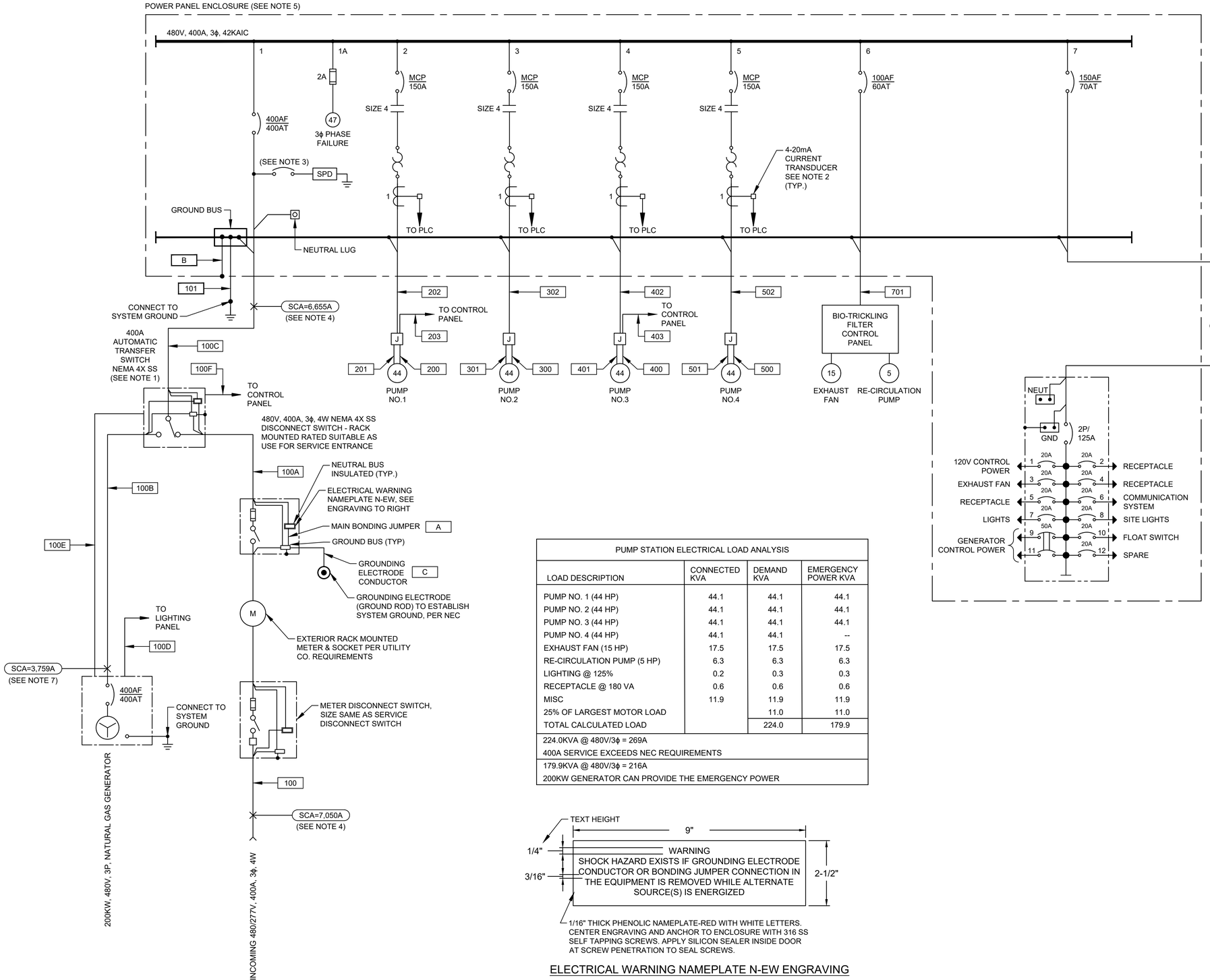
NASIR FAZLJOO, P.E.	
SHEET NO. 201 OF 226	

E-281-101

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 E-281-101.dwg



NOTES:

1. PROVIDE A NORMALLY OPEN (NO) AUXILIARY CONTACT FOR BOTH ON POSITIONS.
2. PROVIDE 5A PRIMARY TO 4-20mA CURRENT TRANSDUCER.
3. PROVIDE BREAKER ACCORDING TO MANUFACTURER'S REQUIREMENTS.
4. POINT TO POINT METHOD IS USED FOR SHORT CIRCUIT CURRENT CALCULATION.
5. CONTRACTOR SHALL PROVIDE A PERMANENTLY AFFIXED LABEL (2" X 3") SHOWING THE AVAILABLE FAULT CURRENT AND CALCULATION DATE. THE LABEL SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND.
6. THE INSULATION TYPES OF ALL ELECTRICAL CONDUCTOS USED IN THE PROJECT HAVE BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS (16120, 16121, AND 16122). THE TYPES OF CONDUITS USED IN THE PROJECT HAS BEEN SPECIFIED IN ELECTRICAL SPECIFICATIONS 16111.
7. THE INFORMATION IS PROVIDED BY GENERATOR MANUFACTURER (CUMMINS).

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PUMP STATION ELECTRICAL LOAD ANALYSIS			
LOAD DESCRIPTION	CONNECTED KVA	DEMAND KVA	EMERGENCY POWER KVA
PUMP NO. 1 (44 HP)	44.1	44.1	44.1
PUMP NO. 2 (44 HP)	44.1	44.1	44.1
PUMP NO. 3 (44 HP)	44.1	44.1	44.1
PUMP NO. 4 (44 HP)	44.1	44.1	--
EXHAUST FAN (15 HP)	17.5	17.5	17.5
RE-CIRCULATION PUMP (5 HP)	6.3	6.3	6.3
LIGHTING @ 125%	0.2	0.3	0.3
RECEPTACLE @ 180 VA	0.6	0.6	0.6
MISC	11.9	11.9	11.9
25% OF LARGEST MOTOR LOAD		11.0	11.0
TOTAL CALCULATED LOAD		224.0	179.9
224.0KVA @ 480V/3ϕ = 269A			
400A SERVICE EXCEEDS NEC REQUIREMENTS			
179.9KVA @ 480V/3ϕ = 216A			
200KW GENERATOR CAN PROVIDE THE EMERGENCY POWER			

1/16" THICK PHENOLIC NAMEPLATE-RED WITH WHITE LETTERS. CENTER ENGRAVING AND ANCHOR TO ENCLOSURE WITH 316 SS SELF TAPPING SCREWS. APPLY SILICON SEALER INSIDE DOOR AT SCREW PENETRATION TO SEAL SCREWS.

ELECTRICAL WARNING NAMEPLATE N-EW ENGRAVING

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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

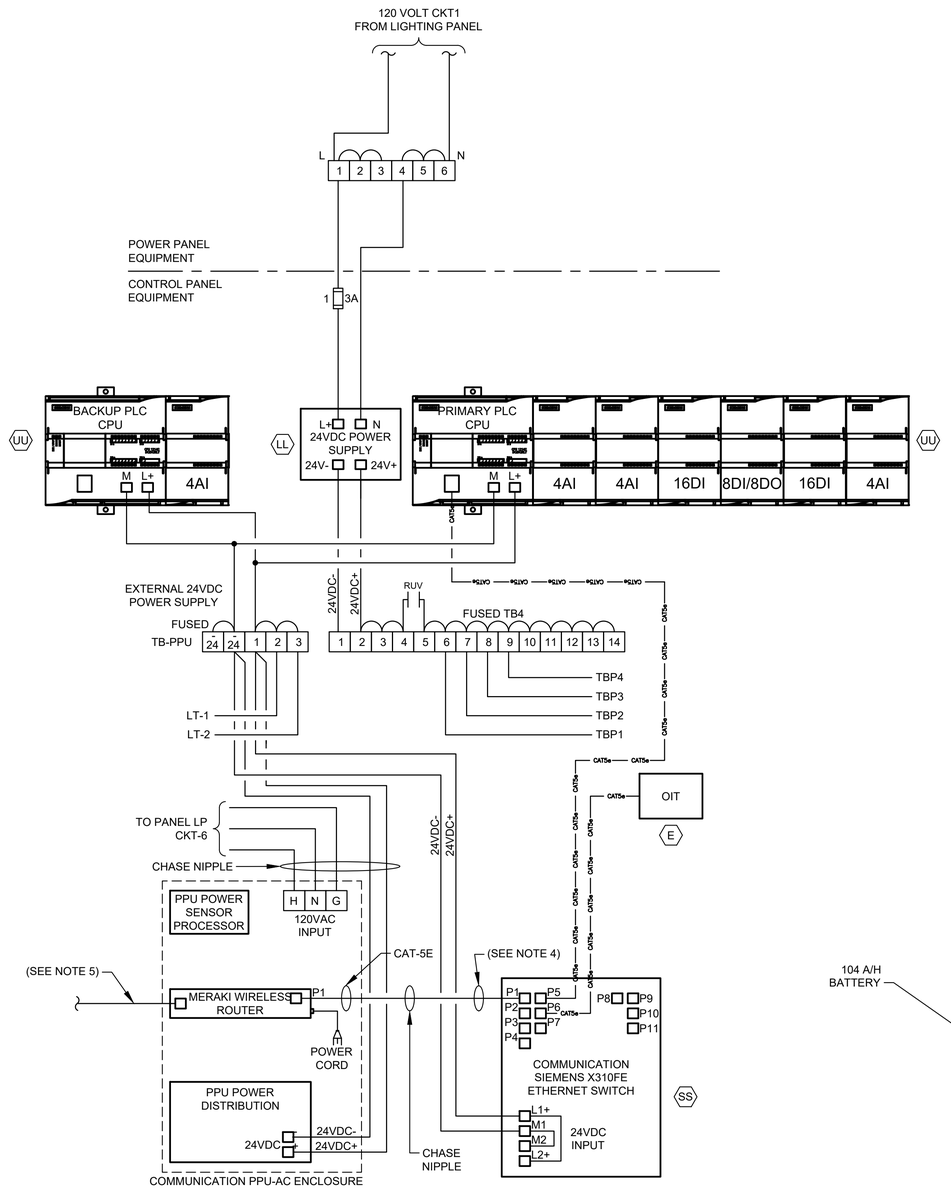
ELECTRICAL

M.U.D #175 LIFT STATION
1090 ENCLAVE PARKWAY
ONE-LINE DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 202 OF 226	

E-281-701

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 E-281-701.dwg

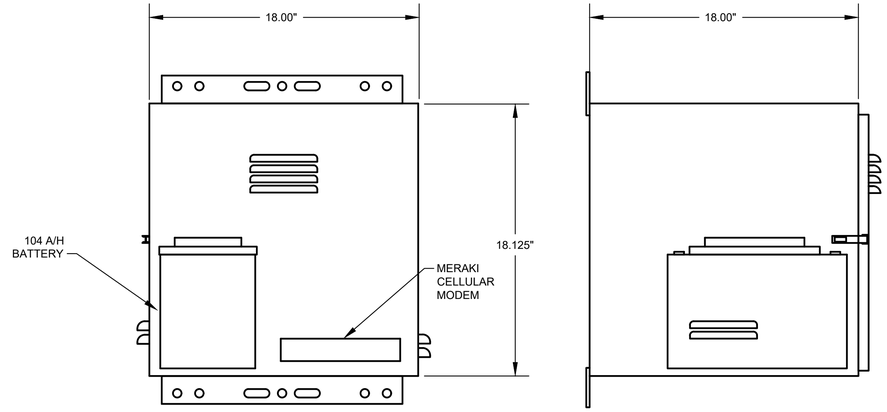


CONTROL POWER &
COMMUNICATIONS WIRING

DIAGRAM

NTS

(SEE NOTE 2 & 6)



PPU-AC ENCLOSURE
FRONT VIEW

PPU-AC ENCLOSURE
SIDE VIEW

PPU-AC
CONTROL ENCLOSURE

ELEVATION

NTS

(SEE NOTE 7)

NOTES:

1. FOR DESCRIPTION AND RATINGS OF ITEMS INDICATED WITH ITEM TAG, SEE DEVICE RATINGS SCHEDULE.
2. REFER TO SPEC SECTION 16120 FOR CONDUCTOR COLOR CODE.
3. THE PLC POWER SUPPLY SHALL FEED THE 24VDC I/O.
4. ETHERNET CABLE FOR MERAKI CELLULAR ROUTER (P1).
5. POE CABLE TO RADIO.
6. COMMUNICATION PPU-AC & SCADA SHALL BE PROVIDED BY CONTRACTOR INCLUDING TO RUN CONDUITS & WIRES.
7. COORDINATE WITH VENDOR TO PROVIDE PROPER VENTILATION WHERE APPLICABLE.

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LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

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M.U.D #175 LIFT STATION
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COMMUNICATION DIAGRAM

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DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
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E-281-702

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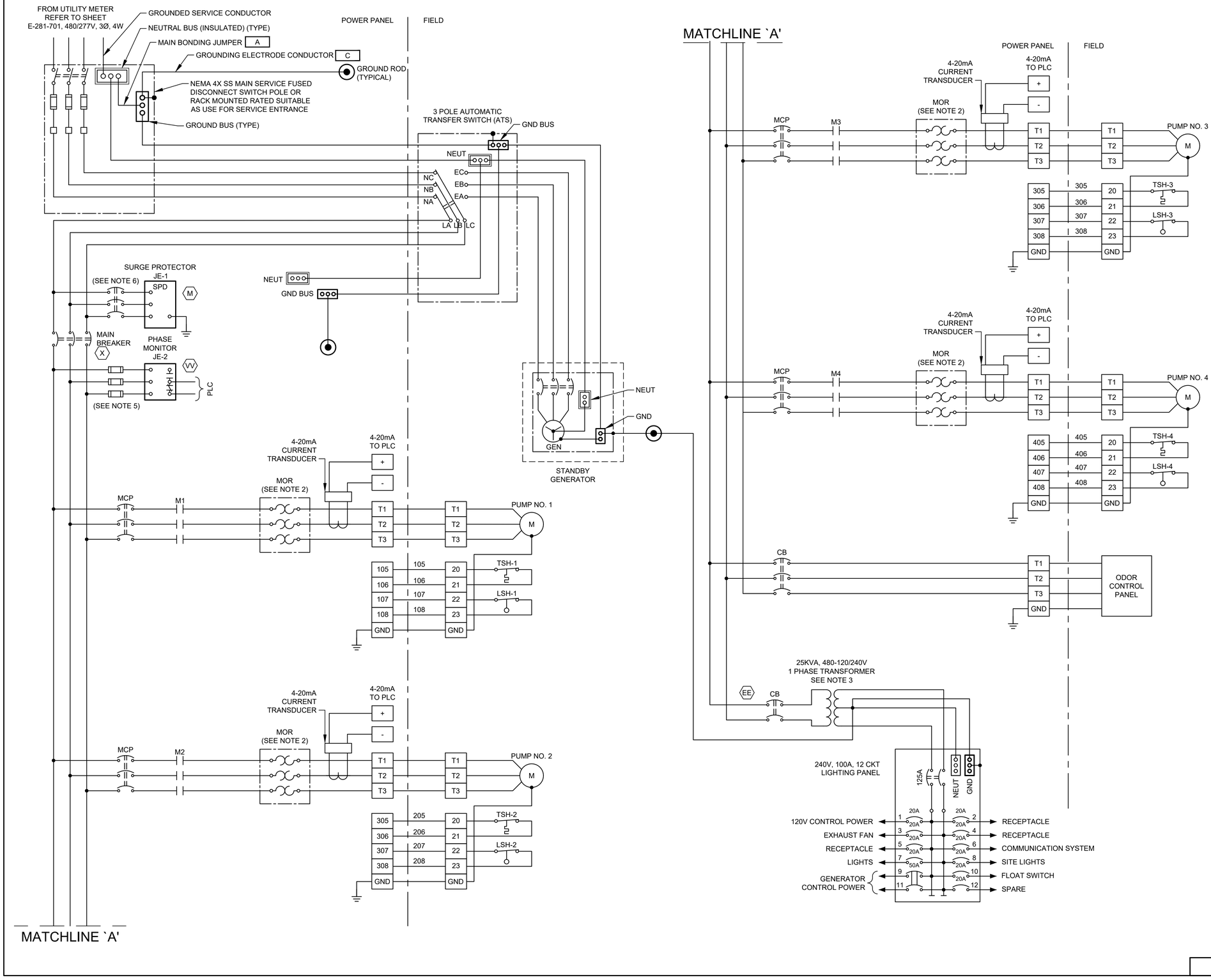
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 E-281-702.dwg



NOTES:

1. UNLESS OTHERWISE INDICATE, ALL DEVICES WITHOUT FURTHER DESIGNATION ARE LOCATED AT THE CONTROL PANEL.
2. THE COMBINATION OF CT AND MOTOR OVERLOAD RELAY IF REQUIRED.
3. CONTRACTOR TO REVISE DWG. BASED ON MANUFACTURE AND SIZE.
4. CONTRACTOR SHALL TERMINATE POWER & CONTROL WIRES PER MANUFACTURER'S REQUIREMENTS.
5. PROVIDE FUSE SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
6. PROVIDE BREAKER SIZE ACCORDING TO MANUFACTURER'S REQUIREMENTS.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

ELECTRICAL

M.U.D #175 LIFT STATION
1090 ENCLAVE PARKWAY
THREE-LINE DIAGRAM

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CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-281-703

SHEET NO. 204 OF 226

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 E-281-703.dwg

CONDUIT AND CABLE SCHEDULE

ITEM NO.	CONDUIT TAG.	CONDUIT QUANTITY	CONDUIT SIZE	# CONDS PAIRS/TRIADS	CONDUCTOR SIZE	AMPS OR HP	VOLTAGE LEVEL	FROM	TO	DESCRIPTION
1	A	1	-	-	#2 GND.	-	-	SERVICE DISCONNECT NEUTRAL BUS BAR	SERVICE DISCONNECT GROUND BUS BAR	MAIN BONDING JUMPER
2	B	1	-	-	#2 GND.	-	-	POWER PANEL GROUND BUS	POWER PANEL ENCLOSURE	EQUIPMENT BONDING JUMPER
3	C	1	-	-	#2 GND.	-	-	GROUNDING ELECTRODE	SERVICE DISCONNECT GROUND BUS BAR	GROUNDED ELECTRODE CONDUCTOR
4	100	1	2"	1/C	3#500 MCM, #2 GND.,	400A	480V	SERVICE POLE	METER DISCONNECT SWITCH	UTILITY 480V SERVICE POWER
5	100A	1	2"	1/C	3#500 MCM, #2 GND.,	400A	480V	SERVICE DISCONNECT SWITCH	ATS	UTILITY POWER ENTRANCE
6	100B	1	2"	1/C	3#500 MCM, #2 GND.,	400A	480V	STANDBY GENERATOR	ATS	GENERATOR POWER ENTRANCE
7	100C	1	2"	1/C	3#500 MCM, #2 GND.,	400A	480V	ATS	CONTROL PANEL	480V POWER
8	100D	1	1"	1/C	3#6 AWG., #8 GND.,	50A	120/240V	STANDBY GENERATOR	LIGHTING PANEL	GENERATOR CONTROL POWER
9	100E	1	1"	1/C	6#14 AWG., #14 GND.,	-	24VDC	STANDBY GENERATOR	ATS	GENERATOR CONTROLS
10	100F	1	1"	1/C	4#14 AWG., #14 GND.,	-	24VDC	ATS	CONTROL PANEL	NORMAL/EMERGENCY POWER STATUS
11	100G	1	1"	-	12#14 AWG., #14 GND.	-	24VDC	STANDBY GENERATOR	CONTROL PANEL	GENERATOR ALARM SIGNALS
12	105	1	1"	-	POE CABLE	-	24VDC	COMMUNICATION POLE	PPU-AC ENCLOSURE	COMMUNICATION
13	200	1	2-1/2"	-	MANUFACTURER CABLE	44HP	480V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 POWER
14	201	1	2-1/2"	-	MANUFACTURER CABLE	-	120V	PUMP NO.1	PUMP NO.1 JUNCTION BOX	PUMP NO.1 CONTROL
14	202	1	2"	1/C	3#3 AWG., #8 GND.,	44HP	480V	PUMP NO.1 JUNCTION BOX	PUMP STARTER	PUMP NO.1 POWER
15	203	1	1"	1/C	8#14 AWG., #14 GND.,	-	120V	PUMP NO.1 JUNCTION BOX	CONTROL PANEL	PUMP NO.1 & PUMP NO.2 COMBINED CONTROLS
16	300	1	2-1/2"	-	MANUFACTURER CABLE	44HP	480V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 POWER
17	301	1	2-1/2"	-	MANUFACTURER CABLE	-	120V	PUMP NO.2	PUMP NO.2 JUNCTION BOX	PUMP NO.2 CONTROL
18	302	1	2"	1/C	3#3 AWG., #8 GND.,	44HP	480V	PUMP NO.2 JUNCTION BOX	PUMP STARTER	PUMP NO.2 POWER
19	400	1	2-1/2"	-	MANUFACTURER CABLE	44HP	480V	PUMP NO.3	PUMP NO.3 JUNCTION BOX	PUMP NO.3 POWER
20	401	1	2-1/2"	-	MANUFACTURER CABLE	-	120V	PUMP NO.3	PUMP NO.3 JUNCTION BOX	PUMP NO.3 CONTROL
20	402	1	2"	1/C	3#3 AWG., #8 GND.,	44HP	480V	PUMP NO.3 JUNCTION BOX	PUMP STARTER	PUMP NO.3 POWER
21	403	1	1"	1/C	8#14 AWG., #14 GND.,	-	120V	PUMP NO.3 JUNCTION BOX	CONTROL PANEL	PUMP NO.3 & PUMP NO.4 COMBINED CONTROLS
22	500	1	2-1/2"	-	MANUFACTURER CABLE	44HP	480V	PUMP NO.4	PUMP NO.4 JUNCTION BOX	PUMP NO.4 POWER
23	501	1	2-1/2"	-	MANUFACTURER CABLE	-	120V	PUMP NO.4	PUMP NO.4 JUNCTION BOX	PUMP NO.4 CONTROLS
24	502	1	2"	1/C	3#3 AWG., #8 GND.,	44HP	480V	PUMP NO.4 JUNCTION BOX	PUMP STARTER	PUMP NO.4 POWER
25	601	1	1"	1/C	2#4 AWG., #8 GND.,	70A	480V	CONTROL PANEL	LIGHTING TRANSFORMER	LIGHTING TRANSFORMER FEEDER
26	602	1	1-1/2"	1/C	3#1 AWG., #6 GND.,	125A	120/240V	LIGHTING TRANSFORMER	LIGHTING PANEL	LIGHTING PANEL FEEDER
27	701	1	1-1/2"	1/C	3#4 AWG., #8 GND.,	60A	480V	CONTROL PANEL	ODOR CONTROL PANEL	ODOR CONTROL PANEL POWER
28	1000	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER LT-1	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
29	1001	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	TRANSMITTER LT-2	TRANSMITTER JUNCTION BOX	LEVEL TRANSMITTER
30	1002	1	1"	-	2-TRIAD #16, 4#14,	-	24VDC	TRANSMITTER JUNCTION BOX	CONTROL PANEL	COMBINED LEVEL TRANSMITTERS & FLOAT SWITCH
31	1003	1	2-1/2"	4/C	MANUFACTURER CABLE	-	24VDC	FLOAT SWITCHES	TRANSMITTER JUNCTION BOX	WELL FLOAT SWITCHES
32	1100	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
33	1200	1	3/4"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	RECEPTACLE ON PLATFORM	120VAC FOR RECEPTACLE
34	1300	1	1"	1/C	2#12 AWG., #12 GND.,	-	120V	LIGHTING PANEL	SITE LIGHTS	SITE LIGHTING
35	1400	1	1"	1-TRIAD	1-TRIAD #16,	-	24VDC	CONTROL PANEL	ODOR CONTROL PANEL	CONTROL WIRES

NOTES:

1. CONDUITS LABELED "FUTURE SPACE" ARE TO BE INSTALLED AND CAPPED IN FIELD.
2. ANY CONDUIT REQUIRING A CSBE SEAL, SHALL BE A MINIMUM SIZE OF 2 1/2".
3. ALL UNDERGROUND CONDUITS (SINGLE AND MULTI-RUN) TO BE ENCASED IN REINFORCED CONCRETE DUCTBANK.

GENERAL NOTES:

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FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
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REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
CONDUIT SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

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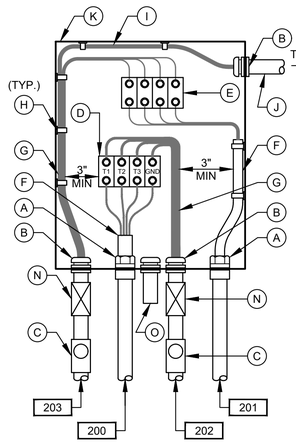
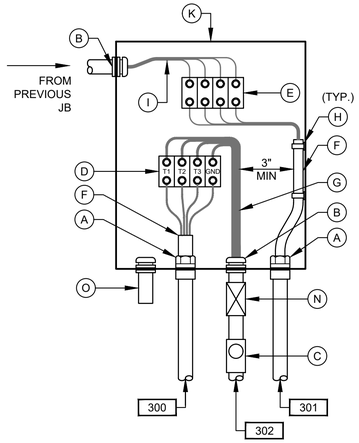


PUMP NO.1
JUNCTION BOX

DETAIL 3
NTS
(SEE NOTE 7)



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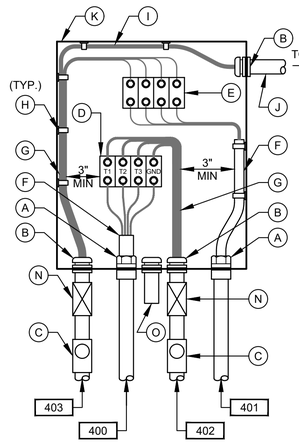
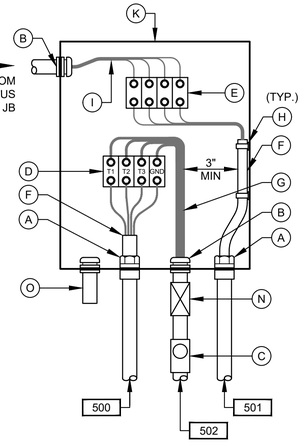
JUNCTION BOX

DETAIL 4
NTS
(SEE NOTE 7)



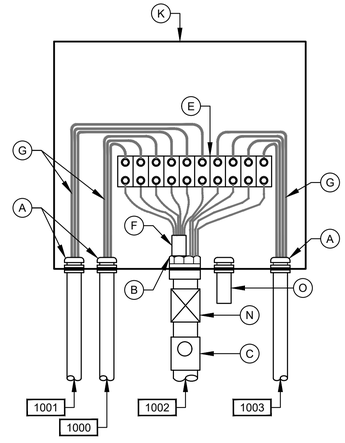
PUMP NO.3
JUNCTION BOX

DETAIL 5
NTS
(SEE NOTE 7)



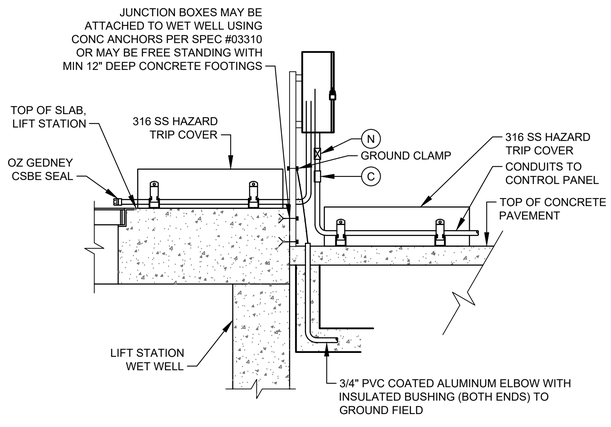
PUMP NO.4
JUNCTION BOX

DETAIL 6
NTS
(SEE NOTE 7)



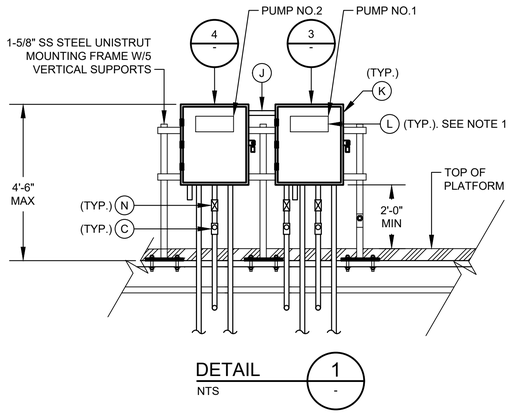
LEVEL TRANSMITTER
JUNCTION BOX

DETAIL 7
NTS
(SEE NOTE 7)

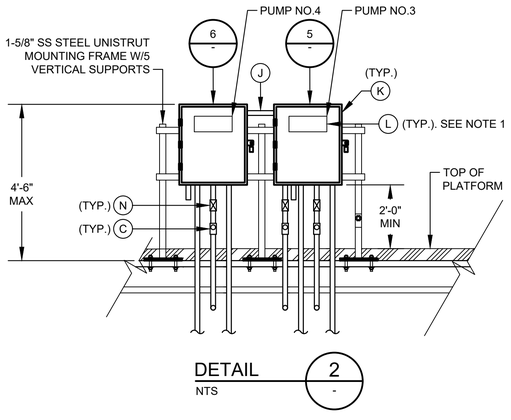


TYP SIDE VIEW FOR DETAIL 1, 2, & 8

(SEE NOTE 10)



DETAIL 1
NTS



DETAIL 2
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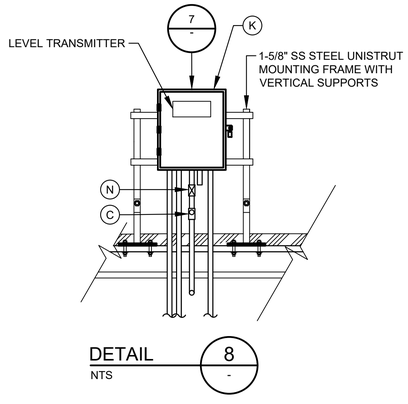

DETAIL 8
NTS

JUNCTION BOX EQUIPMENT SCHEDULE

- A - OZ GEDNEY CSBE SEAL
- B - WATERTIGHT CONDUIT HUB WITH INSULATED BUSHING
- C - CLASS I, DIV 1, EXPLOSION PROOF SEAL INSTALLED PER NEC DIV 501
- D - POWER TERMINAL BLOCK W/SCREW DOWN BOX LUGS
- E - CONTROL TERM BLOCK W/SCREW DOWN BOX LUGS
- F - MULTI-CONDUCTOR CABLE, REMOVE OUTER JACKET AS SHOWN
- G - WIRING AS SCHEDULED
- H - WIRING HARNESS PERMANENTLY AFFIXED
- I - PUMP CONTROL WIRING FROM PUMPS NO.1 TO NO.3 OR FROM PUMP NO.4 TO PUMP NO.5.
- J - 1 1/2" PVC COATED CONDUIT NIPPLE
- K - NEMA 4X STAINLESS STEEL JUNCTION BOX WITH GASKETED FRONT COVER, SINGLE QUARTER TURN, OIL-TIGHT LATCH AND PADLOCKING PROVISIONS, HOFFMAN D-3L16H1206 SS LF OR EQUAL. MINIMUM SIZE: 12"W X 16"H X 6"D
- L - NAMEPLATE, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
- M - NOT USED.
- N - EXPANSION FITTING
- O - DRAIN VENT

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO JUNCTION BOXES USING 316 STAINLESS STEEL HARDWARE.
2. MAINTAIN MINIMUM SEPARATION REQUIRED UNDER NEC ARTICLE 504, BETWEEN INTRINSICALLY SAFE CONTROL WIRING AND NON INTRINSICALLY SAFE MOTOR FEEDER WIRING.
3. UNLESS OTHERWISE NOTED, ALL EXTERIOR EXPOSED CONDUITS SHALL BE PVC COATED ALUMINUM.
4. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, SCREWS WASHERS, ETC SHALL BE TYPE 316 STAINLESS STEEL.
5. ALL UNDERGROUND CONDUITS TO BE ENCASED IN REINFORCED CONCRETE DUCTBANK.
6. PROVIDE ANTI-CORROSIVE SPRAY ON ANY BARE METAL PARTS OR EXPOSED WIRE.
7. SEE WIRING SCHEMATICS FOR TERMINALS AND WIRE NUMBERS.
8. ANY CONDUIT REQUIRING A CSBE SEAL, SHALL BE A MINIMUM SIZE OF 2 1/2" PER CABLE.
9. DETAIL SHOWN MAY BE MODIFIED PER SITE SITUATION.
10. COORDINATE WITH WASTE WATER OPERATIONS ELECTRICAL ORGANIZATION FOR THE OPENING OF JUNCTION BOXES TO THE SIDE OF WET WELL IF REQUIRED DURING CONSTRUCTION.
11. THE ENCLOSURES WITH ELECTRICAL CIRCUITS SHALL BE A MINIMUM OF 5 FEET FROM ANY CLASSIFIED AREA, OTHERWISE EXPLOSION PROOF TYPE ENCLOSURES SHALL BE USED.
12. ALL JUNCTION BOXES SHALL BE NEMA 6P 316 STAINLESS STEEL RATING.

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10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
TYPICAL JUNCTION BOX DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 206 OF 226	

E-281-501

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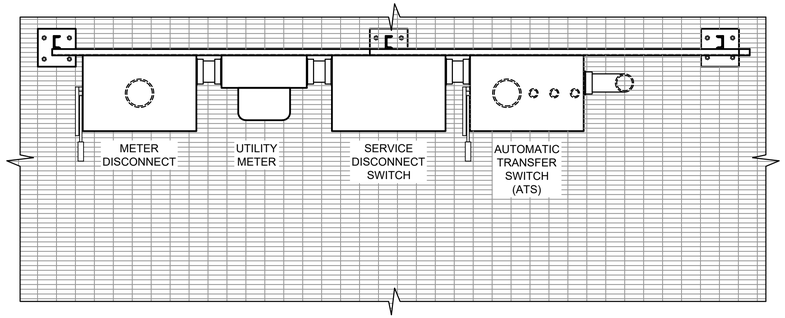

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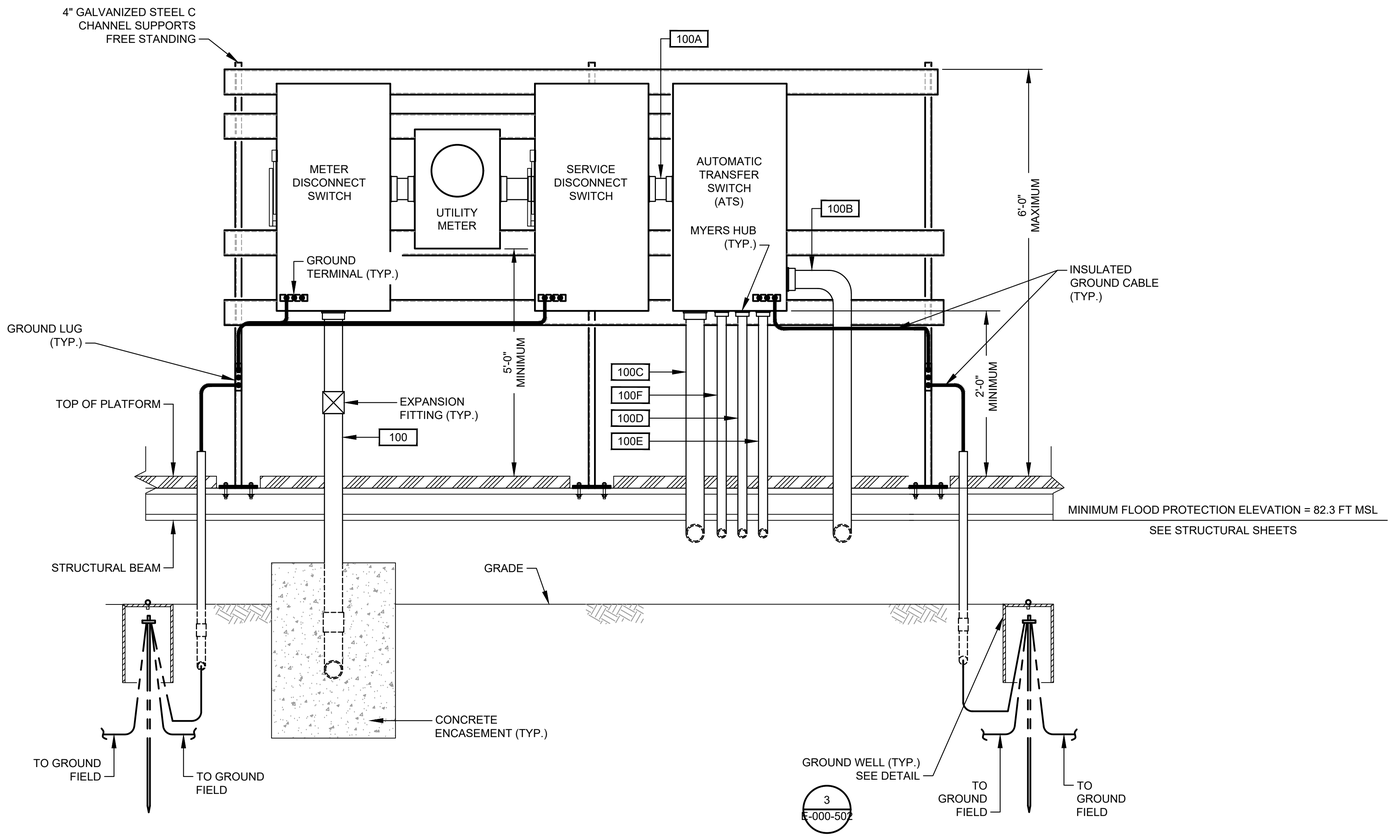

SERVICE MOUNTING RACK

DETAIL 1
NTS. -

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
SERVICE RACK DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

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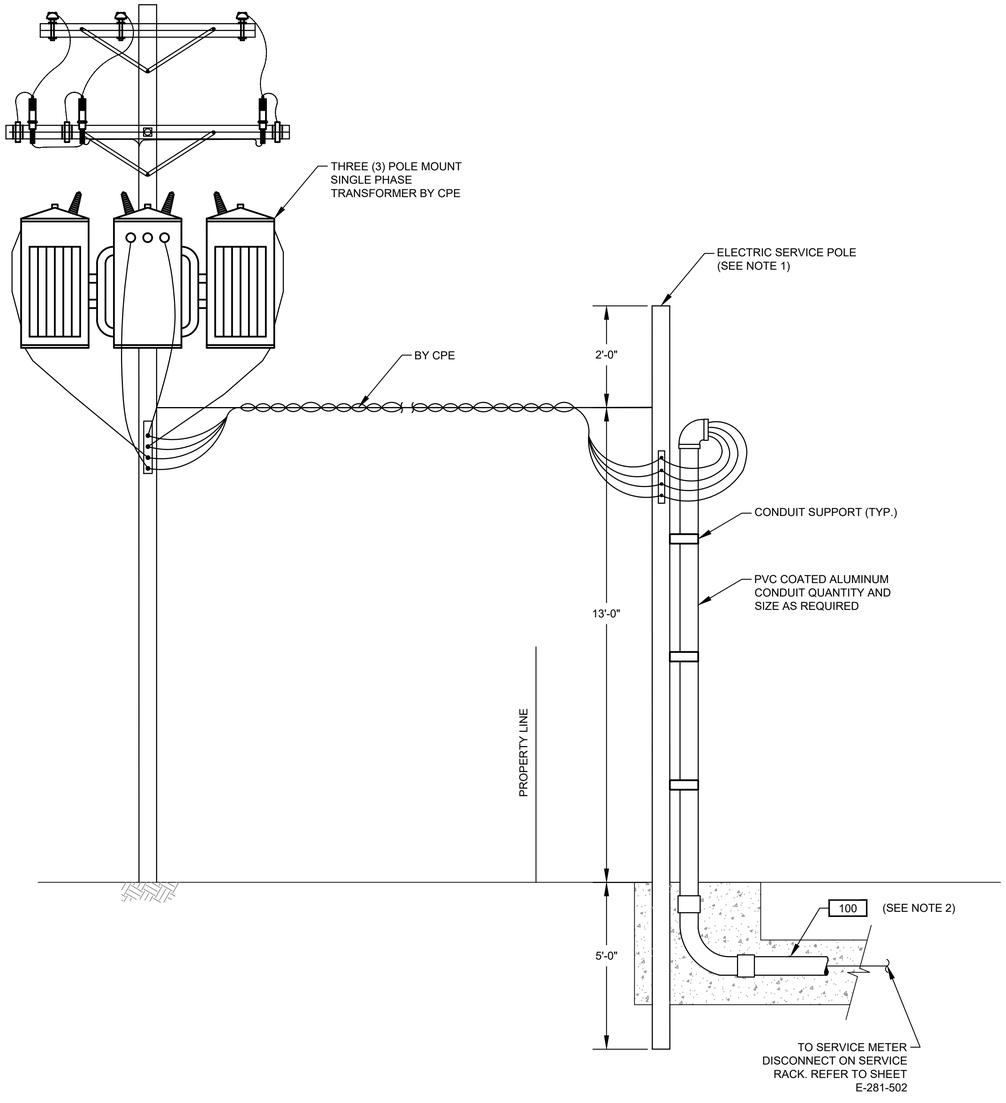

ELECTRICAL SERVICE ENTRANCE

DETAIL 1
NTS. -

NOTES:

1. WOODEN POLE 20' LONG. TOP DIAMETER 6", BOTTOM DIAMETER 8" PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2. ELECTRICAL SERVICE FEEDER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. COORDINATE WITH CPE FOR THE REQUIREMENTS OF THE INSTALLATION.

GENERAL NOTES:

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
SERVICE POLE DETAILS

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DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-281-503

SHEET NO. 208 OF 226

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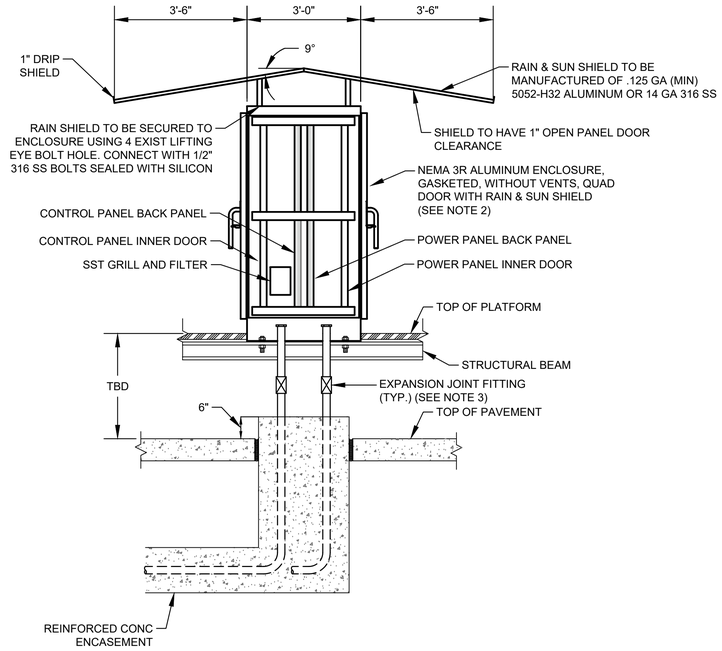
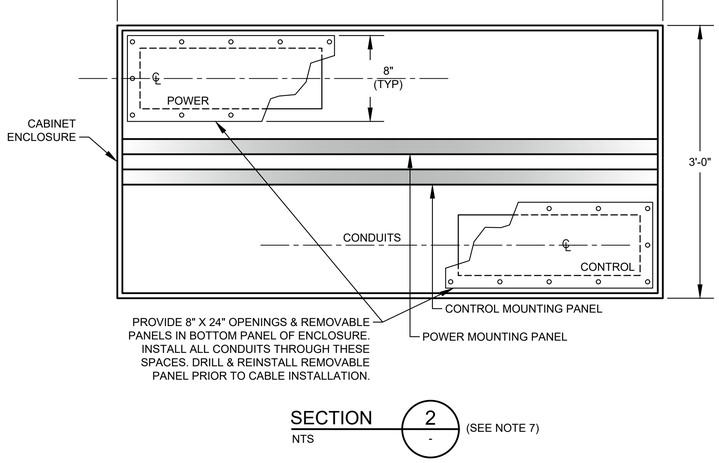
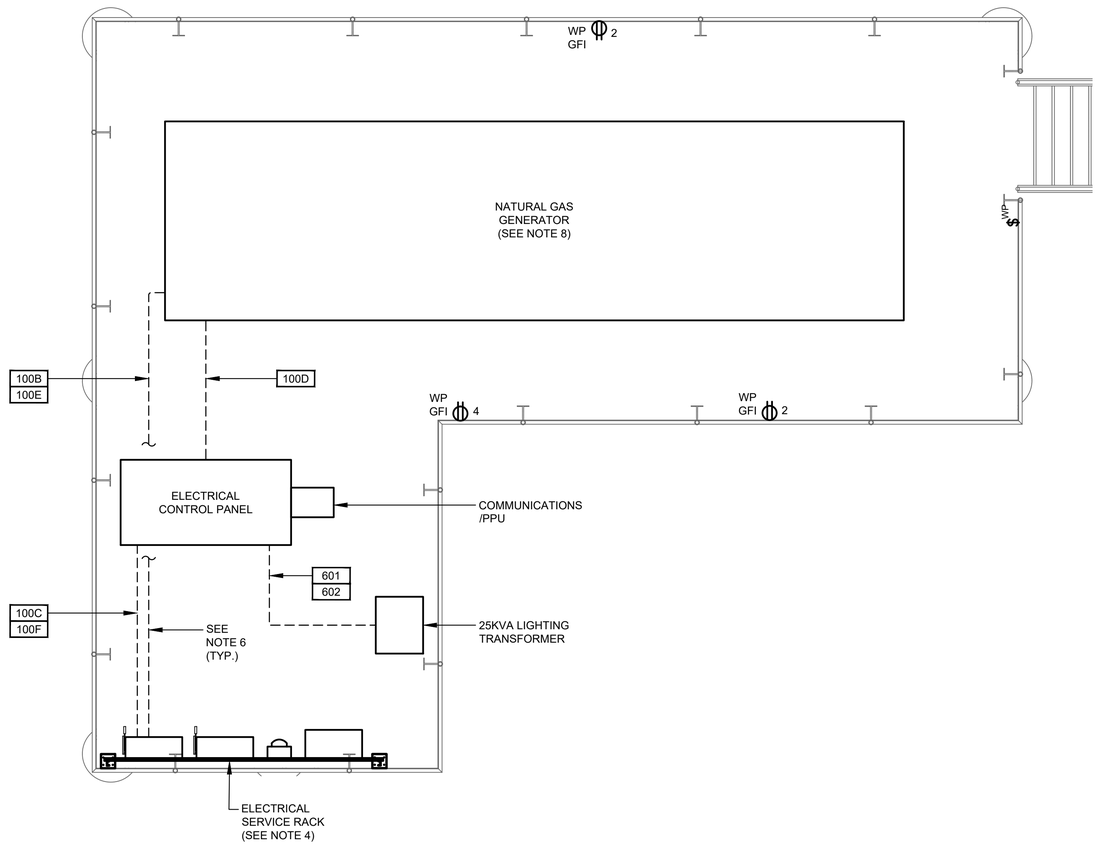


CONTROL CABINET ENCLOSURE WITH PLATFORM



SECTION 2 (SEE NOTE 7)
NTS



CONTROL CABINET ENCLOSURE ON ELEVATED PLATFORM DETAIL

DETAIL 1
3/8" = 1'-0"

NOTES:

1. SEE SHEET I-281-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO SPEC 13325-8 FOR PANEL DIMENSIONS.
3. EXPANSION JOINT FITTINGS AS REQUIRED.
4. REFER TO SERVICE RACK FOR DETAIL.
5. REFER TO STRUCTURAL DRAWINGS FOR THE DETAIL OF THE PLATFORM.
6. CONDUIT TO BE MOUNTED BELOW PLATFORM GRATING.
7. ALL CONDUITS ENTERING THE CABINET SHALL BE BOTTOM ENTRY.
8. THIS GENERATOR WILL BE USED IN EMERGENCY USE ONLY.

GENERAL NOTES:

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BLACK & VEATCH

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SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

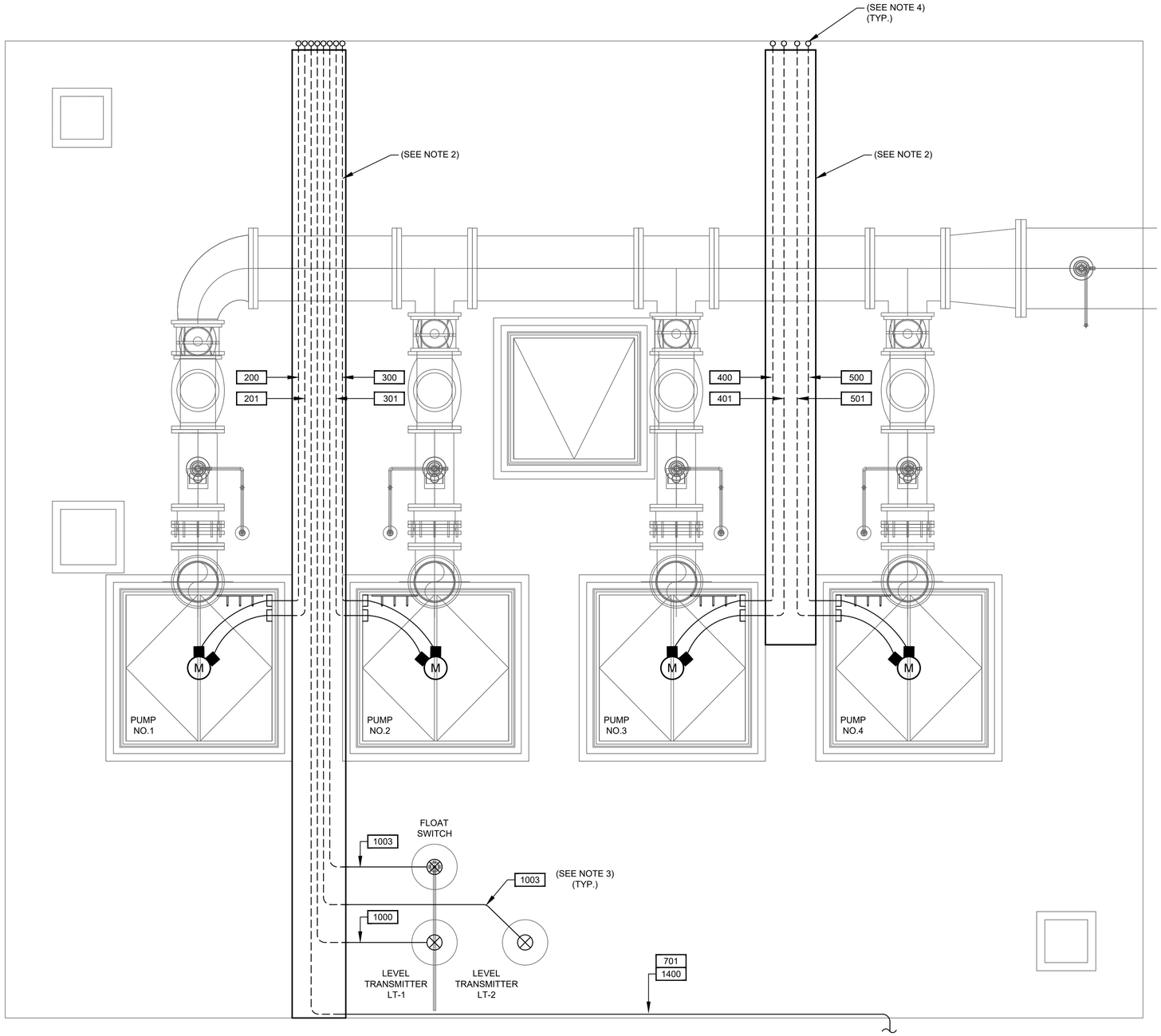
LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
CONTROL CABINET ENCLOSURE DETAIL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

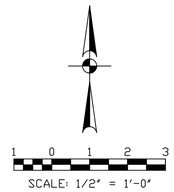
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Electrical\Working\MUD 175\MUD 175-1 E-281-504.dwg



MUD-175 LIFT STATION
ENLARGED PLAN

PLAN

1/2"=1'-0"



NOTES:

1. SEE SHEET E-281-101 FOR CONTINUATION.
2. PROVIDE TRIP PROTECTION COVER.
3. CONDUIT TO BE INSTALLED ON TOP CONCRETE SLAB OF THE LIFT STATION.
4. CONDUIT UP TO JUNCTION BOX ON PLATFORM.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL
AND REHABILITATION
1090 ENCLAVE PKY

ELECTRICAL

MUD #175 LIFT STATION
1090 ENCLAVE PARKWAY
PROPOSED PLAN VIEW

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

E-281-505

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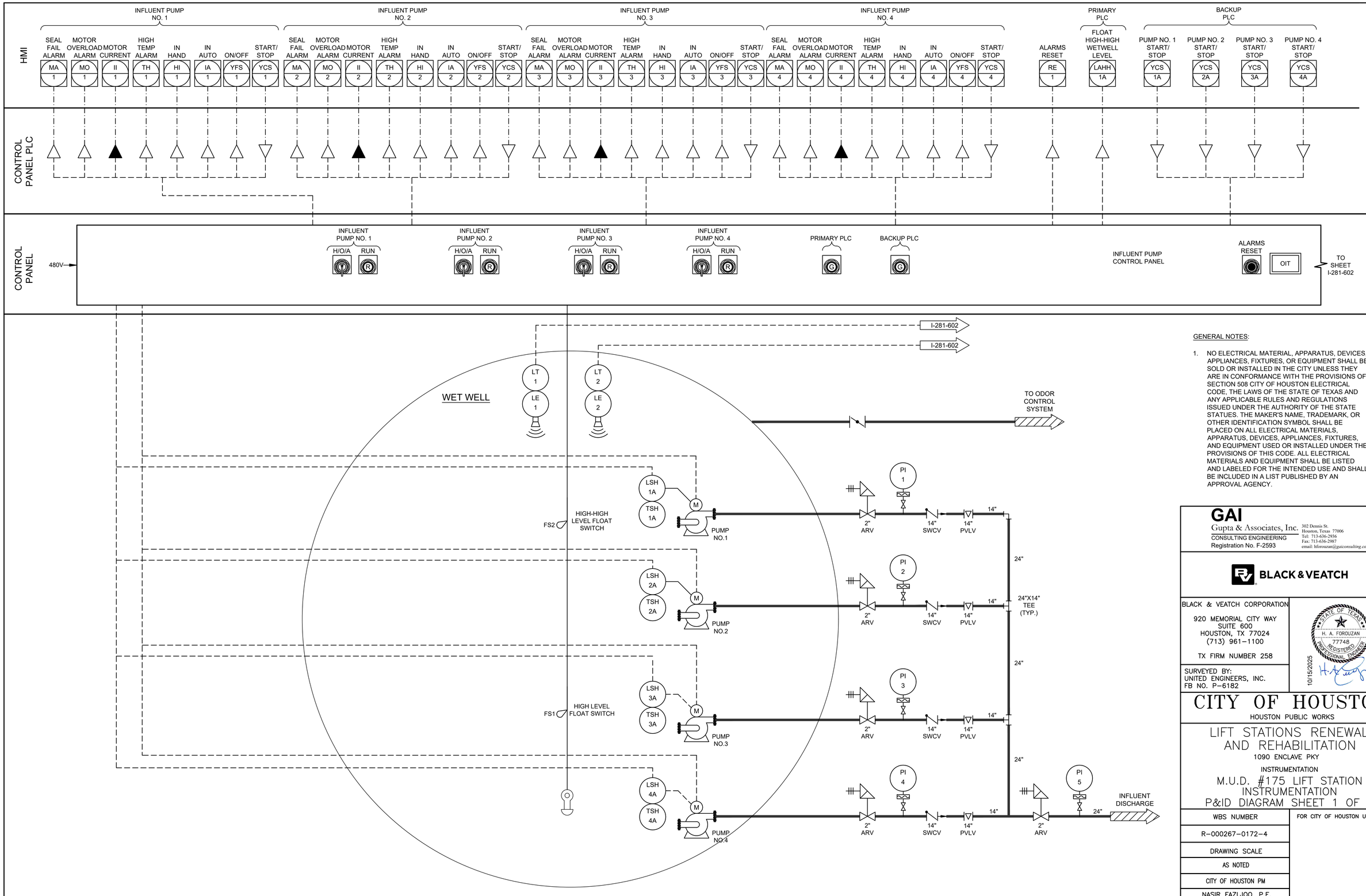

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

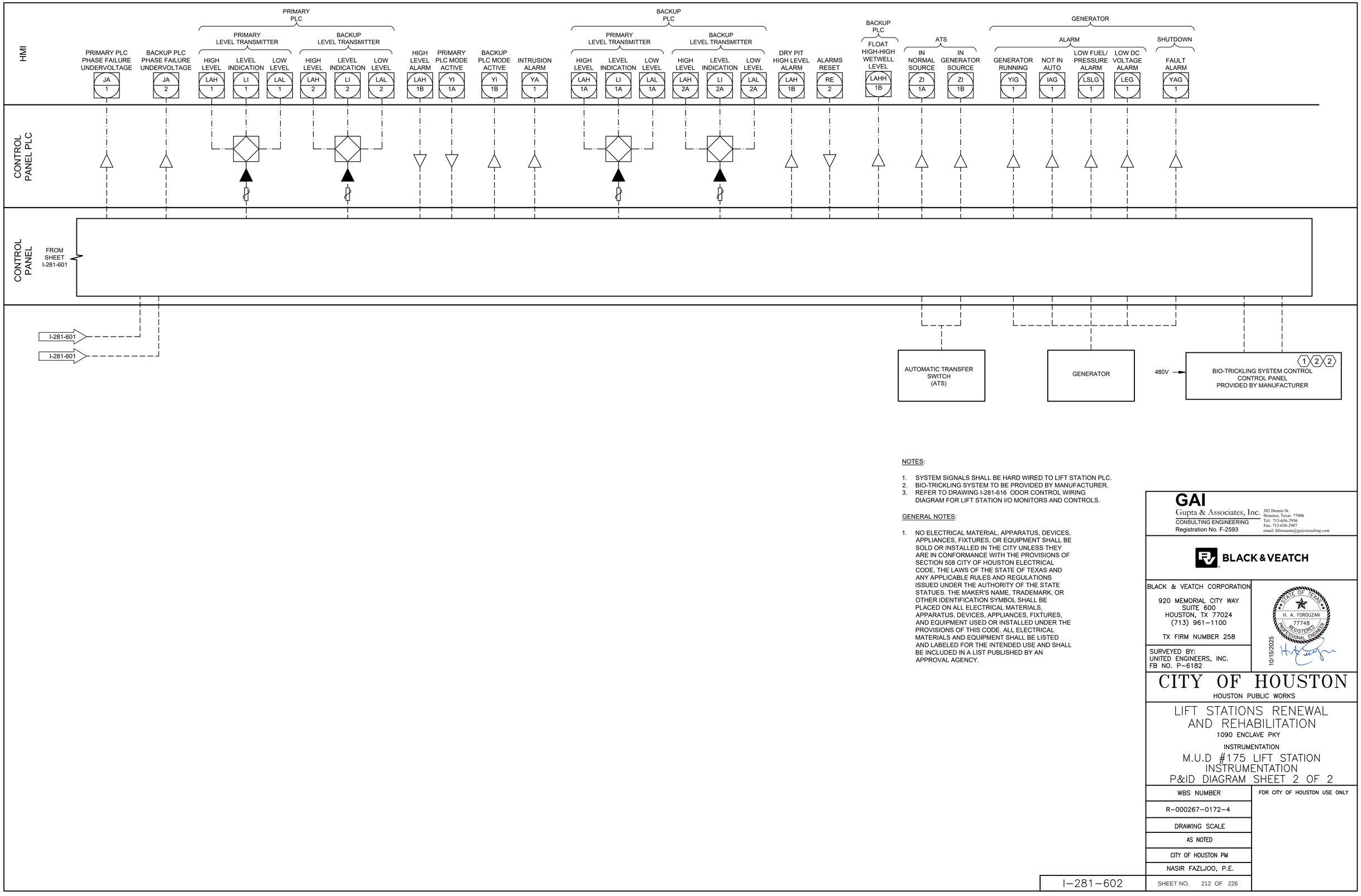
INSTRUMENTATION

M.U.D. #175 LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-281-601

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-601.dwg



NOTES:

1. SYSTEM SIGNALS SHALL BE HARD WIRED TO LIFT STATION PLC.
2. BIO-TRICKLING SYSTEM TO BE PROVIDED BY MANUFACTURER.
3. REFER TO DRAWING I-281-616 ODOR CONTROL WIRING DIAGRAM FOR LIFT STATION I/O MONITORS AND CONTROLS.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D #175 LIFT STATION INSTRUMENTATION P&ID DIAGRAM SHEET 2 OF 2

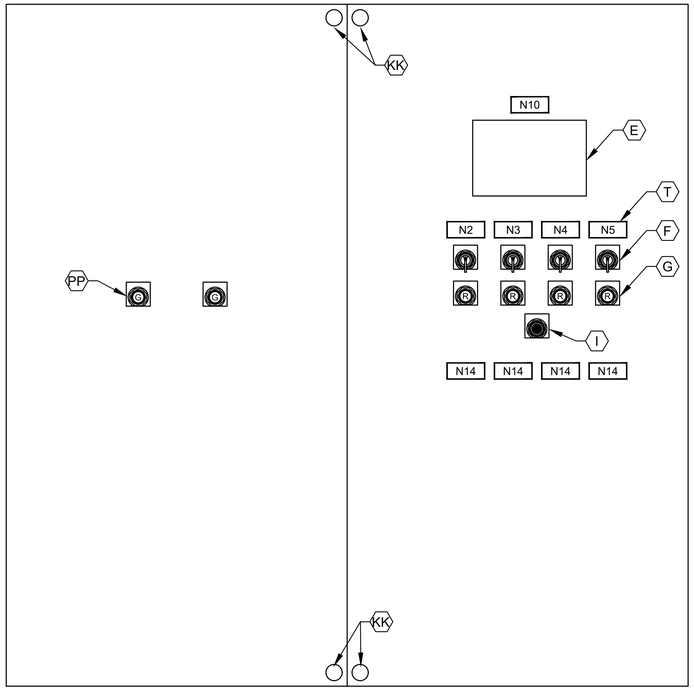
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 212 OF 226	

I-281-602

FILE PATH: Q:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-602.dwg

EQUIPMENT AND DEVICE SCHEDULE		
ITEM	QUANTITY	DESCRIPTION
A	1	PANEL BOARD, 120/240V, 1 PHASE, 3 WIRE, 100A, 12 CKTS
B	4	FULL VOLTAGE, NON-REVERSING, SINGLE SPEED, AUTOMATIC MOTOR STARTER W/120 VOLT CONTROL COIL, NEMA SIZE AS SCHEDULED.
C	4	TIME DELAY RELAY WITH THREE FORM C CONTACTS, 120VAC COIL AND 11 PIN SOCKET BASE.
D	1	SINGLE CHANNEL INTRINSICALLY SAFE RELAY
E	1	PROGRAMMING SCREEN (OIT)
F	4	HAND-OFF-AUTO SWITCH, 3 POSITION, HEAVY-DUTY, OILTIGHT WITH 2 SETS OF CONTACT BLOCKS (PUMP CONTROL)
G	4	INDICATING LIGHT, HEAVY DUTY, OILTIGHT, RED, 24 VDC, LED, WITH "RUN" LEGEND
H	1	PERPETUAL POWER UNIT (PPU)
I	1	PUMP ALARM RESET PUSHBUTTON
J	2	SWITCH FOR CABINET LIGHT, 120V, 20A, SPST
K	3	DUPLEX RECEPTACLE, 120V, 20A, 2 WIRE, GROUNDED
L	2	24" LED STRIP LIGHT 120V SUITABLE FOR ZERO DEGREE OPERATION.
M	1	SURGE PROTECTOR - INCOMING POWER
N	*	NOT USED.
P	4	CURRENT TRANSFORMER, RATIO AS SCHEDULED W/4-20mA OUTPUT.
Q	12	TERMINAL BLOCKS, SIZED FOR MOTOR POWER REQUIREMENTS
R	*	RELAY WITH THREE FORM C CONTACTS, AND 11 PIN SOCKET BASE
S	*	NOT USED.
T	*	NAMEPLATES, SEE SPECIFICATIONS (SEE NAMEPLATE SCHEDULE)
U	4	SOLID STATE MOTOR OVERLOAD RELAY
V	6	FUSE HOLDER & FUSES - PHASE FAILURE
W	1	NEMA 3R GASKETED ALUMINUM ENCLOSURE WITHOUT VENTS 72"H x 72"W x 36"D
X	1	DOOR MOUNTED ROTARY HANDLE DISCONNECT SWITCH (SUITABLE FOR ENVIRONMENT)
Y	1	THERMAL-MAGNETIC MOLDED CASE MAIN CIRCUIT BREAKER, SIZE AS SCHEDULED
Z	4	ADJUSTABLE INSTANTANEOUS TRIP MOTOR CIRCUIT PROTECTOR, SIZE AS SCHEDULED
AA	*	TERMINAL BLOCKS
BB	4	EXTERNAL OVERLOAD RESET PUSHBUTTON MECHANISM
CC	4	ANALOG I/O SURGE SUPPRESSOR
DD	1	WIRE DUCT 2" WIDE x 2" DEEP MINIMUM
EE	1	THERMAL-MAGNETIC MODELED CASE CIRCUIT BREAKER FOR LIGHTING TRANSFORMER, SIZE AS SCHEDULED
FF	1	GROUND BUS
GG	1	25 KVA, 480 - 240/120V,1ϕ, 3W DRY TYPE TRANSFORMER (PAD MOUNTED)
HH	*	NOT USED.
II	1	120VAC - 24VAC POWER SUPPLY (AS REQUIRED)
JJ	11	CARTRIDGE FUSES & FUSE HOLDER
KK	8	QUARTER TURN CAPTIVE DOOR CLOSURE
LL	1	120VAC - 24VDC PLC POWER SUPPLY 5A
MM	2	MOTION SWITCH
NN	*	NOT USED
PP	2	INDICATING LED LIGHT, HEAVY DUTY, OILTIGHT, GREEN, 24 VDC, LED WITH " PRIMARY PLC" & "BACKUP PLC" LEGEND
QQ	*	NOT USED
RR	*	NOT USED
SS	1	COMMUNICATION ETHERNET SWITCH
TT	1	POWER SURGE PROTECTOR - CONTROL POWER
UU	2	PROGRAMMABLE LOGIC CONTROLLER WITH EXPANSION UNIT
VV	1	PHASE AND UNDER VOLTAGE MONITOR
WW	*	FUSED TERMINAL BLOCKS
XX	4	PUMP PROTECTION MODULE RATED FOR CLASS I, DIVISION I
YY	2	ANALOG SIGNAL ISOLATOR
ZZ	-	NOT USED
AB	1	THERMAL-MAGNETIC MODELED CASE CIRCUIT BREAKER FOR LIGHTING TRANSFORMER, SIZE AS SCHEDULED
AC	3	POWER DISTRIBUTION BLOCK
AD	1	NEUTRAL LUG
AE	1	6" EXHAUST FAN, 120V, STAINLESS FILTERS & GRILL PACKAGE W/BUG GUARD
AF	1	T-STAT FOR EXHAUST FAN

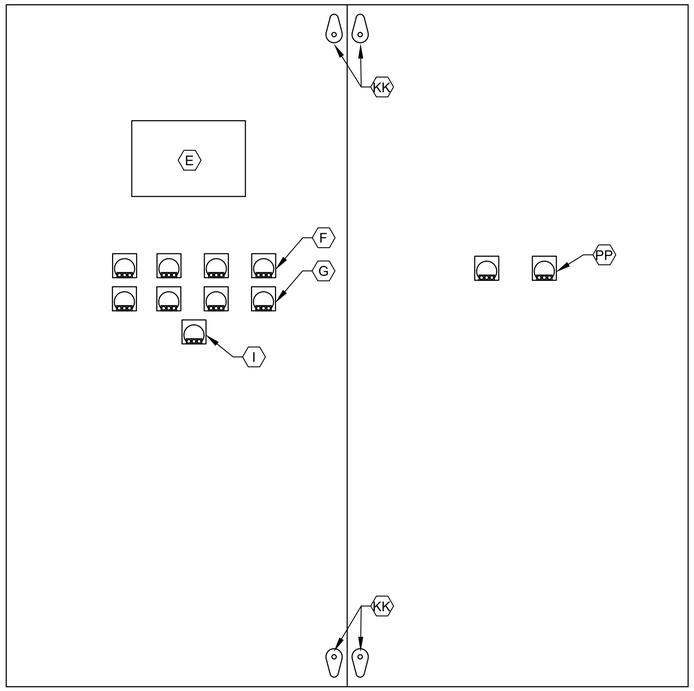
* - AS SCHEDULED



CONTROL PANEL FRONT INNER DOOR

ELEVATION

NTS



CONTROL PANEL BACK INNER DOOR

ELEVATION

NTS

NOTES:

1. NAMEPLATES SHALL BE MOUNTED TO PANELS USING STAINLESS STEEL HARDWARE.
2. REFER SPECIFICATIONS FOR ALL PANEL COMPONENTS.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

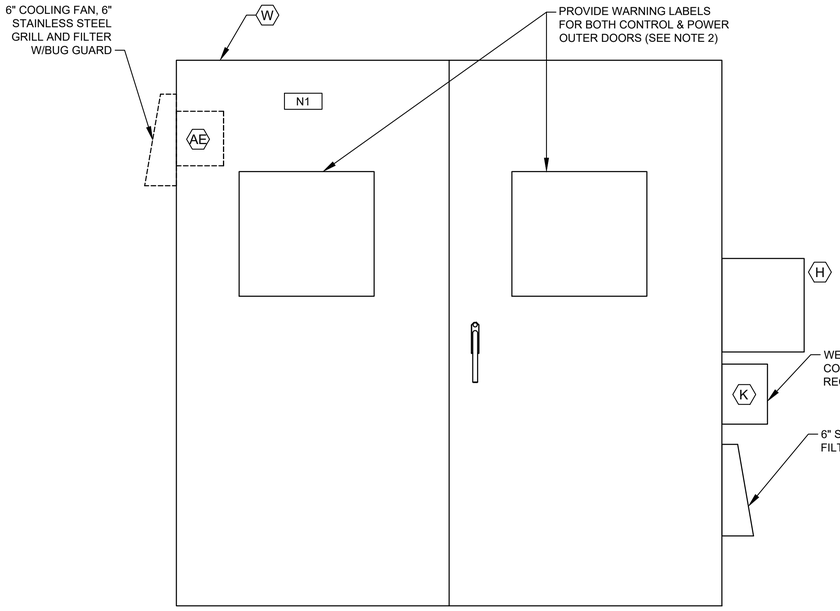
M.U.D #175 LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT & SCHEDULE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	

I-281-603

SHEET NO. 213 OF 226

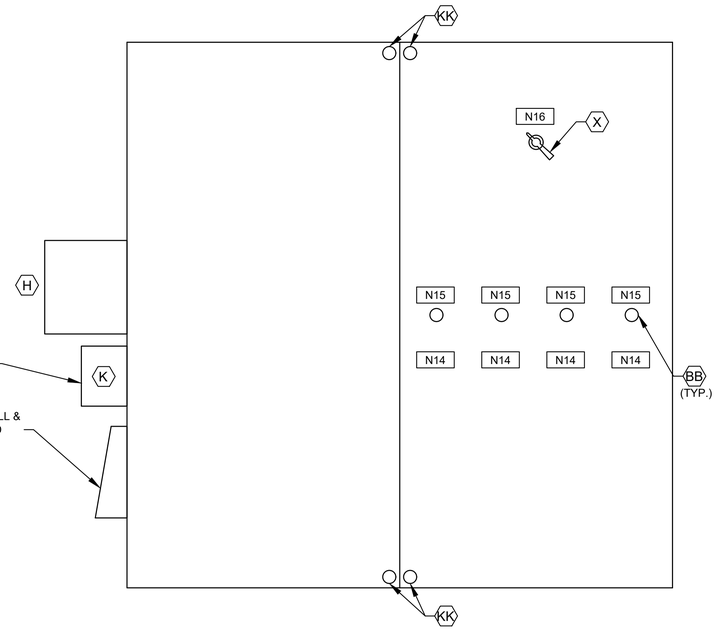
FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-603.dwg



CONTROL CABINET (CONTROL SIDE)
OUTER DOOR

ELEVATION

NTS



CONTROL CABINET (POWER SIDE)
INNER DOOR

ELEVATION

NTS
(SEE NOTE 1)

NOTES:

1. SEE SHEET I-281-603 FOR EQUIPMENT SCHEDULE.
2. REFER TO NEC SECTIONS 110.16 & 110.21

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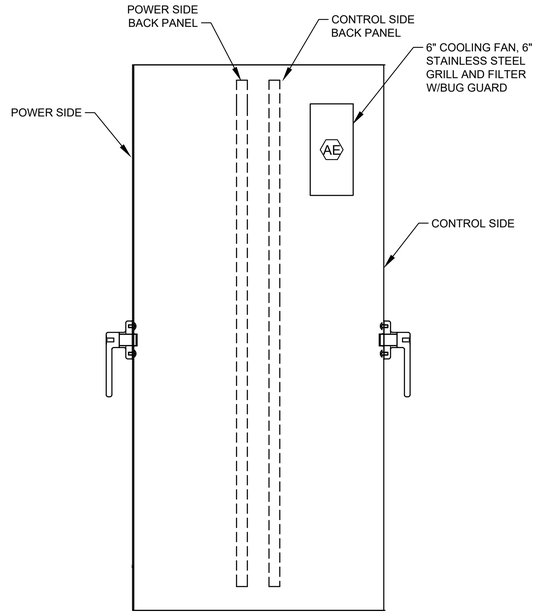
NAMEPLATE SCHEDULE

DESIGNATION	ENGRAVED
N1	PUMP STATION DESIGNATION
N2	PUMP NO. 1
N3	PUMP NO. 2
N4	PUMP NO. 3
N5	PUMP NO. 4

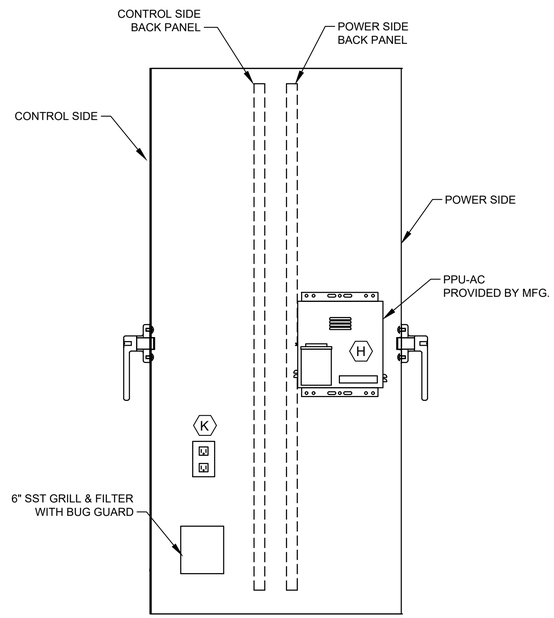
DESIGNATION	ENGRAVED
N8	NOT USED.
N9	NOT USED.
N10	PROGRAMMING SCREEN
N11	NOT USED.
N12	PRIMARY PLC
N13	BACKUP PLC
N14	MOTOR DATA HORSEPOWER (OUTPUT) ---------- RPM AT FULL LOAD ---------- TIME RATING ---------- FREQUENCY ---------- NUMBER OF PHASES ---------- MODEL NUMBER ---------- RATED VOLTAGE ---------- SERVICE FACTOR ---------- FULL LOAD AMPS ---------- INSULATION CLASS ---------- NEMA DESIGN LETTER ---------- TEMPERATURE RISE ---------- NEMA FRAME SIZE ---------- DATE OF MANUFACTURE ---------- THERMO PROTECTION (IF REQUIRED) -- MOISTURE PROTECTION (IF REQUIRED)-
N15	EXTERNAL OVERLOAD RESET PUSH BUTTON MECHANISM
N16	MAIN BREAKER



CONTROL CABINET (LEFT SIDE VIEW)

ELEVATION

NTS



CONTROL CABINET (RIGHT SIDE VIEW)

ELEVATION

NTS

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D #175 LIFT STATION
CONTROL CABINET
EQUIPMENT LAYOUT SHEET 1 OF 3

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I-281-604

SHEET NO. 214 OF 226

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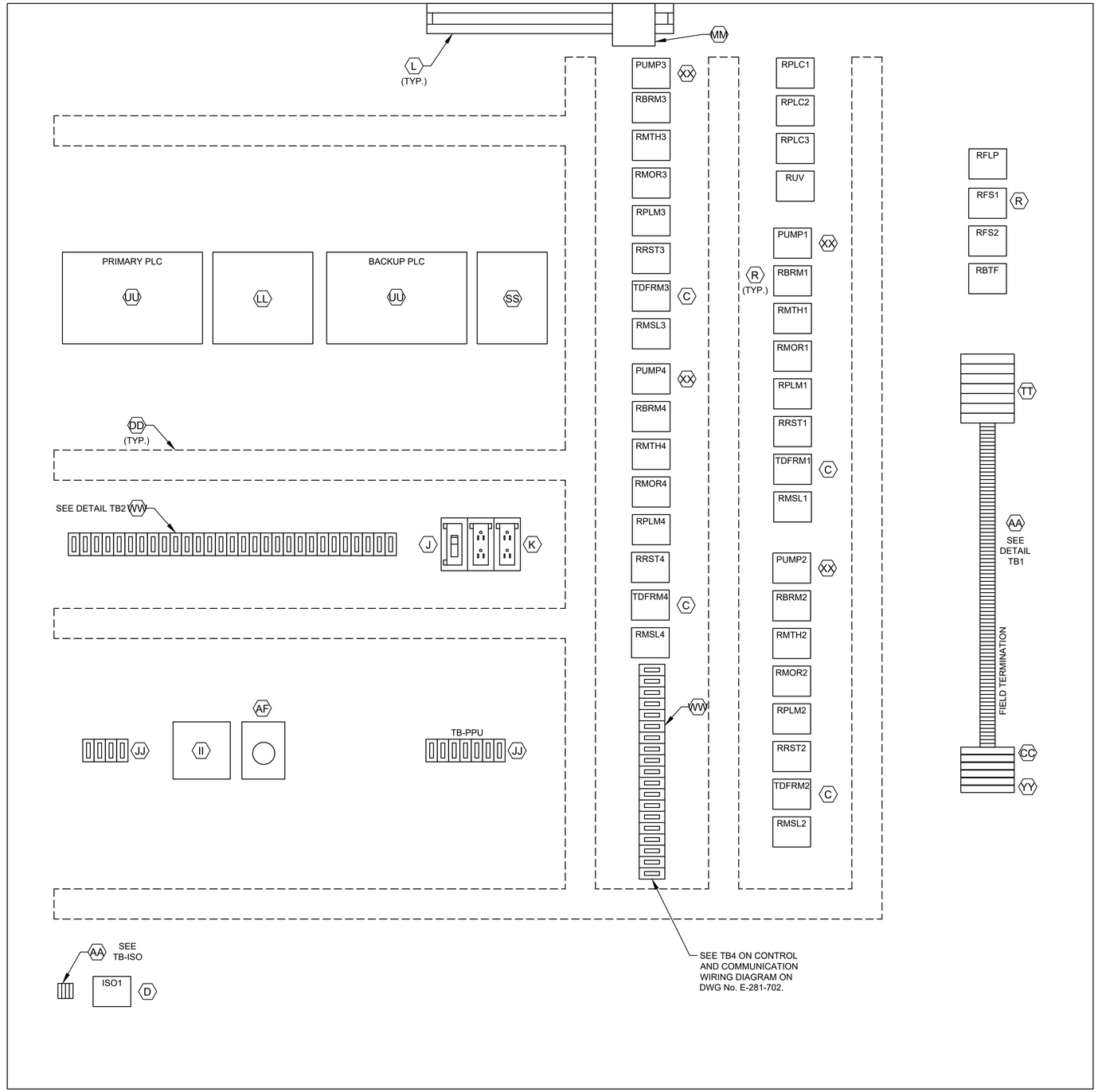

CONTROL PANEL
ELEVATION

L1A
L1N
SPARE
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3N
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50
51
52
53
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1004
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24V-
24V-
1002
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1001
1001A
12
1003
1003A
1002
1004
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3N
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36N
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SPARE
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DETAIL TB1

316
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DETAIL TB1

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54A
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35B
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41B
47B
13B
13AB
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DETAIL TB2

1500
1501
1503
1504

DETAIL TB-ISO

ALL L AND N FOR
EACH PUMP
CONTROL TO BE
FUSED

LEGEND	
TAG	DESCRIPTION
RMTH	MOTOR HIGH TEMPERATURE ALARM RELAY
RPLM	PLC PUMP RUN RELAY
RRST	PUMP RESET AUX RELAY
RPLC	PLC MODE AUX RELAY
RMOR	MOTOR OVERLOAD ALARM RELAY
RBRM	BACKUP SYSTEM RUN RELAY
RUV	UNDER VOLTAGE RELAY
ISO	INTRINSICALLY SAFE RELAY
RFS	PUMP RUN FLOAT SWITCH RELAY
TDFRM	TIMER FLOAT SWITCH RUN RELAY
RMSL	MOTOR SEAL LEAK ALARM RELAY
RFLP	FLOAT LOCKOUT PUMP RELAY
RBTF	BIO-TRICKLING FILTER RELAY

GENERAL NOTES:

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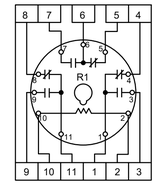
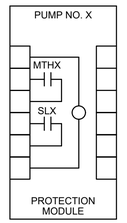


RELAY DETAIL
ITEM R



PUMP PROTECTION
MODULE DETAIL, ITEM XX

NOTE: REPLACE "X" WITH
APPROPRIATE PUMP NO.

NOTES:

1. SEE SHEET I-281-603 FOR EQUIPMENT SCHEDULE.

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SURVEYED BY:
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FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
REGISTERED
PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

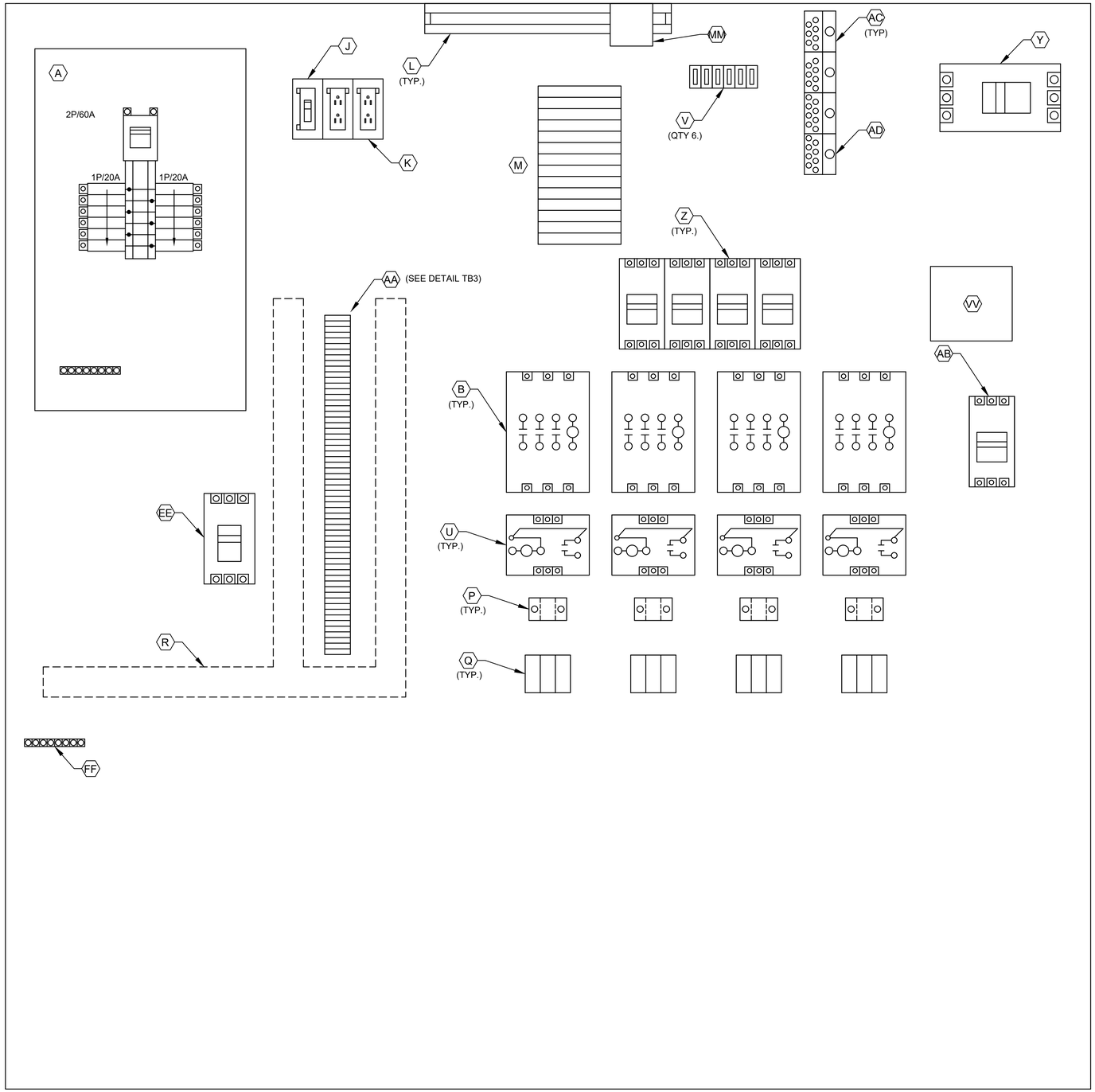
INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 2 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 215 OF 226	

I-281-605

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-605.dwg



POWER PANEL
ELEVATION

3
18
L1A
L1N
SPARE
SPARE
103
104
105
106
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108
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113
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116
119
SPARE
203
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SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE

DETAIL TB3

NOTES:

1. SEE SHEET I-281-603 FOR EQUIPMENT SCHEDULE.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

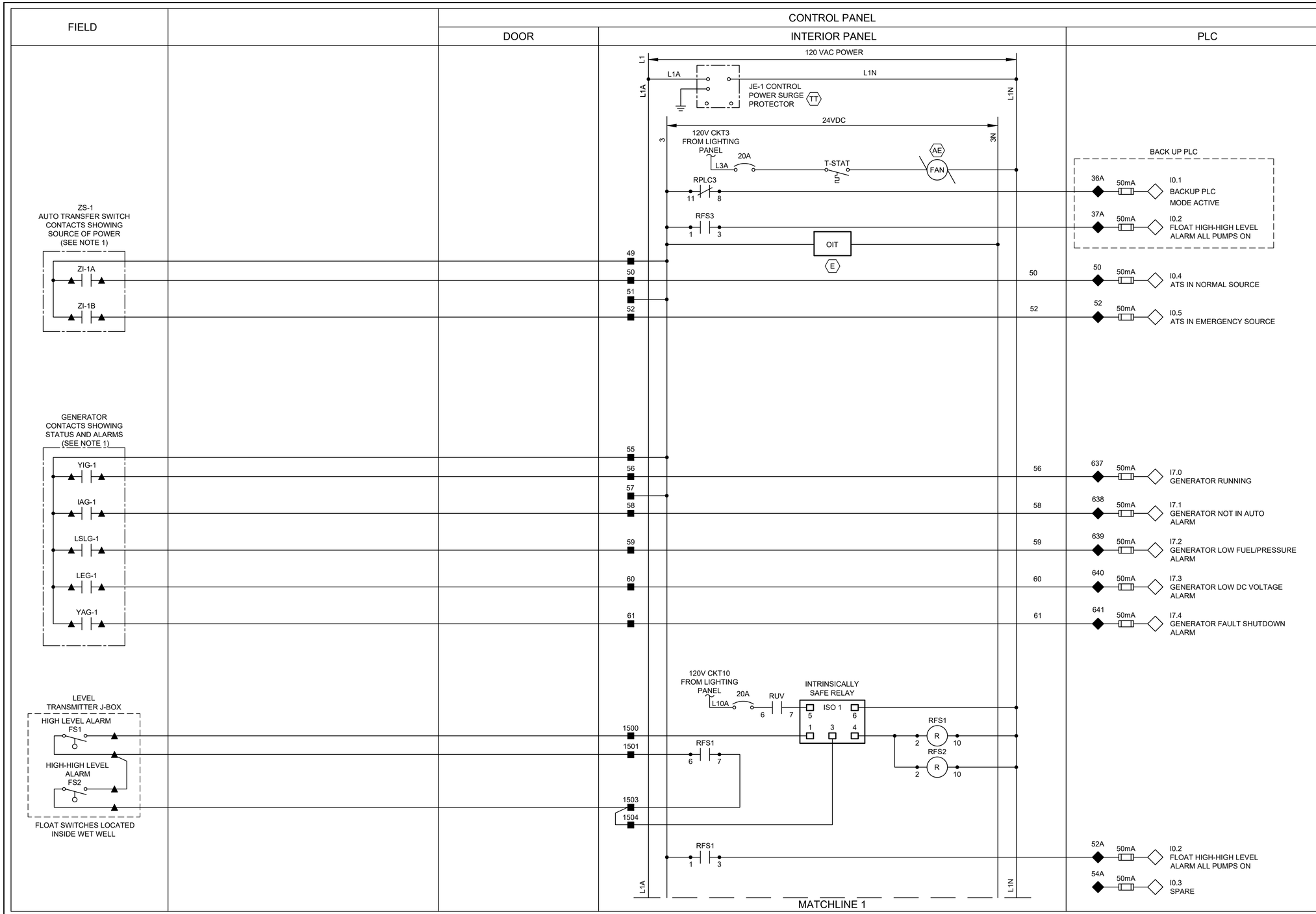
INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL CABINET EQUIPMENT LAYOUT SHEET 3 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 216 OF 226	

I-281-606

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-606.dwg



NOTES:

1. PROVIDE AUTO TRANSFER SWITCH DRY CONTACT.
2. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

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LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

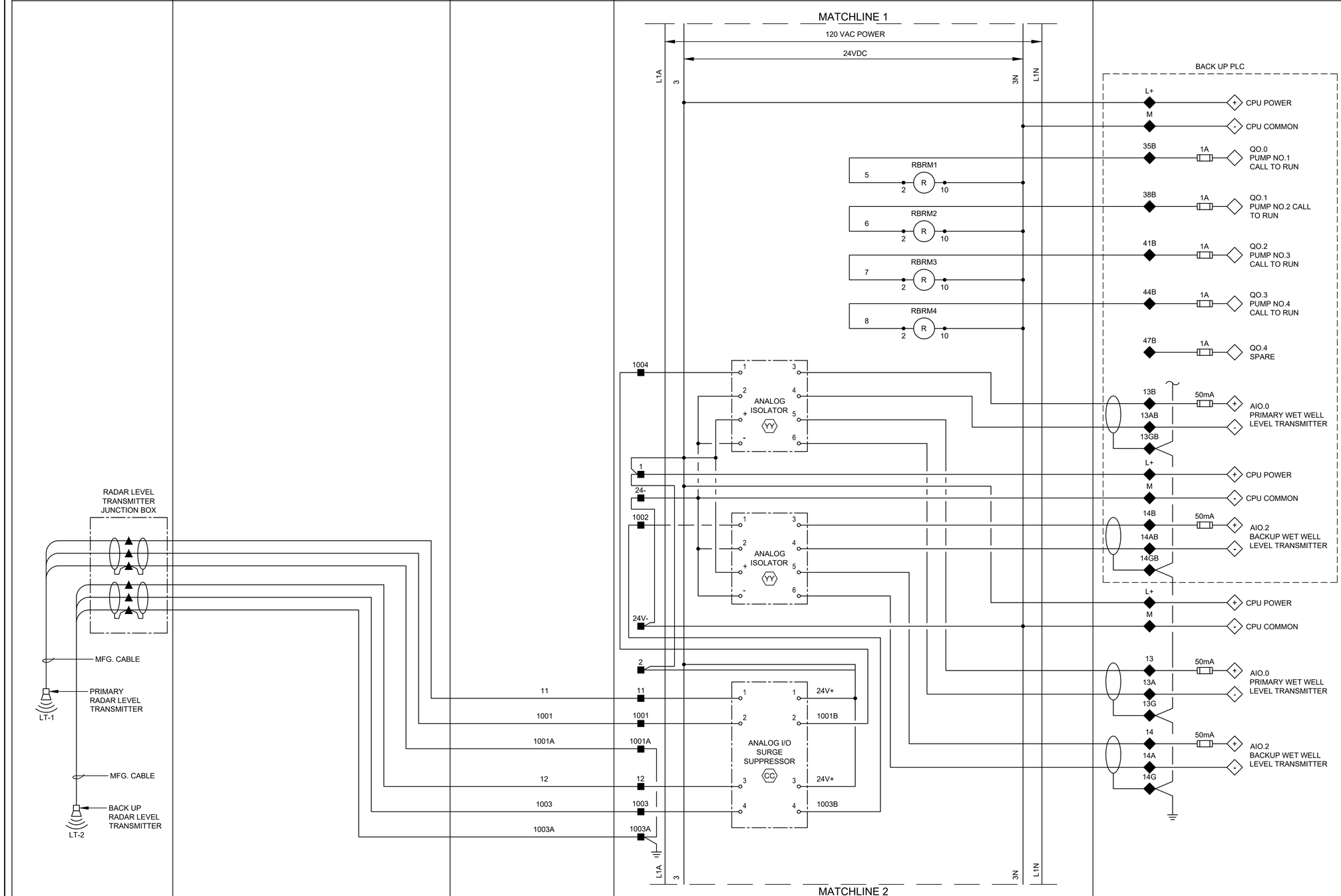
INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 1 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 217 OF 226	

I-281-607

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD 175 I-281-607.dwg



LEGEND

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- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 2 OF 4

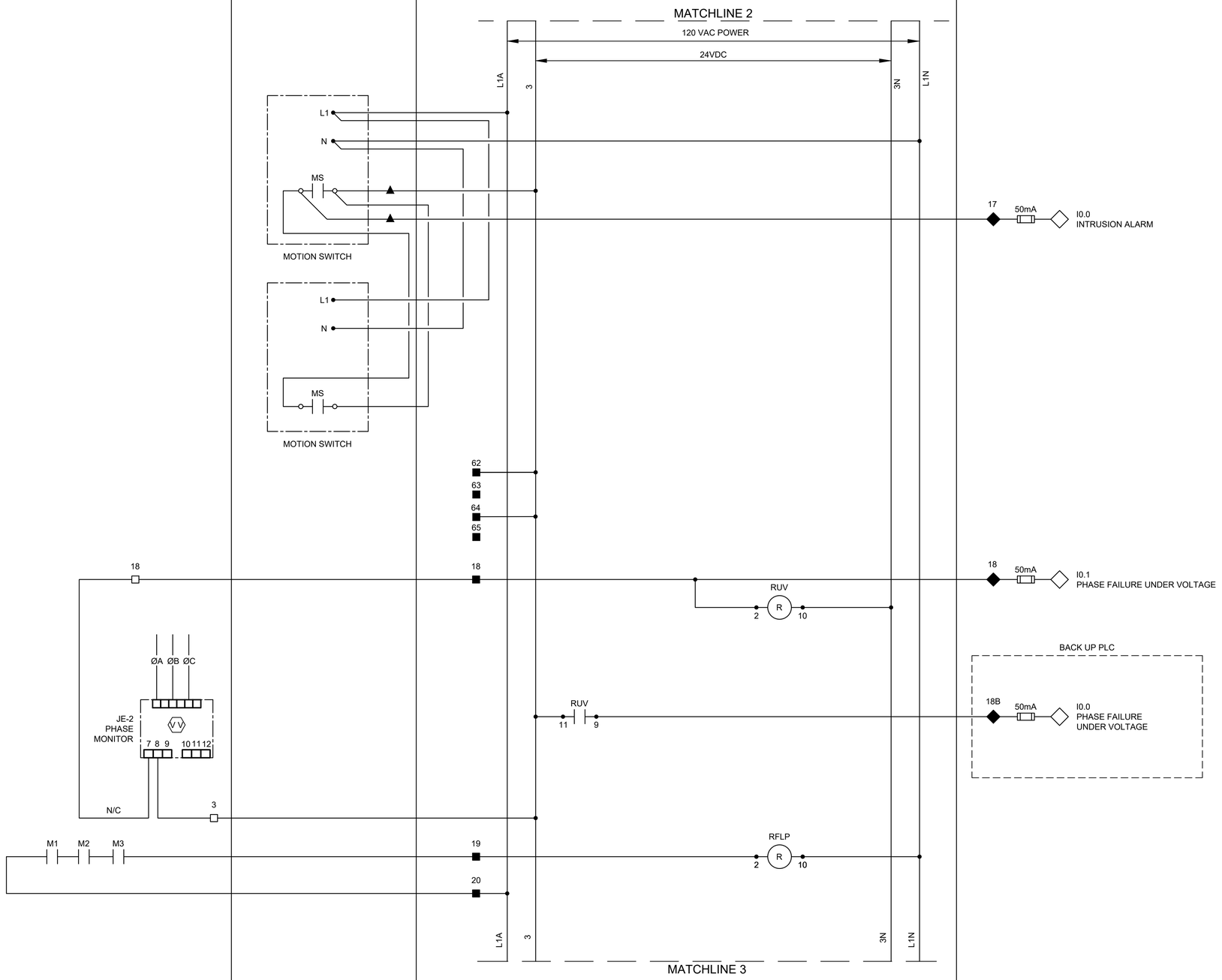
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 218 OF 226	

I-281-608

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-608.dwg

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-609.dwg

FIELD	POWER PANEL	CONTROL PANEL		
		DOOR	INTERIOR PANEL	PLC



NOTES:

1. PROVIDE ONE LIMIT SWITCH PER EXTERIOR CONTROL PANEL AND POWER PANEL DOOR, WIRED IN PARALLEL.

GENERAL NOTES:

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- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

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STATE OF TEXAS
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10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

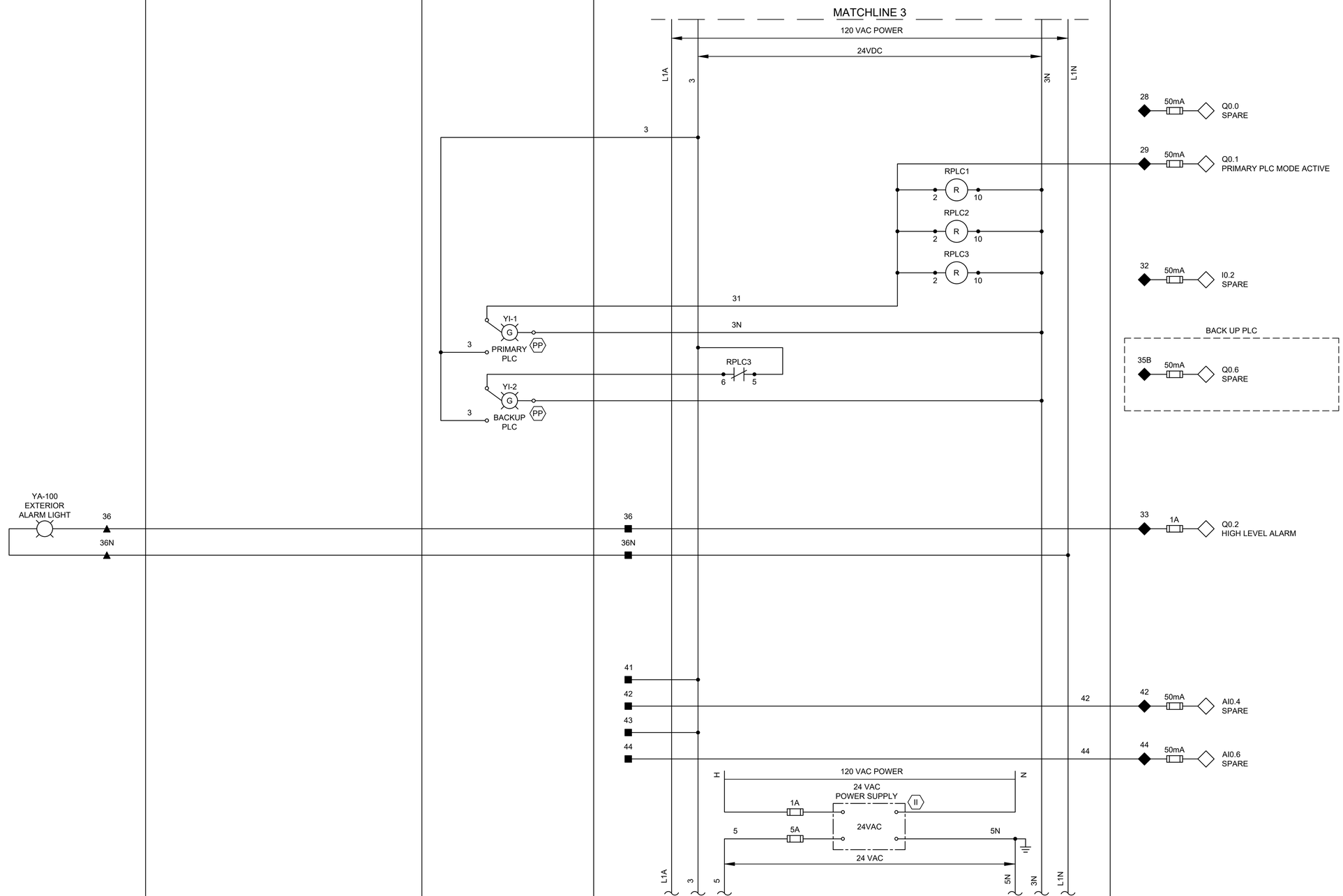
INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 3 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 219 OF 226	

I-281-609

FIELD	POWER PANEL	CONTROL PANEL		
		DOOR	INTERIOR PANEL	PLC



LEGEND

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

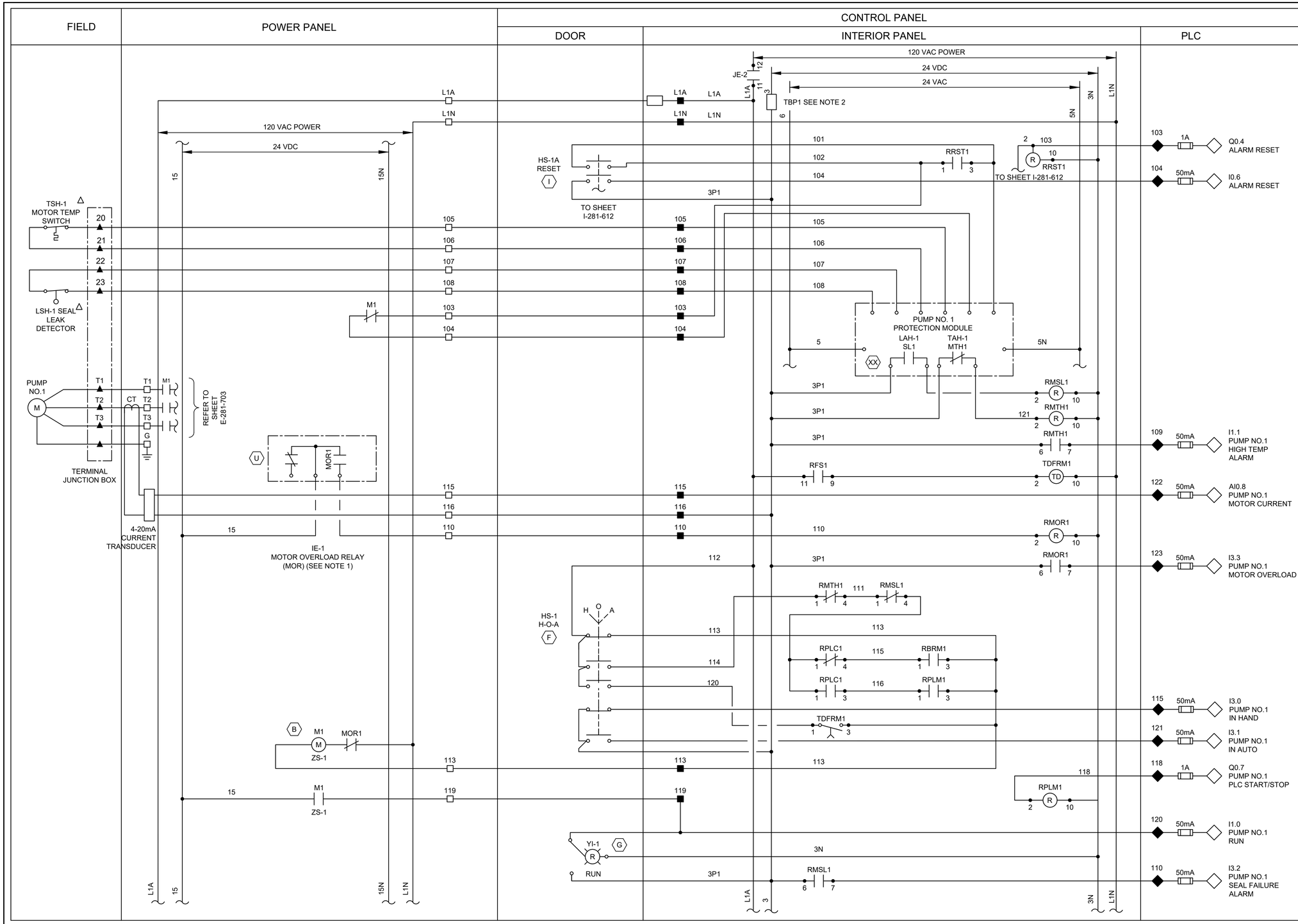
INSTRUMENTATION

M.U.D #175 LIFT STATION CONTROL PANEL CONTROL WIRING DIAGRAM SHEET 4 OF 4

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 220 OF 226	

I-281-610

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-610.dwg



NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-281-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

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- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

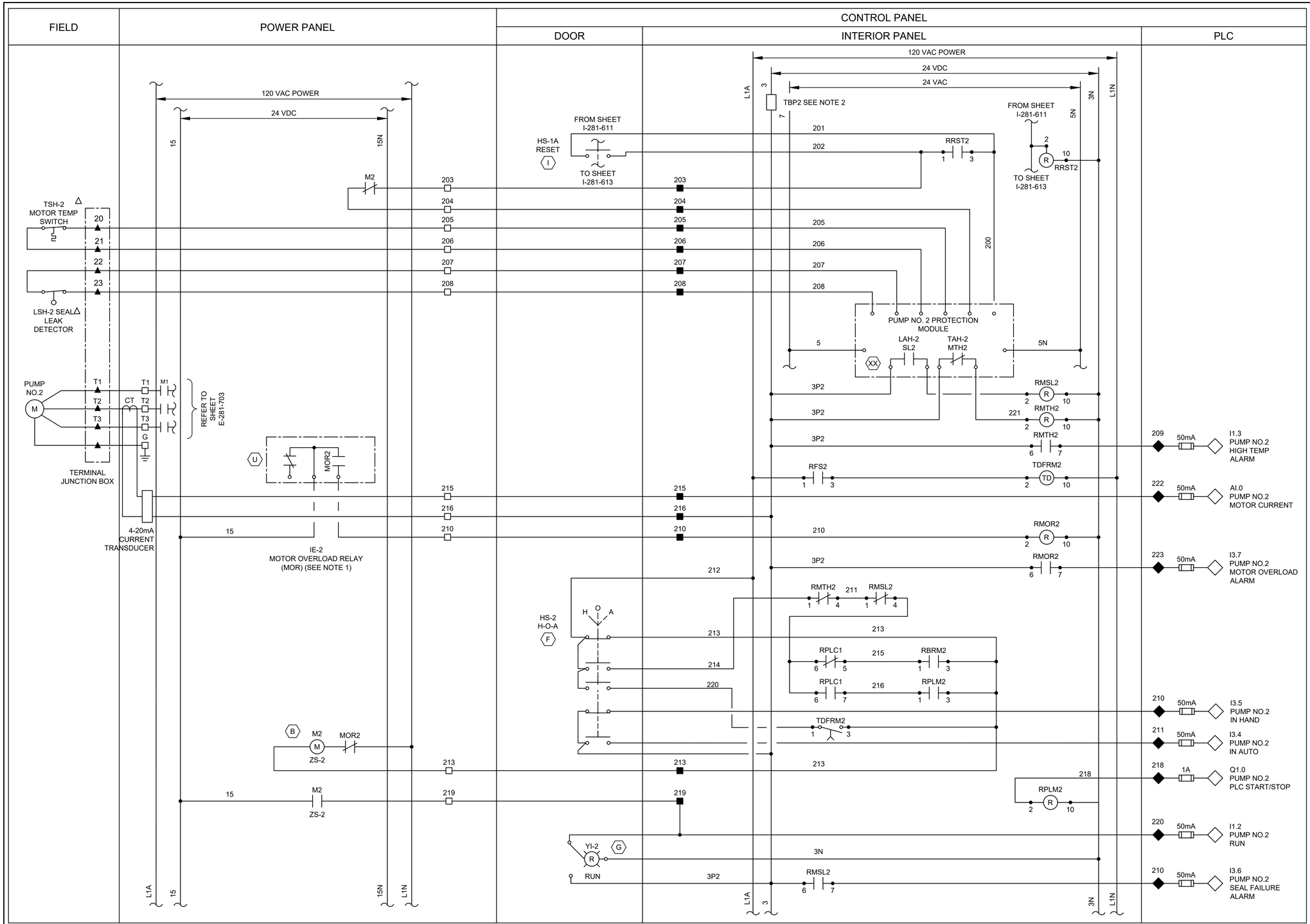
M.U.D #175 LIFT STATION PUMP NO.1 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 221 OF 226	

I-281-611

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-611.dwg

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-612.dwg



NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN IS NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM DRAWING NO. E-281-702.
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- ▲ REMOTE TERMINAL
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LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

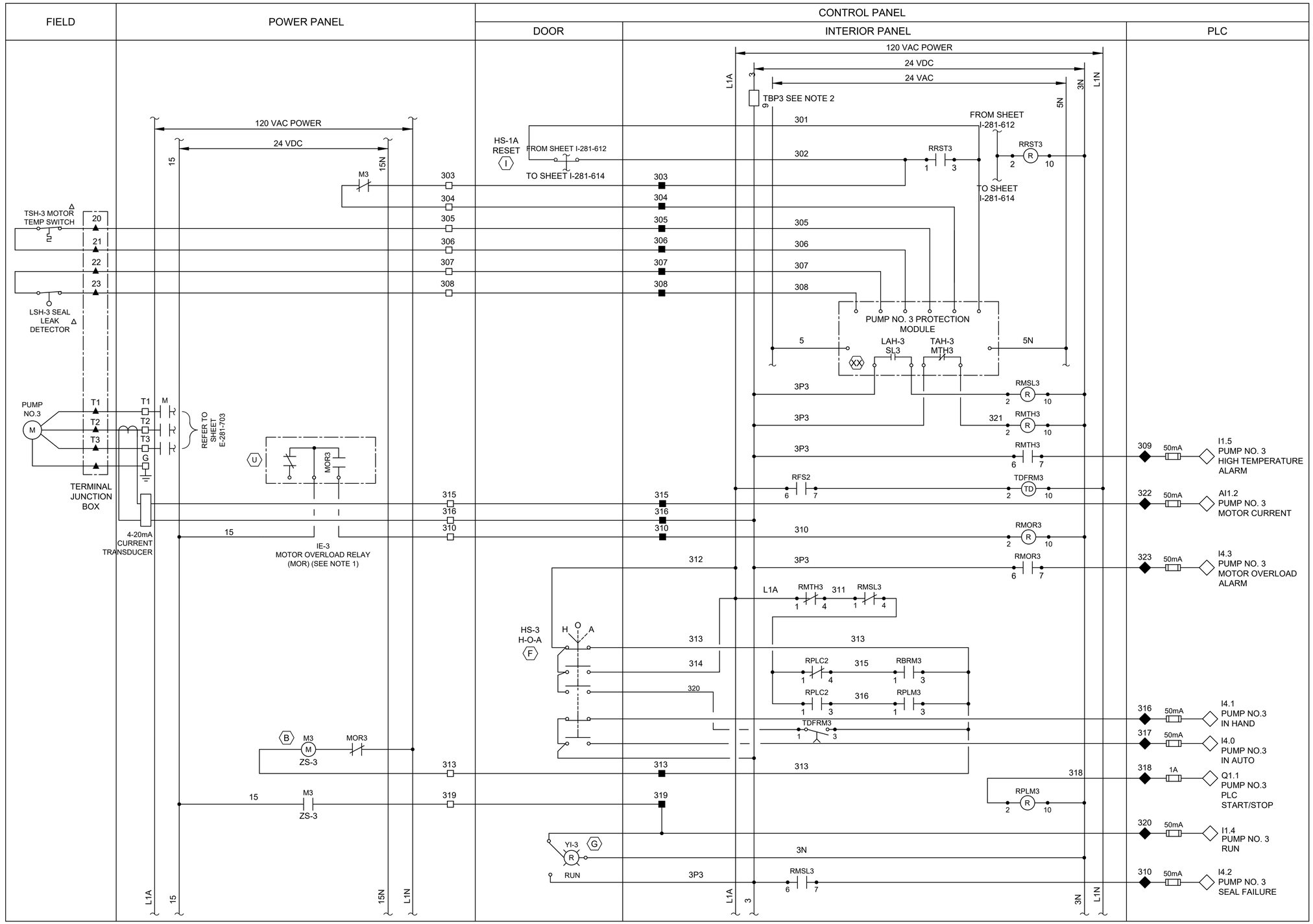
INSTRUMENTATION

M.U.D #175 LIFT STATION PUMP NO.2 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 222 OF 226	

I-281-612

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-613.dwg



LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
- ■ FIELD TERMINAL LOCATED AT CONTROL PANEL
- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM. DRAWING NO. E-281-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

STATE OF TEXAS
H. A. FOROUZAN
77748
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PROFESSIONAL ENGINEER
10/15/2025

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D #175 LIFT STATION PUMP NO.3 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 223 OF 226	

I-281-613

FILE PATH: O:\H8110_Prof Services And Technical Support For Wastewater Oper (B&V)\6 Drawings\Instrumentation And Control\Working\MUD 175\MUD-175 I-281-614.dwg

FIELD | POWER PANEL | CONTROL PANEL: DOOR | CONTROL PANEL: INTERIOR PANEL | PLC

120 VAC POWER
24 VDC
24 VAC
L1A
3
9
TBP4 SEE NOTE 2
3N
L1N
5N
15
15N
M4
HS-1A RESET
FROM SHEET I-281-613
FROM SHEET I-281-613
RRST4
TSH-4 MOTOR TEMP SWITCH
LSH-4 SEAL LEAK DETECTOR
PUMP NO.4
TERMINAL JUNCTION BOX
REFER TO SHEET E-281-703
4-20mA CURRENT TRANSDUCER
IE-4 MOTOR OVERLOAD RELAY (MOR) (SEE NOTE 1)
MOR4
PUMP NO. 4 PROTECTION MODULE
LAH-4 SL4
TAH-4 MTH4
RMSL4
RMTH4
RFS2
TDFRM4
RMOR4
RPLC2
RBRM4
RPLM4
RFLP
HS-4 H-O-A
ZS-4
YI4
RUN

409	50mA	I2.1	PUMP NO. 4 HIGH TEMPERATURE ALARM
422	50mA	AI1.4	PUMP NO. 4 MOTOR CURRENT
423	50mA	I4.7	PUMP NO. 4 MOTOR OVERLOAD ALARM
416	50mA	I4.5	PUMP NO. 4 IN HAND
417	50mA	I4.4	PUMP NO. 4 IN AUTO
418	1A	Q2.0	PLC START/STOP
420	50mA	I2.0	PUMP NO. 4 RUN
410	50mA	I4.6	PUMP NO. 4 SEAL FAILURE ALARM

LEGEND

- △ DEVICE OR FIELD TERMINAL LOCATED AT MOTOR
- ✳ DEVICE OR FIELD TERMINAL LOCATED REMOTE
- □ DEVICE OR FIELD TERMINAL LOCATED AT MCC/POWER PANEL
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- ▲ REMOTE TERMINAL
- ● DEVICE TERMINAL NO.
- ◆ PLC INTERFACE TERMINAL

NOTES:

1. MOTOR OVERLOAD RELAY OUTPUT CONTACT SHOWN NORMALLY CLOSED WHEN RELAY IS DE-ENERGIZED, OPEN WHEN ENERGIZED, AND CLOSED WHEN IN ALARM. VERIFY OPERATION OF RELAY PROVIDED AND ADJUST CONNECTION OF RMOR AUXILIARY RELAYS.
2. FUSED TERMINAL ON TERMINAL BLOCK TB4 SEE CONTROL POWER AND COMMUNICATION WIRING DIAGRAM. DRAWING NO. E-281-702.
3. ALL FLOAT CONTROL CIRCUIT WIRES COLOR SHALL BE YELLOW.

GENERAL NOTES:

1. NO ELECTRICAL MATERIAL, APPARATUS, DEVICES, APPLIANCES, FIXTURES, OR EQUIPMENT SHALL BE SOLD OR INSTALLED IN THE CITY UNLESS THEY ARE IN CONFORMANCE WITH THE PROVISIONS OF SECTION 508 CITY OF HOUSTON ELECTRICAL CODE, THE LAWS OF THE STATE OF TEXAS AND ANY APPLICABLE RULES AND REGULATIONS ISSUED UNDER THE AUTHORITY OF THE STATE STATUES. THE MAKER'S NAME, TRADEMARK, OR OTHER IDENTIFICATION SYMBOL SHALL BE PLACED ON ALL ELECTRICAL MATERIALS, APPARATUS, DEVICES, APPLIANCES, FIXTURES, AND EQUIPMENT USED OR INSTALLED UNDER THE PROVISIONS OF THIS CODE. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE LISTED AND LABELED FOR THE INTENDED USE AND SHALL BE INCLUDED IN A LIST PUBLISHED BY AN APPROVAL AGENCY.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

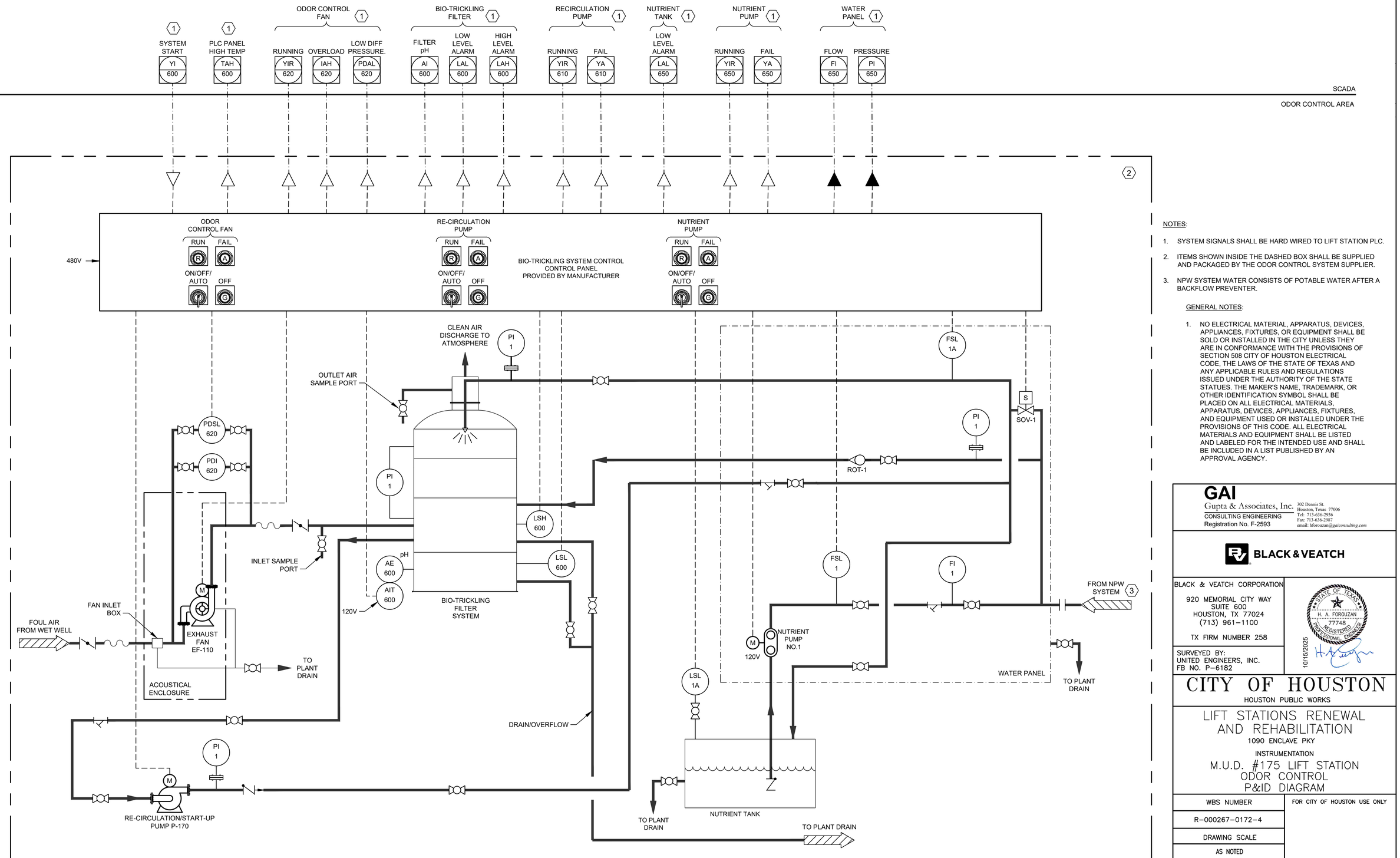
LIFT STATIONS RENEWAL AND REHABILITATION
1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D #175 LIFT STATION PUMP NO.4 CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 224 OF 226	

I-281-614



NOTES:

1. SYSTEM SIGNALS SHALL BE HARD WIRED TO LIFT STATION PLC.
2. ITEMS SHOWN INSIDE THE DASHED BOX SHALL BE SUPPLIED AND PACKAGED BY THE ODOR CONTROL SYSTEM SUPPLIER.
3. NPW SYSTEM WATER CONSISTS OF POTABLE WATER AFTER A BACKFLOW PREVENTER.

GENERAL NOTES:

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HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

M.U.D. #175 LIFT STATION ODOR CONTROL P&ID DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
R-000267-0172-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
NASIR FAZLJOO, P.E.	
SHEET NO. 225 OF 226	

I-281-615

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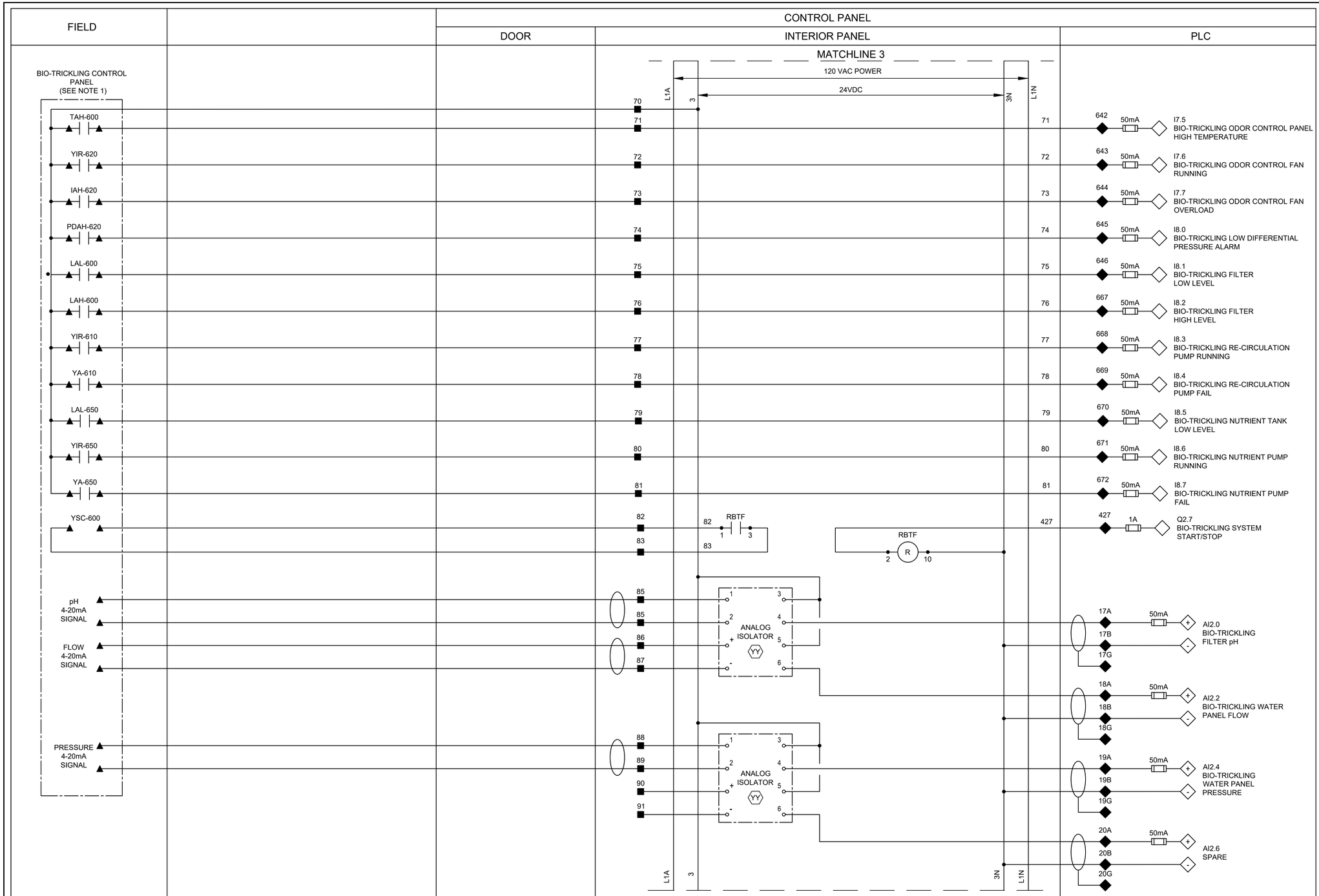

NOTES:

1. RUNNING STATUS AND ALARM FROM MANUFACTURER PROVIDED BIO-TRICKLING CONTROL PANEL.

GENERAL NOTES:

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

LIFT STATIONS RENEWAL AND REHABILITATION

1090 ENCLAVE PKY

INSTRUMENTATION

MUD-175 LIFT STATION ODOR CONTROL CONTROL WIRING DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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NASIR FAZLJOO, P.E.	

I-281-616

SHEET NO. 226 OF 226

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