CATTAIL BRANCH SPS UPGRADES
LEESBURG, VIRGINIA

TOWN OF LEESBURG
DEPARTMENT OF PUBLIC WORKS
CONTRACT NO. 500640-FY17-23

GENERAL NOTES

1. DRAWINGS CONTAINED HEREIN WERE DEVELOPED FROM FIELD OBSERVATIONS AND AVAILABLE INFORMATION AND MAY NOT INDICATE ACTUAL CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR BEGINNING ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IN WRITING AND AWAIT DIRECTION FROM THE ENGINEER BEFORE PROCEEDING WITH WORK.
2. THE PUMP STATION SHALL REMAIN IN OPERATION DURING CONSTRUCTION, UNLESS APPROVED BY THE TOWN IN ACCORDANCE WITH SPECIFICATION SECTION 01520.
3. ALL WORK SHALL BE COORDINATED WITH BRIAN BAILEY, TOWN OF LEESBURG UTILITY PLANT MANAGER.
4. PRIOR TO BEGINNING ANY WORK, THE CONTRACTOR SHALL SUBMIT A PLANNED SEQUENCE OF CONSTRUCTION, IN ACCORDANCE WITH SPECIFICATION SECTION 01520

VICINITY MAP
1" = 400'

INDEX OF DRAWINGS

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
Lic. No. 32180
PROFESSIONAL ENGINEER
3/29/17

DESIGNED BY MB
DRAWN BY MRB
CHECKED BY JTH
APPROVED BY AWD

Hazen
HAZEN AND SAWYER
1 SOUTH STREET, SUITE 1150; BALTIMORE, MD 21202
410-539-7581

PROJECT NO. 31111-020
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA
GENERAL
COVER, GENERAL NOTES, AND SHEET INDEX

G-1
SHEET 1 OF 27

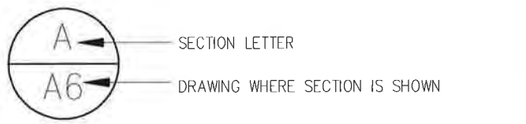
LINETYPES

- PROPOSED ITEMS
- EXISTING ITEMS
- HIDDEN ITEMS
- DEMOLITION ITEMS
- CENTER LINE
- EX. ROAD
- EX. BUILDING
- EX. TREES
- X — EX. FENCE
- SD — EX. STORM DRAIN
- SS — EX. SEWER
- FM — EX. FORCEMAIN
- UGE — EX. UG ELECTRIC
- UGT — EX. UG TELEPHONE
- W — EX. WATER
- EX. BOLLARAD

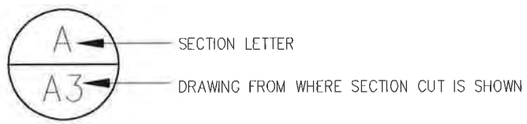
SECTION KEYING

DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING METHOD:

(A) A SECTION CUT ON DRAWING A3 IS IDENTIFIED AS FOLLOWS:



(B) THE SECTION SHOWN ON DRAWING A6 IS IDENTIFIED AS FOLLOWS:



ABBREVIATIONS

ALT	ALTERNATE
APPROX	APPROXIMATE
ARV	AIR RELEASE VALVE
BLDG	BUILDING
BLK	BLOCK
BM	BENCH MARK
BO	BLOW OFF
BOC	BACK OF CURB
BOT	BOTTOM
CF	CUBIC FEET
CI	CAST IRON
CIP	CAST IRON PIPE
CL	CENTER LINE
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
COMM	COMMUNICATIONS
CONC	CONCRETE
CY	CUBIC YARD
DET	DETAIL
DIA	DIAMETER
ø	DIAMETER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DR	DRIVE
DWG	DRAWING
EA	EACH
ELEV	ELEVATION
ELEC	ELECTRIC/ELECTRICAL
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQPT	EQUIPMENT
EX	EXISTING
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FH	FIRE HYDRANT
FM	FORCE MAIN
FP	FLOOD PLAIN
FT	FEET
HDD	HORIZONTAL DIRECTIONAL DRILLING
HDPE	HIGH DENSITY POLYETHYLENE
HORZ	HORIZONTAL
IDA	INTENSE DEVELOPMENT AREA
IN	INCH
INV	INVERT
LF	LINEAR FEET
LDA	LIMITED DEVELOPMENT AREA
LOD	LIMITS OF DISTURBANCE
LN	LANE
MAX	MAXIMUM
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
PVC	POLYVINYL CHLORIDE
PG	PAGE
QTY	QUANTITY
RCA	RESOURCE CONSTRUCTION AREA
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REF	REFERENCE
REQD	REQUIRED
ROW	RIGHT OF WAY
RSF	REINFORCED SILT FENCE
R/W	RIGHT OF WAY
SCE	STABILIZED CONSTRUCTION ENTRANCE
SHC	SEWER HOUSE CONNECTION
SF	SQUARE FEET
SPEC	SPECIFICATION
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
ST	STREET
STA	STATION
STD	STANDARD
TYP	TYPICAL
UG	UNDERGROUND
VERT	VERTICAL
W/	WITH
W/O	WITHOUT
WUS	WATERS OF THE US
WY	WAY
YD	YARD
YR	YEAR

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
Lic. No. 32187
PROFESSIONAL ENGINEER
3/29/17

DESIGNED BY MB
DRAWN BY MRB
CHECKED BY JTH
APPROVED BY AWD

Hazen
HAZEN AND SAWYER
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410-539-7661

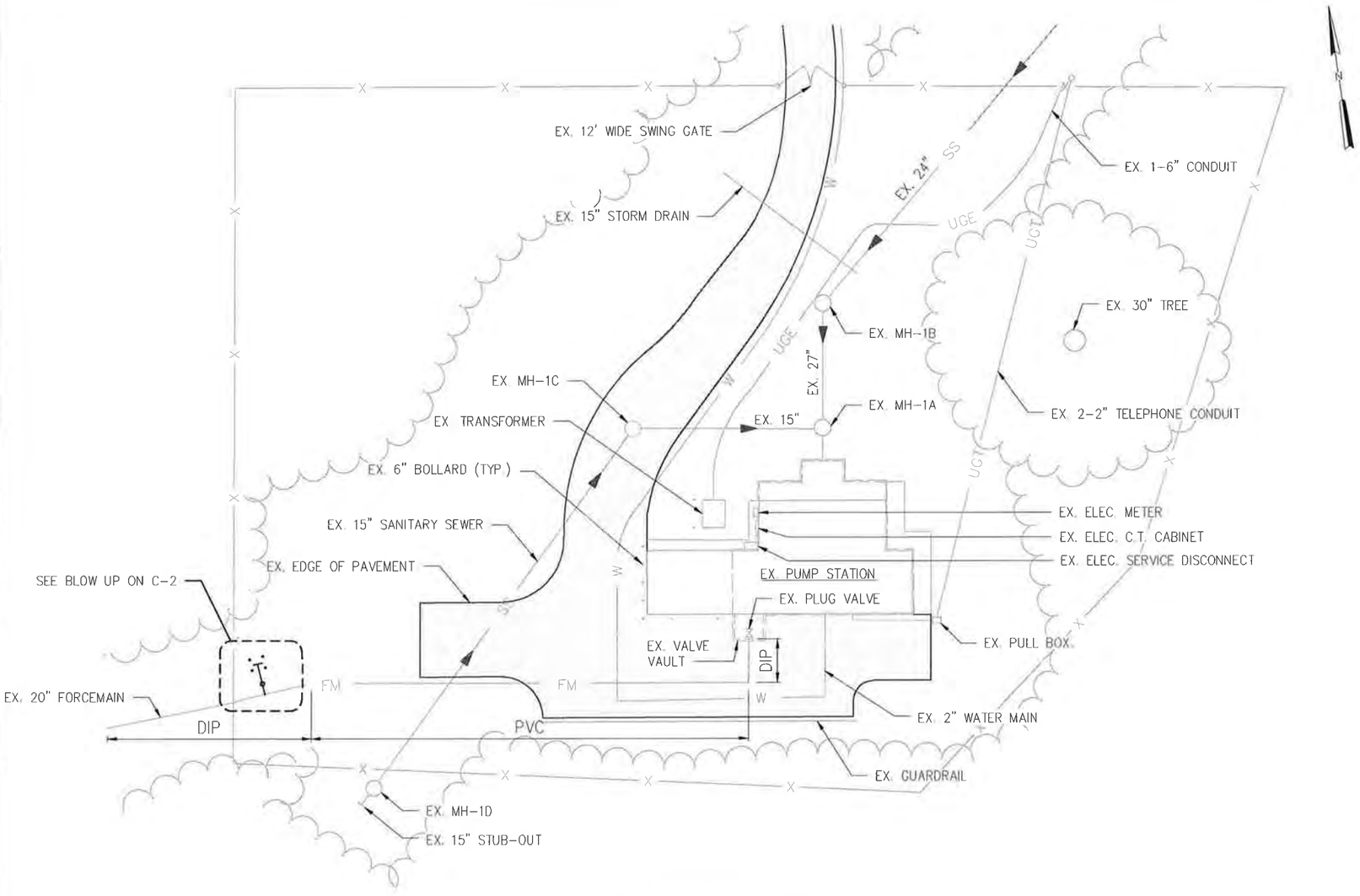
PROJECT NO. 31111-020
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

GENERAL
ABBREVIATIONS, LEGEND, AND SYMBOLS

G-2

SHEET 2 OF 27



SITE PLAN

1" = 30'

NOTES:

1. CONTRACTOR SHALL PERFORM WET TAP ON DUCTILE IRON PIPE PORTION OF FORCE MAIN ONLY. IF AN ALTERNATIVE MATERIAL IS ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE TOWN AND ENGINEER IMMEDIATELY.
2. THE CONTRACTOR SHALL SUBMIT A BYPASS PUMPING PLAN PRIOR TO CONSTRUCTION TO THE TOWN AND ENGINEER. AT A MINIMUM, THE PLAN SHALL INCLUDE SEQUENCE OF BYPASS, LOCATION OF PUMPS AND PIPING, AND ESTIMATED LENGTH OF TIME FOR BYPASS.
3. THE EXISTING FORCE MAIN HAS A PLUG VALVE INSTALLED, WHICH MAY OR MAY NOT OPERATE. IF, DURING CONSTRUCTION, THE PLUG VALVE DOES NOT OPERATE, THE CONTRACTOR SHALL INSTALL A TEMPORARY LINESTOP UPSTREAM OF THE WET TAP CONNECTION PRIOR TO PERFORMING BYPASS PUMPING.
4. BYPASS PUMPING SHALL BE PLANNED FOR LOW-FLOW PERIODS AND BASED UPON FORECASTING OF A DRY PERIOD WITH NO PRECIPITATION. A BACKUP BYPASS PUMP SHALL BY REQUIRED.

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COMMONWEALTH OF VIRGINIA
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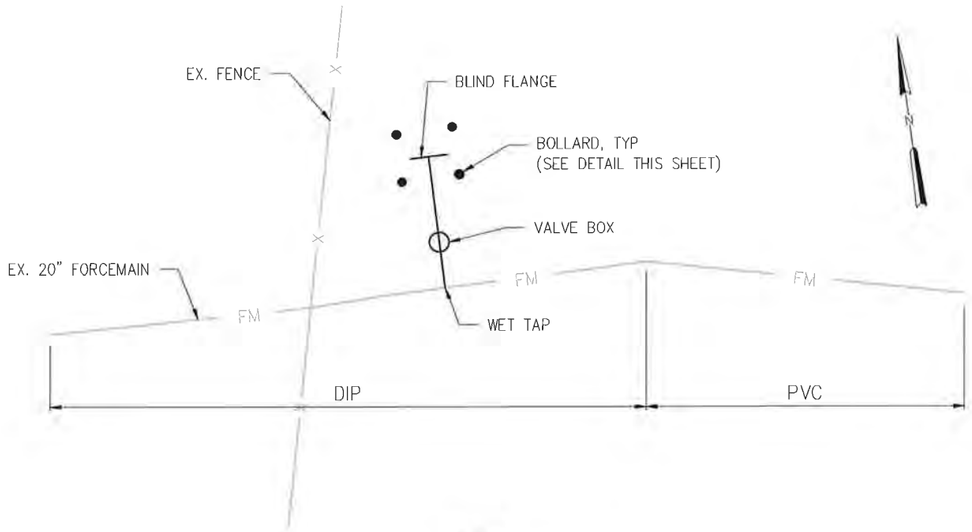
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

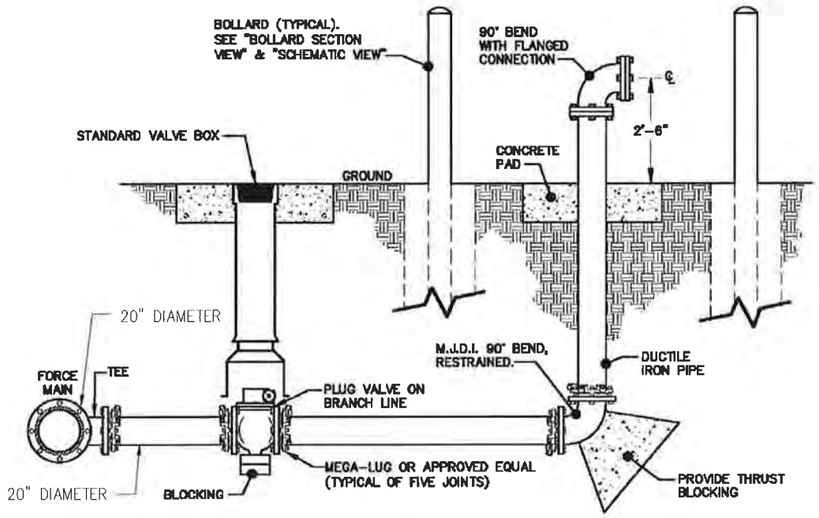
CIVIL
EXISTING SITE PLAN

C-1
SHEET 3 OF 27



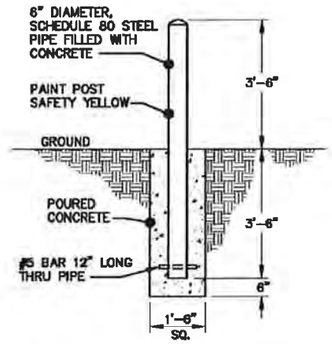
BLOW UP OF WET TAP

NOT TO SCALE



BYPASS PUMPING CONNECTION SECTION VIEW

NOT TO SCALE



BOLLARD SECTION VIEW

NOT TO SCALE

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
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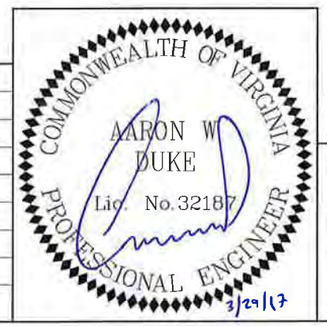

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CHECKED BY JTH
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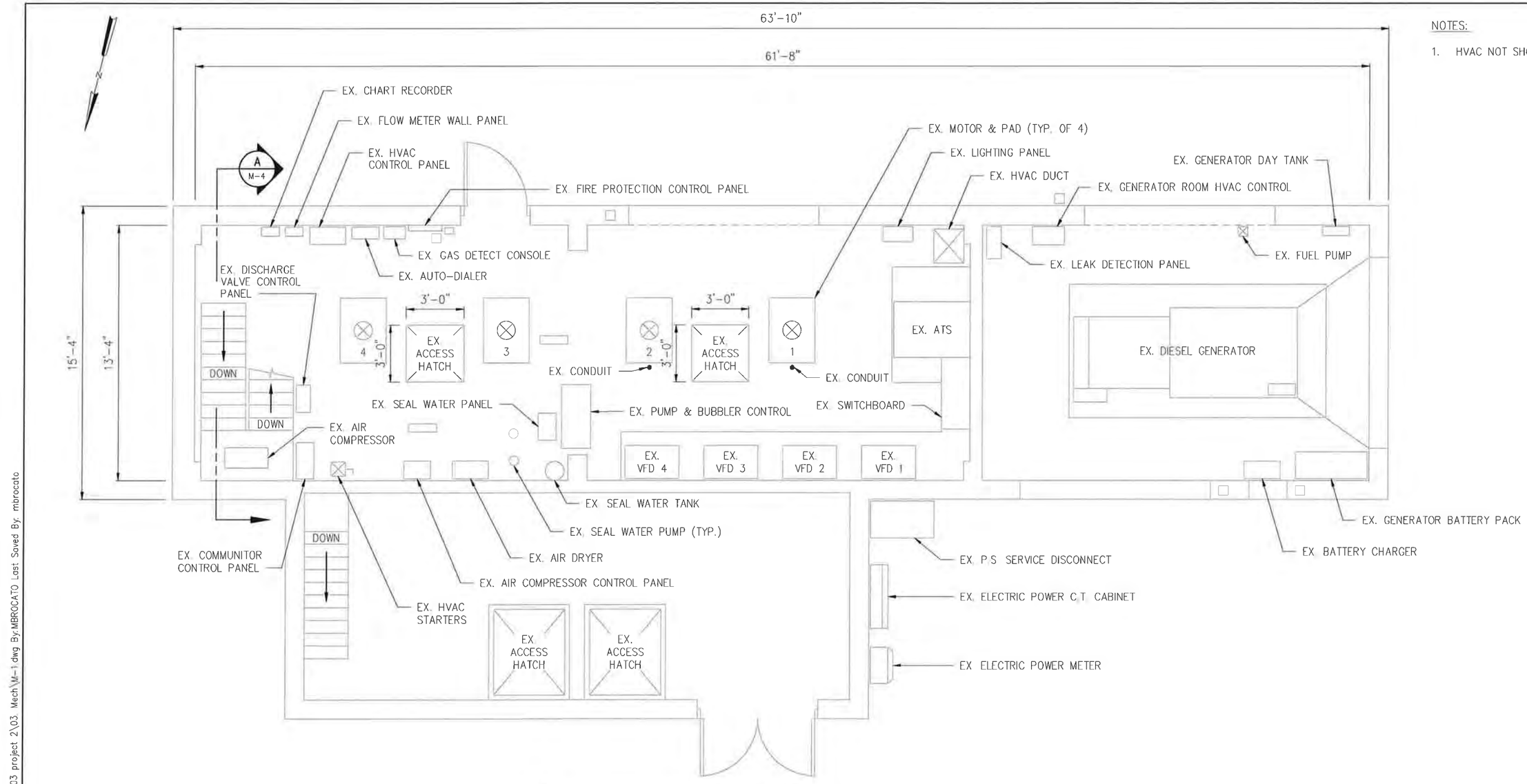
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

CIVIL
DETAILS

C-2

SHEET 4 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY

PLAN - UPPER LEVEL @ EL. 215.10

3/16" = 1'-0"

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COMMONWEALTH OF VIRGINIA
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3/29/17

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CHECKED BY	JTH
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410-539-7681

PROJECT NO.
31111-020

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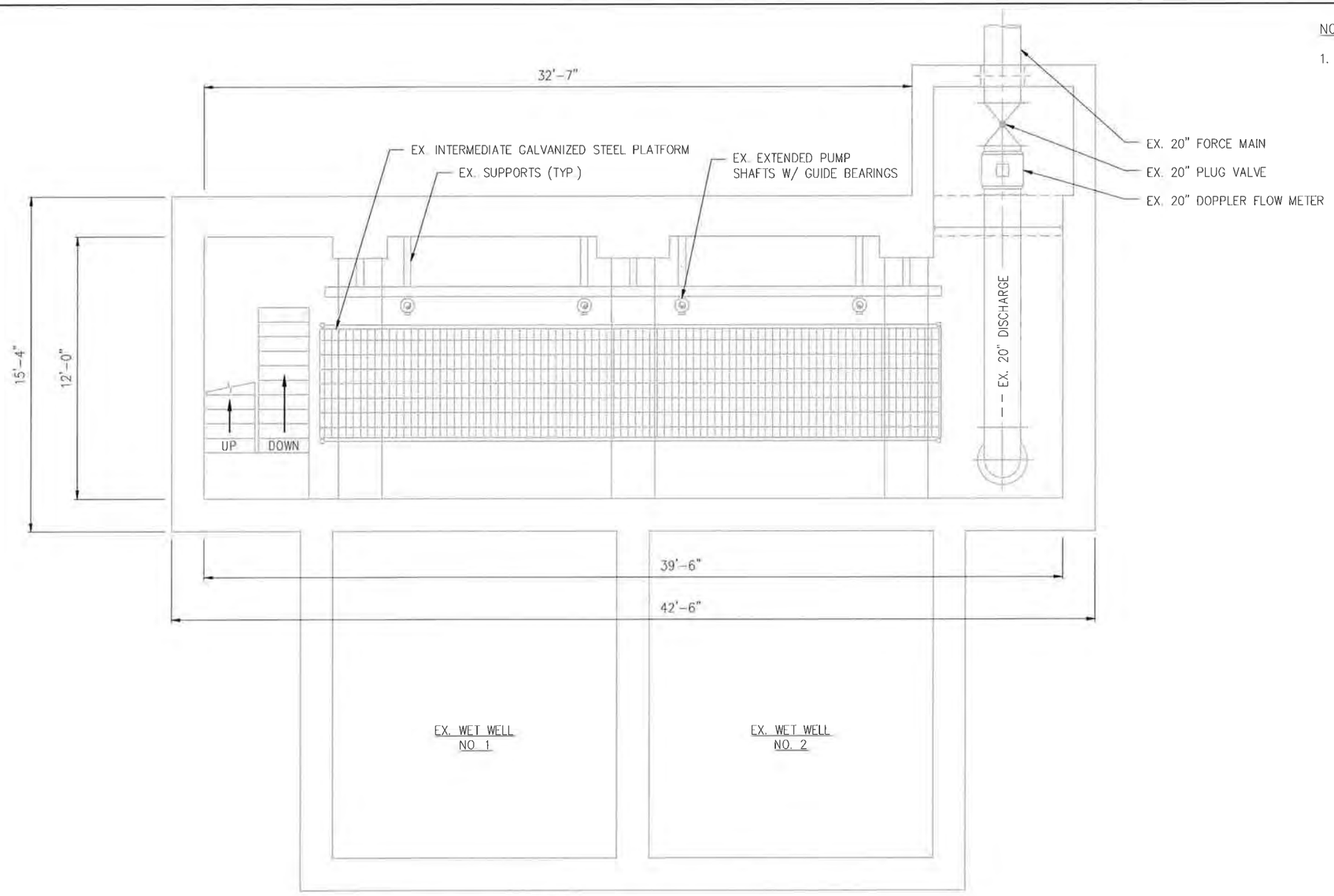
MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
EXISTING PLAN – UPPER LEVEL

M-1

SHEET
5 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY.

PLAN - INTERMEDIATE LEVEL @ EL. APPROX. 195.50

3/16" = 1'-0"

NO	ISSUED FOR	DATE	BY
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COMMONWEALTH OF VIRGINIA
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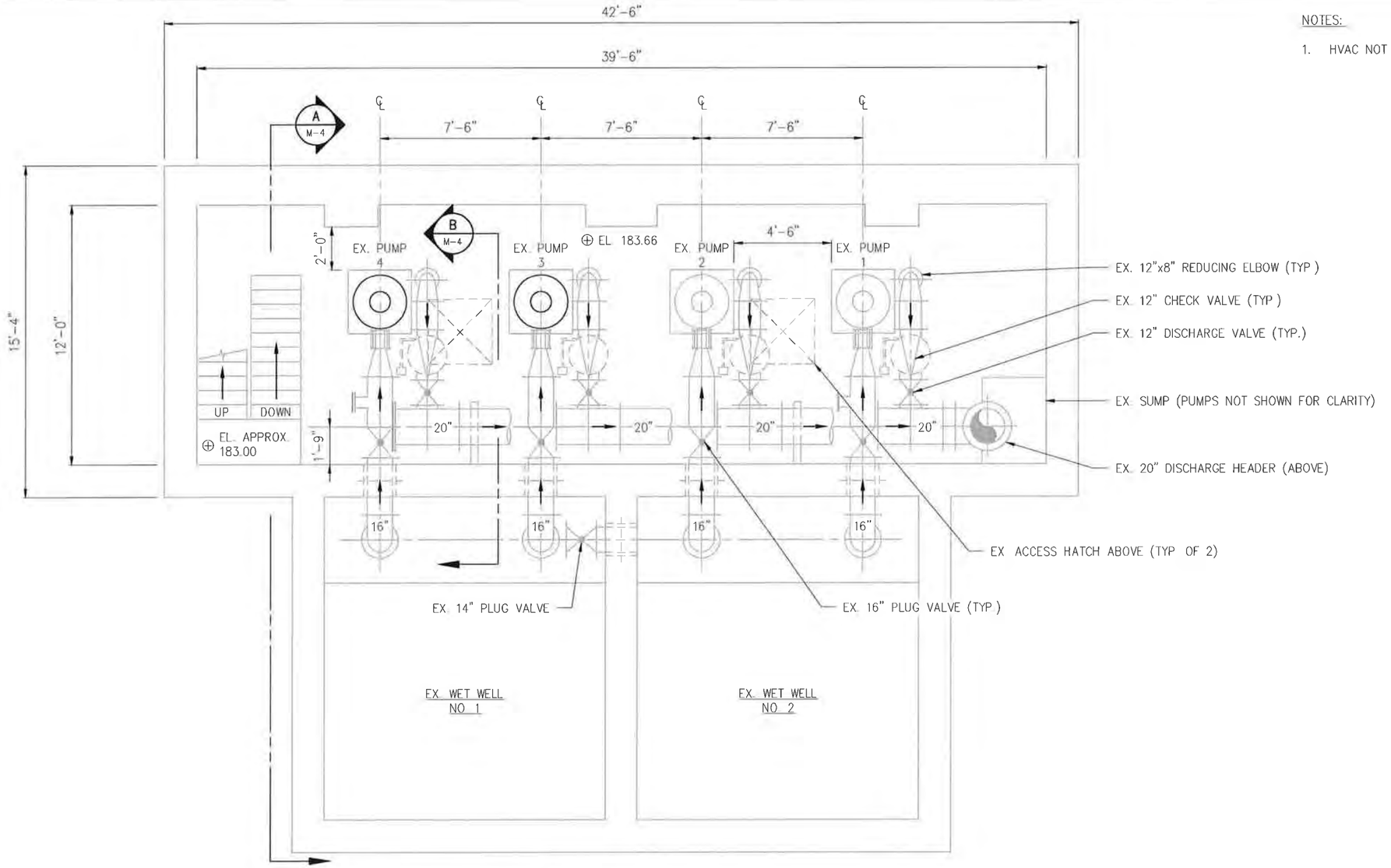
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
EXISTING PLAN – INTERMEDIATE LEVEL

M-2

SHEET 6 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY.

PLAN - LOWER LEVEL @ EL. 183.66

3/16" = 1'-0"

NO	ISSUED FOR	DATE	BY
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COMMONWEALTH OF VIRGINIA
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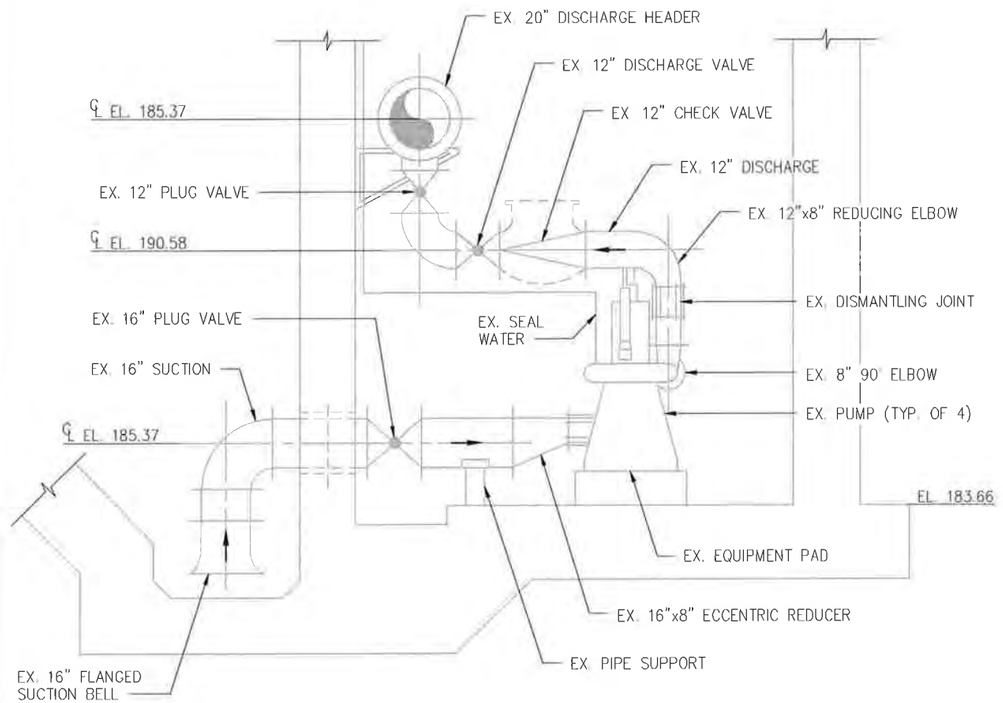
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
EXISTING PLAN – LOWER LEVEL

M-3

SHEET 7 OF 27

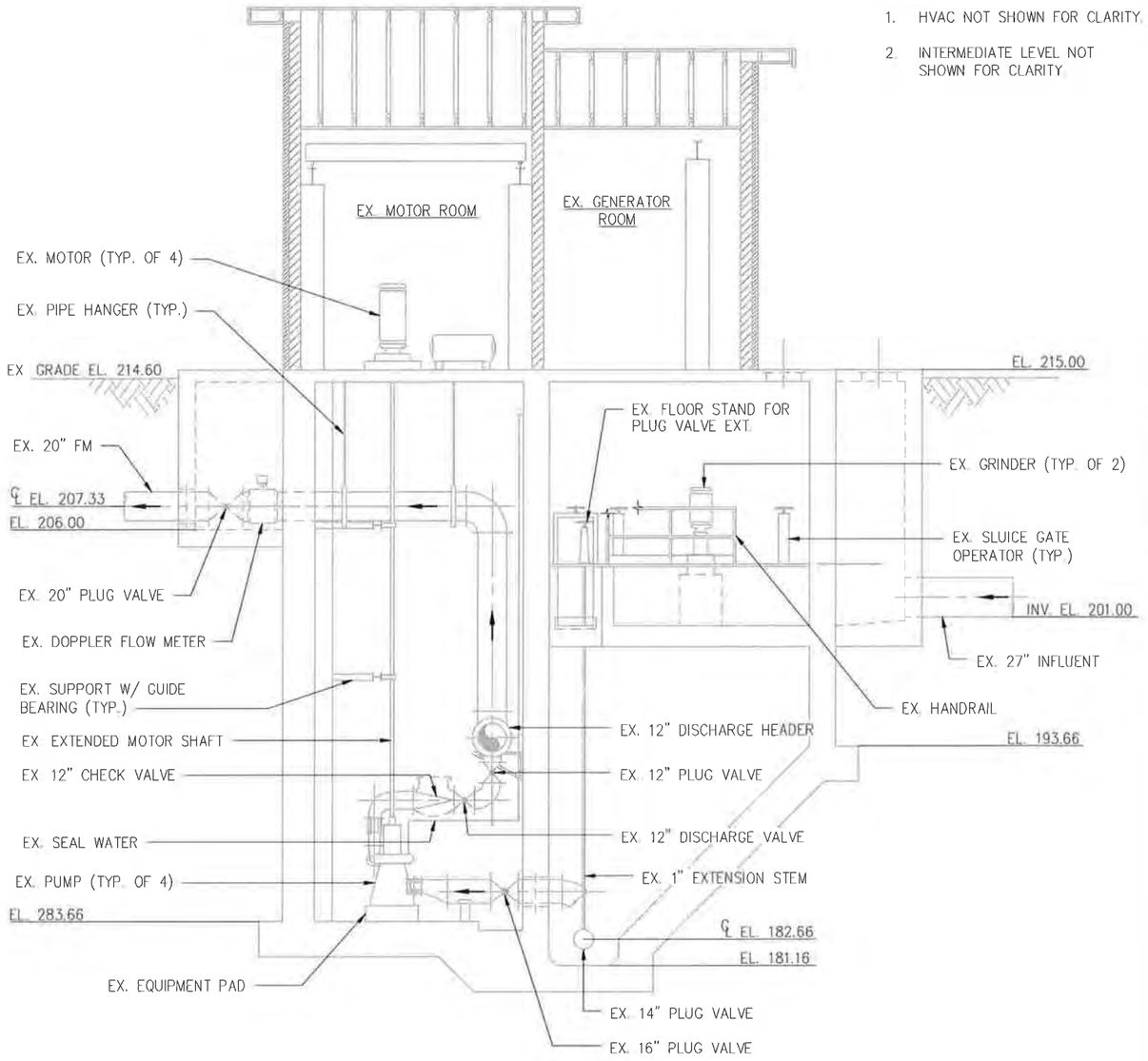


SECTION B
1/8"=1'-0"
M-3

NOTE:
1. TYPICAL OF PUMPS 1, 2, 3 AND 4

NOTES:

1. HVAC NOT SHOWN FOR CLARITY.
2. INTERMEDIATE LEVEL NOT SHOWN FOR CLARITY.



SECTION A
1/8"=1'-0"
M-1

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
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COMMONWEALTH OF VIRGINIA
AARON W. DUKE
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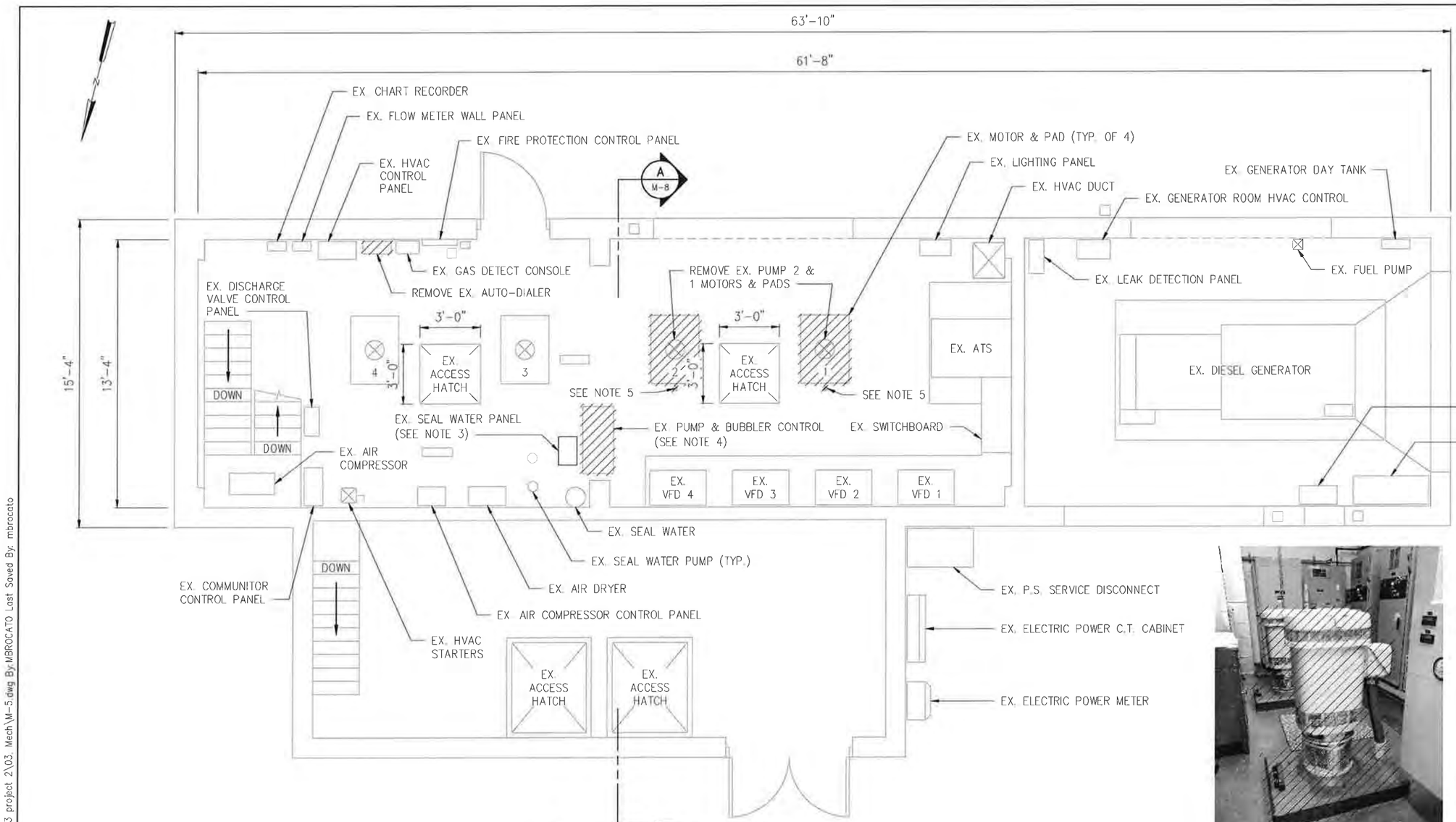
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
EXISTING PLAN – SECTIONS

M-4
SHEET 8 OF 27



NOTES:

1. PHOTOGRAPH(S) ARE FOR ILLUSTRATIVE PURPOSES ONLY. EXTENT OF DEMOLITION SHOWN IN PLAN.
2. HVAC NOT SHOWN FOR CLARITY.
3. RELOCATE EXISTING SEAL WATER CONTROL PANEL AS SHOWN ON SHEET E-7.
4. EXISTING PUMP CONTROL PANEL SHALL BE REMOVED AFTER SUCCESSFUL TESTING OF ALL NEW PUMP CONTROLS.
5. EXISTING ELECTRICAL CONDUITS TO BE CAPPED FLUSH TO FLOOR AND SEAMED.L

PLAN - UPPER LEVEL @ EL. 215.10

3/16" = 1'-0"

IMAGE - PUMP 3 & 4 MOTORS

NTS

LEGEND

////////. DEMOLISH/REMOVE

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COMMONWEALTH OF VIRGINIA
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PROJECT NO. 31111-020

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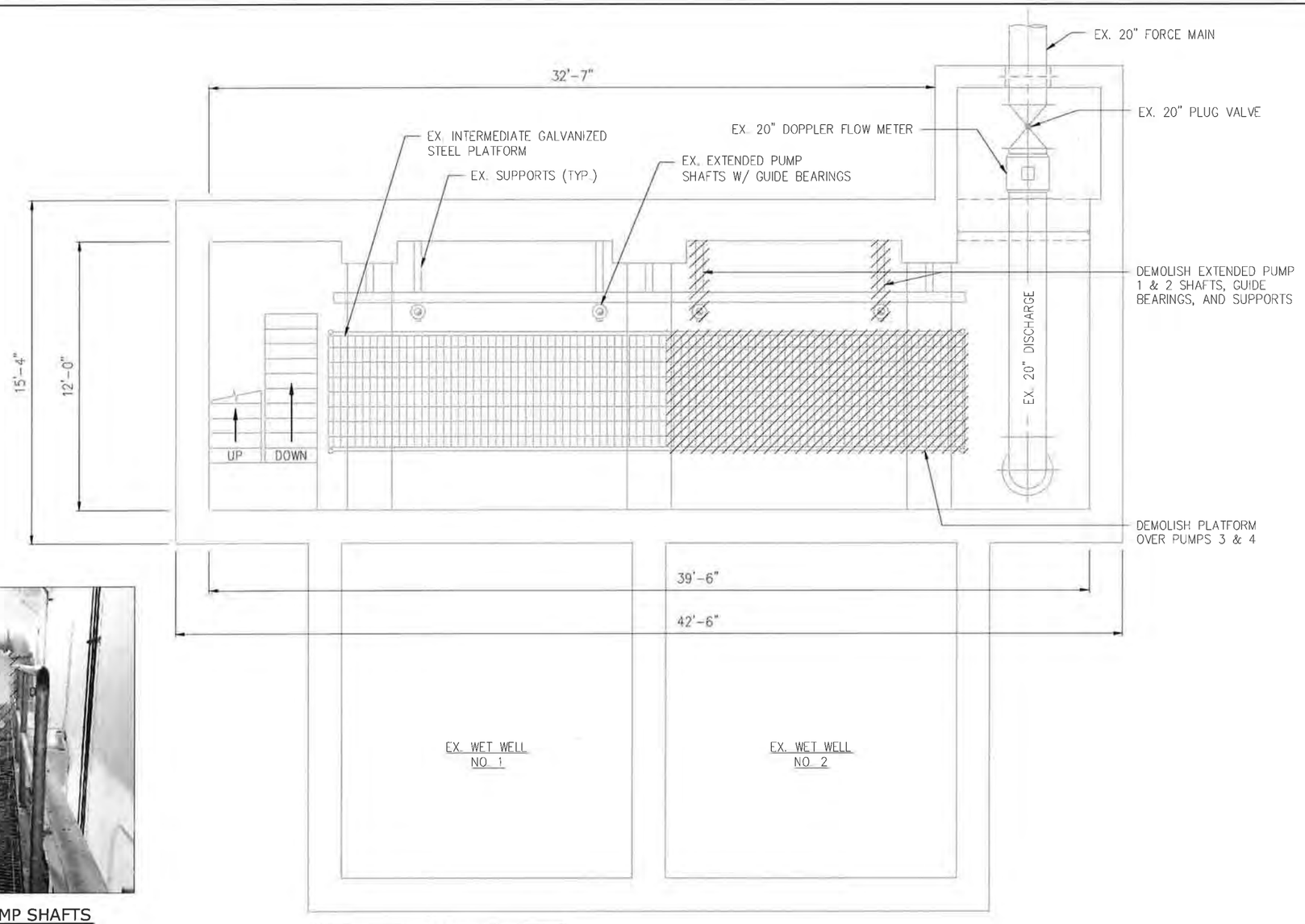
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL & ELECTRICAL
DEMOLITION PLAN – UPPER LEVEL

M-5

SHEET 9 OF 27



NOTES:

1. PHOTOGRAPH(S) ARE FOR ILLUSTRATIVE PURPOSES ONLY. EXTENT OF DEMOLITION SHOWN IN PLAN.
2. HVAC NOT SHOWN FOR CLARITY.

IMAGE - PLATFORM AND PUMP SHAFTS

NTS

PLAN - INTERMEDIATE LEVEL @ EL. APPROX. 195.50

3/16" = 1'-0"

LEGEND

DEMOLISH/REMOVE

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COMMONWEALTH OF VIRGINIA
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3/29/17

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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
DEMOLITION PLAN – INTERMEDIATE LEVEL

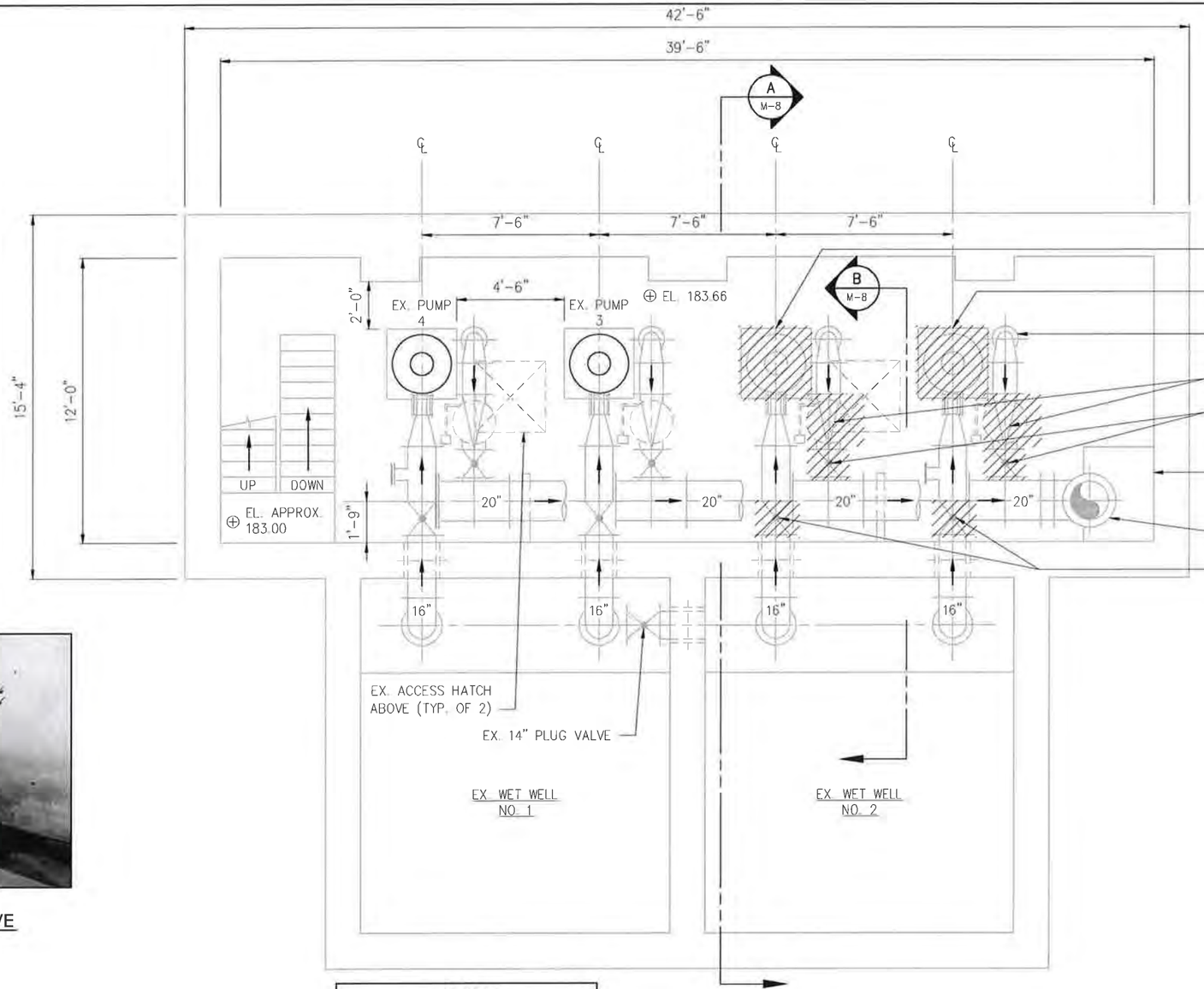
M-6

SHEET 10 OF 27

20170321 3:42P O:\31111-bal\31111-016\Drawings\03 project 2\03 Mech\M-6.dwg By:MBROCATO Last Saved By: mbrocato

IMAGE - PUMP
NTS

IMAGE - SUCTION VALVE
NTS



PLAN - LOWER LEVEL @ EL. 183.66
3/16" = 1'-0"

NOTES:

1. PHOTOGRAPH(S) ARE FOR ILLUSTRATIVE PURPOSES ONLY. EXTENT OF DEMOLITION SHOWN IN PLAN.
2. HVAC NOT SHOWN FOR CLARITY.

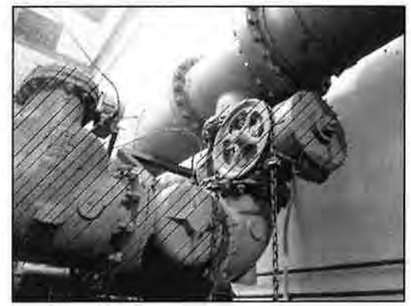


IMAGE - DISCHARGE VALVES
NTS

LEGEND

////////// DEMOLISH/REMOVE

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COMMONWEALTH OF VIRGINIA
AARON W. DUKE
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7/29/17

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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
DEMOLITION PLAN – LOWER LEVEL

M-7
SHEET 11 OF 27

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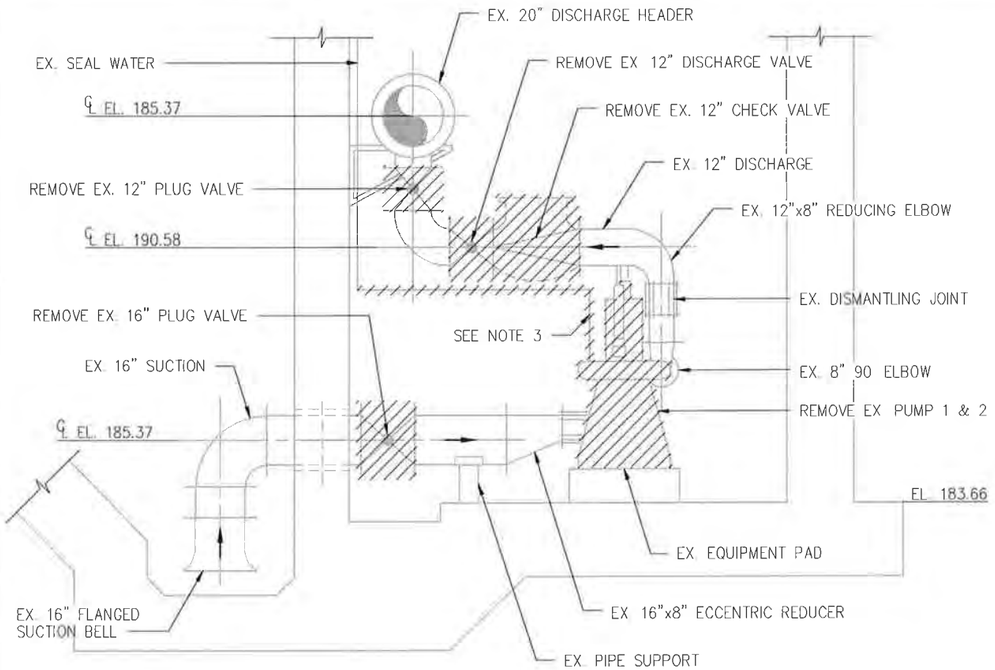
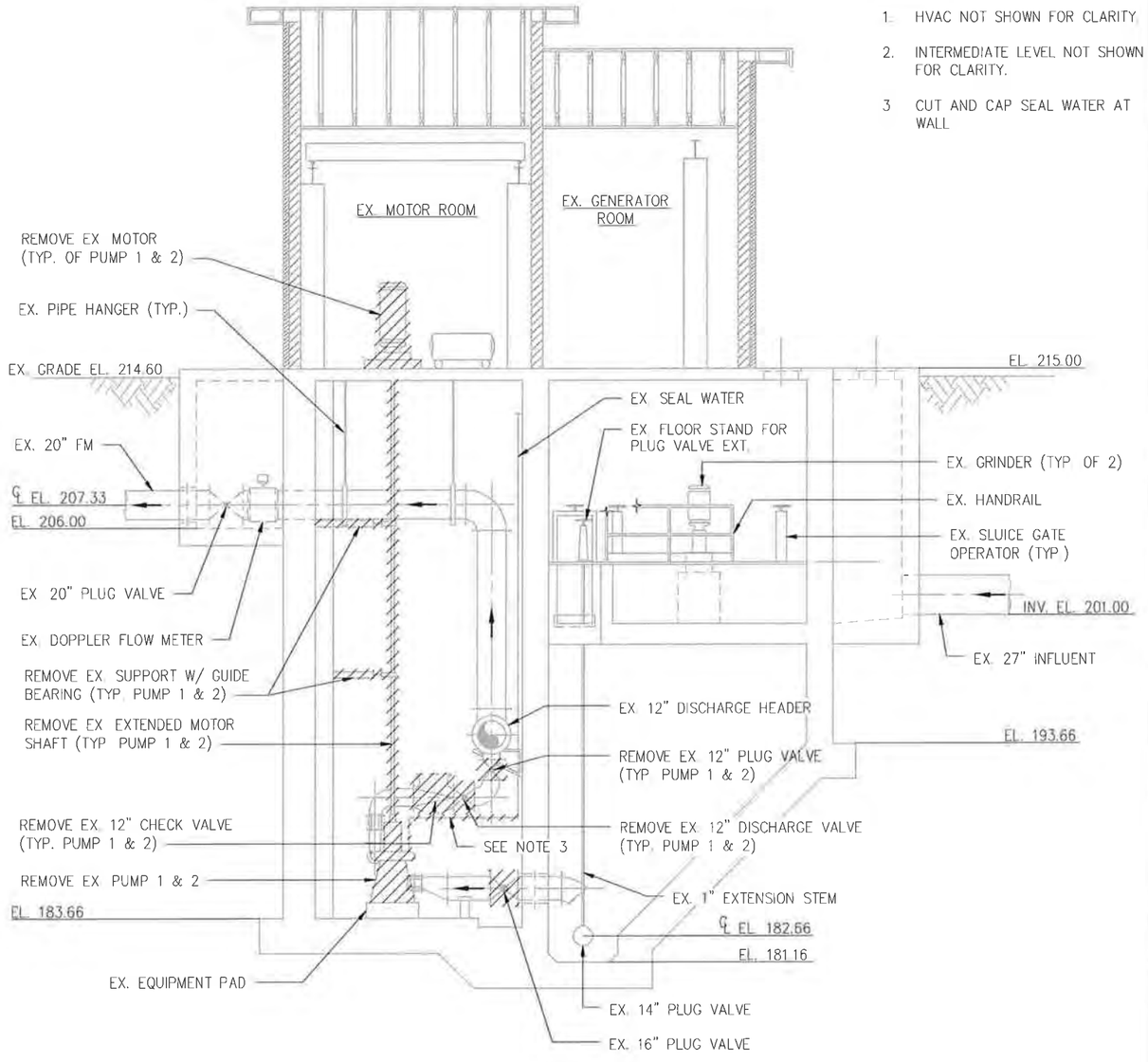


SECTION B
1/8"=1'-0" M-7

NOTE:
1. TYPICAL FOR PUMPS 1 AND 2

IMAGE - SEAL WATER PIPE
NTS

NOTES:
1. HVAC NOT SHOWN FOR CLARITY.
2. INTERMEDIATE LEVEL NOT SHOWN FOR CLARITY.
3. CUT AND CAP SEAL WATER AT WALL



NOTE:
1. TYPICAL FOR PUMP AND MOTOR 1 AND 2

SECTION A
1/8"=1'-0" M-7

LEGEND
////////// DEMOLISH/REMOVE

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COMMONWEALTH OF VIRGINIA
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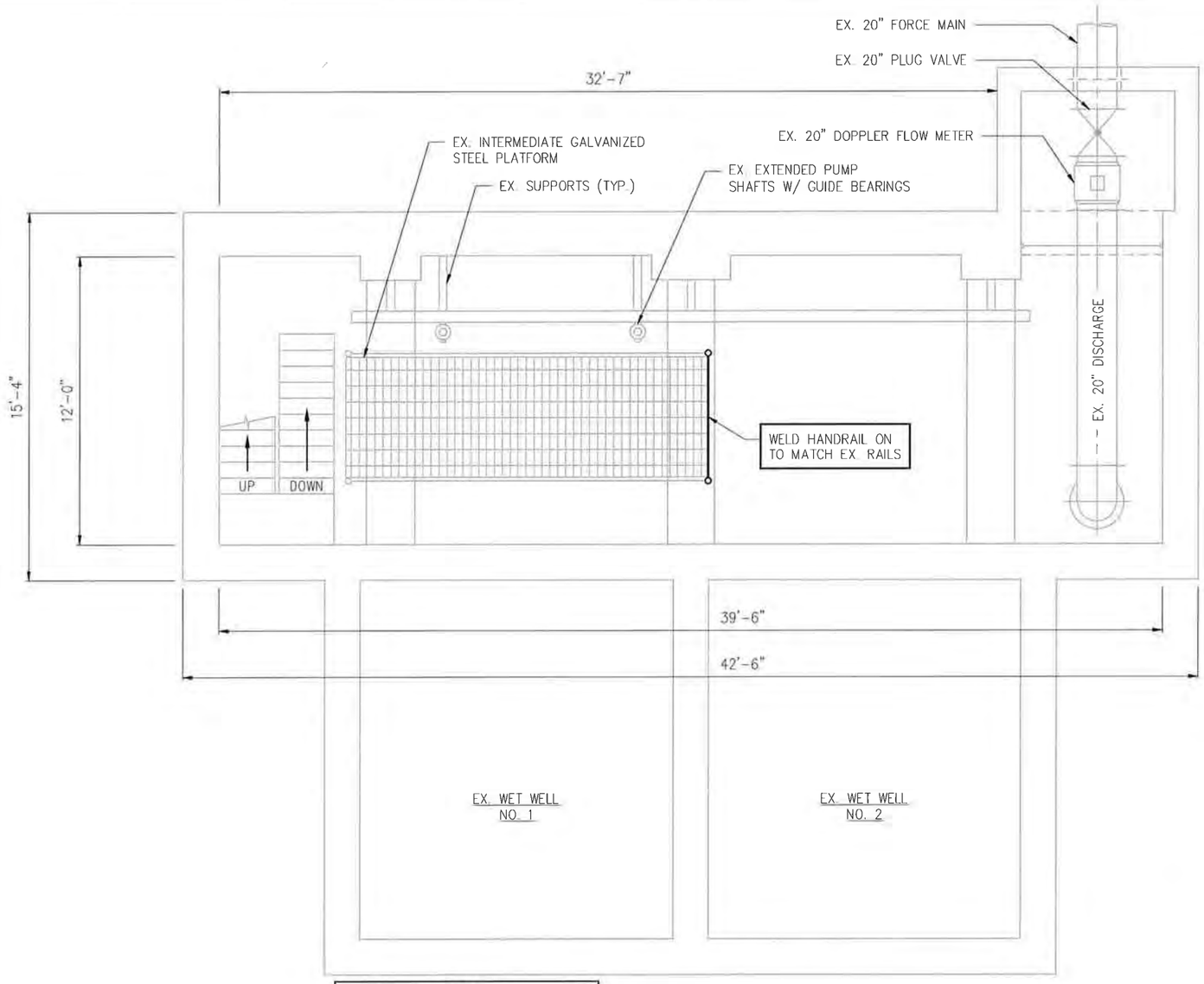
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
DEMOLITION PLAN – SECTIONS

M-8
SHEET 12 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY

PLAN - INTERMEDIATE LEVEL @ EL. APPROX. 195.50

3/16" = 1'-0"

NO	ISSUED FOR	DATE	BY
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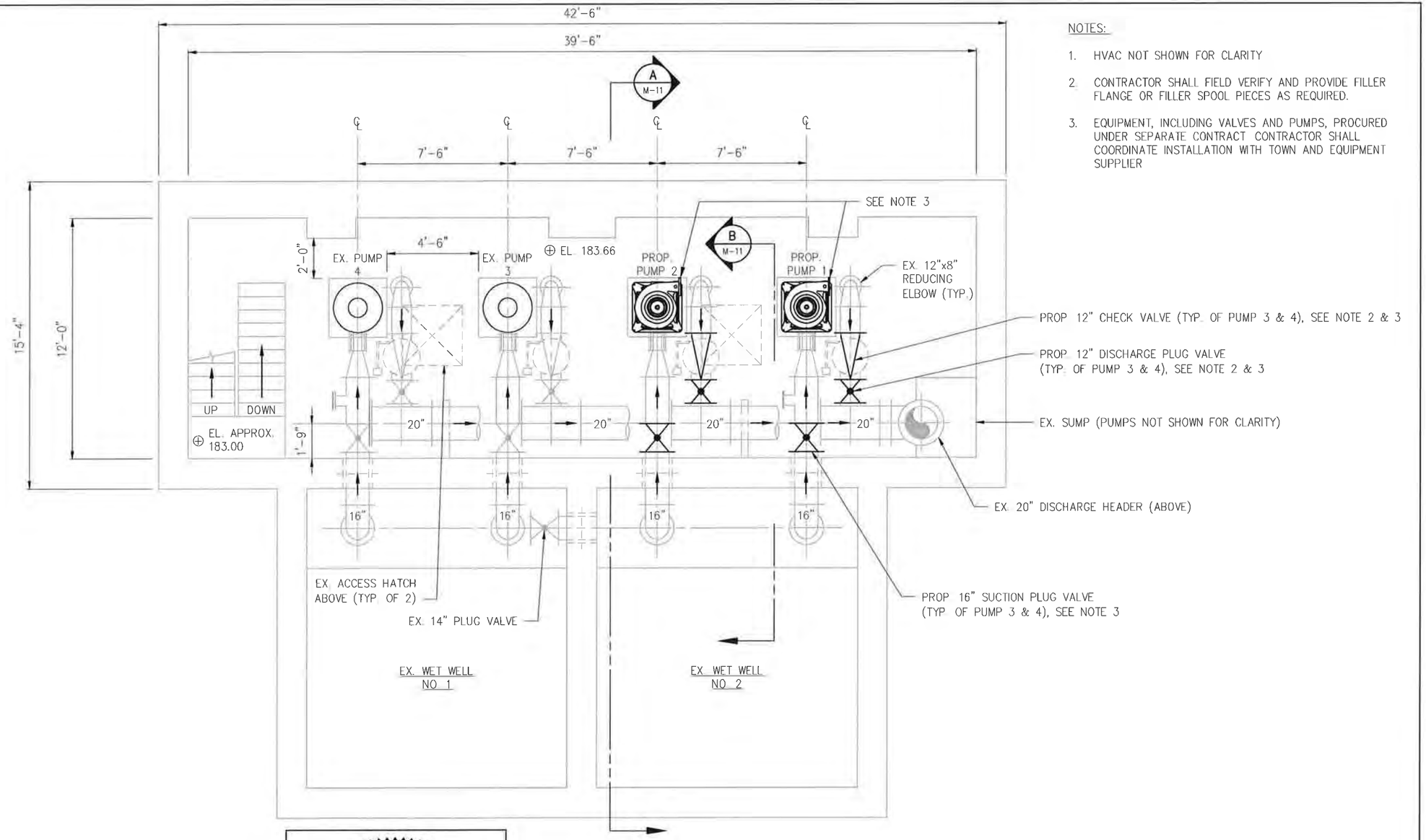
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
INTERMEDIATE LEVEL PLAN

M-9

SHEET 13 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY
2. CONTRACTOR SHALL FIELD VERIFY AND PROVIDE FILLER FLANGE OR FILLER SPOOL PIECES AS REQUIRED.
3. EQUIPMENT, INCLUDING VALVES AND PUMPS, PROCURED UNDER SEPARATE CONTRACT CONTRACTOR SHALL COORDINATE INSTALLATION WITH TOWN AND EQUIPMENT SUPPLIER

PLAN - LOWER LEVEL @ EL. 183.66

3/16" = 1'-0"

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
Lic. No. 32187
PROFESSIONAL ENGINEER
3/29/17

DESIGNED BY MB
DRAWN BY MRB
CHECKED BY JTH
APPROVED BY AWD

Hazen
HAZEN AND SAWYER
1 SOUTH STREET, SUITE 1150; BALTIMORE, MD 21202
410-539-7681

PROJECT NO. 31111-020

DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

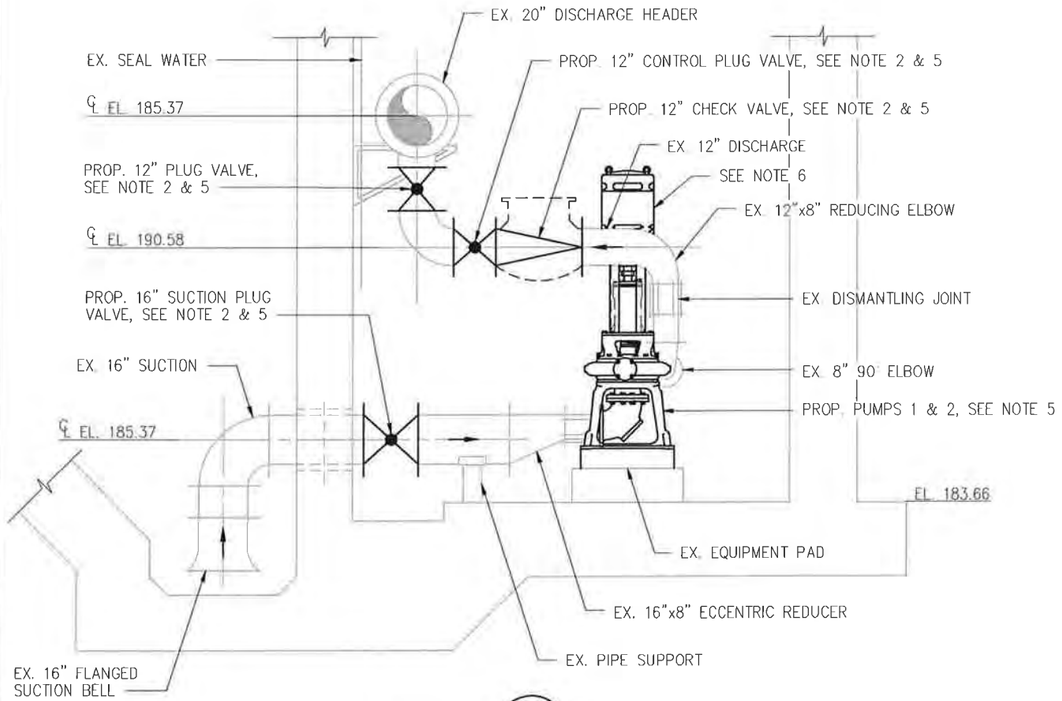
MECHANICAL & ELECTRICAL
LOWER LEVEL PLAN

M-10

SHEET 14 OF 27

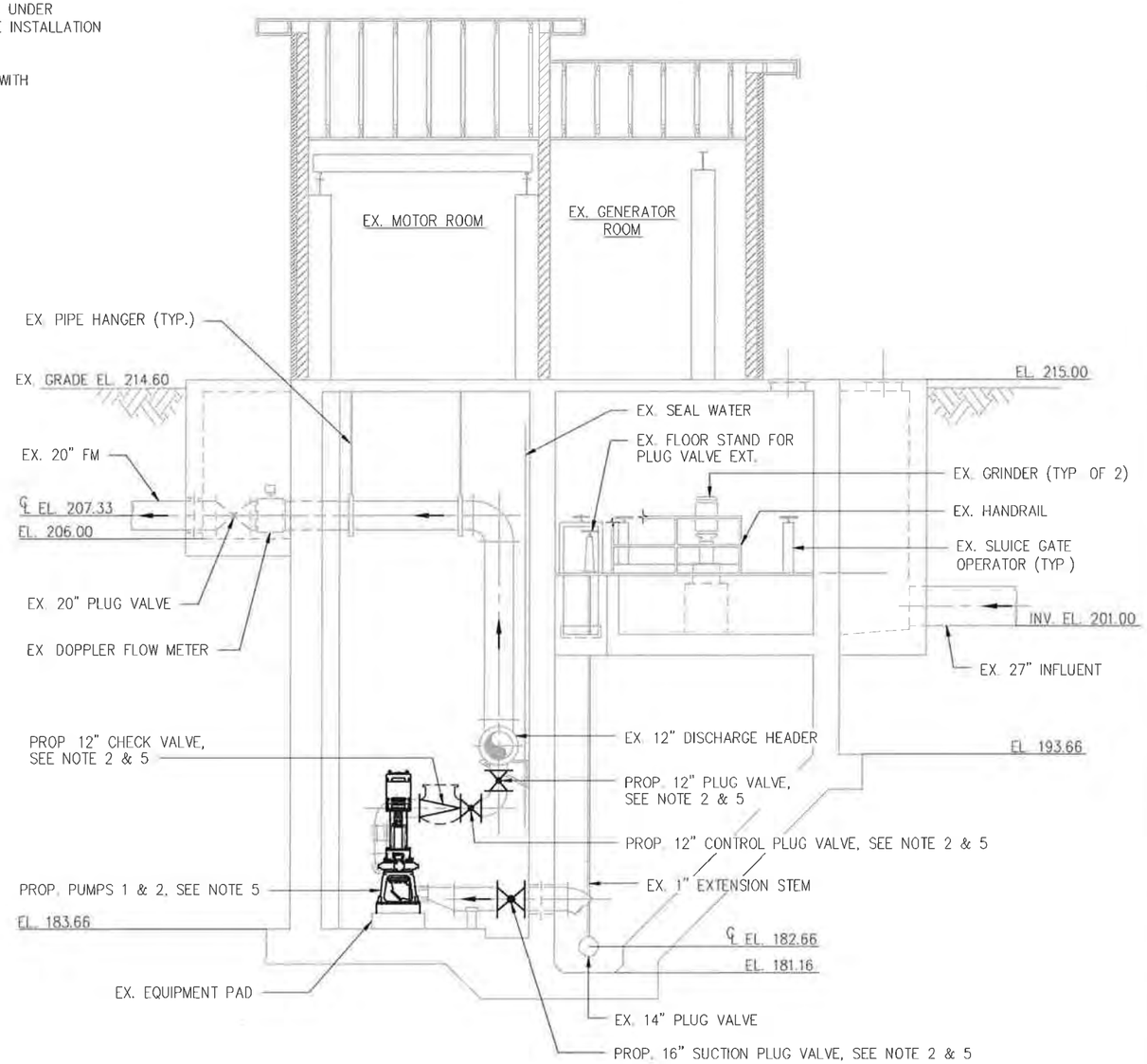
NOTES:

1. HVAC NOT SHOWN FOR CLARITY.
2. CONTRACTOR SHALL FIELD VERIFY AND PROVIDE FILLER FLANGE OR SPOOL PIECES AS REQUIRED.
3. INTERMEDIATE LEVEL NOT SHOWN FOR CLARITY.
4. NEW PLUG VALVES SHALL BE PROVIDED WITH NEW OPERATORS/HANDWHEELS AND CHAIN OPERATORS WITH CHAIN TO MATCH ORIGINAL. LOCATE SEAT END OF VALVE IN ACCORDANCE WITH VALVE MANUFACTURER RECOMMENDATIONS FOR SEWAGE SERVICE.
5. EQUIPMENT, INCLUDING VALVES AND PUMPS, PROCURED UNDER SEPARATE CONTRACT. CONTRACTOR SHALL COORDINATE INSTALLATION WITH TOWN AND EQUIPMENT SUPPLIER.
6. COORDINATE LOCATION OF PUMP CONDUIT ENTRY BOX WITH ELECTRICAL, TYPICAL OF 2.



SECTION B
1/8"=1'-0"
M-10

NOTE:
1. TYPICAL FOR PUMPS 1 AND 2



SECTION A
1/8"=1'-0"
M-10

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
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PROFESSIONAL ENGINEER
3/27/17

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PROJECT NO. 31111-020
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

MECHANICAL
SECTIONS

M-11
SHEET 15 OF 27

LIGHTING:

X DENOTES FIXTURE TYPE (TYP.)
SEE SPECIFICATION 16500 FOR FIXTURE SCHEDULE
# DENOTES CIRCUIT NUMBER (TYP.)

- RECTANGULAR FIXTURE
- CEILING-MOUNTED FIXTURE
- WALL-MOUNTED FIXTURE
- EMERGENCY WALL-MOUNTED FIXTURE: LEFT: STANDARD/RIGHT: REMOTE-HEAD
- CEILING-MOUNTED EXIT SIGN: SHADED PORTION DENOTES SIGN FACE
- WALL-MOUNTED EXIT SIGN: SHADED PORTION DENOTES SIGN FACE
- POLE-MOUNTED FIXTURE
- PHOTOCELL
- CEILING MOUNTED OCCUPANCY SENSOR: NUMBER DENOTES TYPE
- WALL MOUNTED OCCUPANCY SENSOR: NUMBER DENOTES TYPE

RECEPTACLES:

X DENOTES RECEPTACLE TYPE (TYP.):
GFCI DENOTES GROUND FAULT CIRCUIT INTERRUPT
UPS DENOTES UNINTERRUPTIBLE POWER SUPPLY
WPCR DENOTES WEATHERPROOF CORROSION RESISTANT
# DENOTES CIRCUIT NUMBER (TYP.)

- DUPLEX RECEPTACLE
- SIMPLEX RECEPTACLE
- QUADRUPLEX RECEPTACLE
- MULTI-OUTLET RECEPTACLE SIMPLEX
- MULTI-OUTLET RECEPTACLE DUPLEX
- 240 VOLT RECEPTACLE
- SPECIAL PURPOSE OUTLET

HVAC AND FIRE ALARM

- FIRE ALARM CONTROL PANEL
- FIRE ALARM ANNUNCIATOR PANEL
- FIRE ALARM PULL STATION
- FIRE ALARM INDICATOR: X DENOTES ALERT TYPE (TYP.): A DENOTES AUDIBLE; V DENOTES VISIBLE (# DENOTES STROBE INTENSITY)
- FIRE ALARM INDICATOR MOUNTED ABOVE A FIRE ALARM PULL STATION
- DUCT DETECTOR
- SMOKE DETECTOR: X DENOTES TYPE: Z DENOTES IONIZATION; P DENOTES PHOTOELECTRIC; T DENOTES THERMAL
- HEAT DETECTOR
- THERMOSTAT
- AMBIENT TEMPERATURE TRANSMITTER

ELEMENTARY CONTROL SCHEMATICS

- 3-POSITION SELECTOR SWITCH: HOA DENOTES HAND/OFF/AUTO; LOR DENOTES LOCAL/OFF/REMOTE; FOR DENOTES FORWARD/OFF/REVERSE
- PUSHBUTTON SWITCHES: LEFT: N.O./RIGHT: N.C. TEXT DENOTES LEGEND PLATE
- MUSHROOM HEAD EMERGENCY STOP PUSHBUTTON SWITCH N.C. MAINTAINED: TEXT DENOTES LEGEND PLATE
- PUSHBUTTON SWITCH N.C. WITH LOCK-OUT: TEXT DENOTES LEGEND PLATE
- SELECTOR SWITCH: TEXT DENOTES LEGEND PLATE
- THERMAL OVERLOAD RELAY

	NO	NC
DISCONNECT SWITCHES		
CONTACTS	X	X
TORQUE SWITCH	–	TS
LIMIT SWITCHES	LS	LS

NOTATION LEGEND:
NO/NC: NORMALLY OPEN/CLOSED
RO/RC: RISE-TO-OPEN/CLOSE
FO/FC: FALL-TO-OPEN/CLOSE
TO/TC: TIME-OPEN/CLOSE

CONTACTS: TEXT DENOTES COIL ID

SWITCHES: TEXT DENOTES TAG NUMBER

	NORC	NOFC	NCRO	NCFO
TEMPERATURE SWITCHES/ THERMOSTATS	TS	–	TS	–
PRESSURE SWITCHES	PS	PS	PS	PS
LEVEL SWITCHES	LS	LS	LS	LS
FLOW SWITCHES	FS	FS	FS	FS

	NOTC	NOTO	NCTO	NCTC
TIME DELAY SWITCHES	TD	TD	TD	TD

- INDICATOR LIGHT: LEFT: STANDARD/RIGHT: PUSH-TO-TEST; X DENOTES COLOR
- RUN TIME METER
- SOLENOID VALVE
- MOTOR PROTECTION RELAY
- 100VA 480/120V — CONTROL POWER TRANSFORMER
- MECHANICAL INTERLOCK CONNECTION
- MSH — MOTOR SPACE HEATER
- COIL: X DENOTES TYPE: M DENOTES MOTOR STARTER; CR DENOTES CONTROL RELAY; TD DENOTES TIME DELAY RELAY; PR DENOTES INTERPOSING PILOT RELAY; LC DENOTES LIGHTING CONTACTOR; Y DENOTES REFERENCE LINE NUMBER

SINGLE-LINE DIAGRAMS

- PROTECTIVE RELAY: NUMBER DENOTES IEEE DEVICE FUNCTION
- MOTOR AND TYPICAL ADDITIONAL DEVICES: TSH: TEMPERATURE SWITCH; MSH: MOTOR SPACE HEATER; CF: COOLING FAN; TE: TEMPERATURE ELEMENT; ME: MOISTURE DETECTOR
- INSTRUMENT TAG: X DENOTES INSTRUMENT TYPE; Y DENOTES INSTRUMENT NUMBER. **SEE DRAWING I1 FOR INSTRUMENT ABBREVIATIONS**
- 100A FUSE
- 100A 3P — FUSED DISCONNECT SWITCH
- 30A 3P — DISCONNECT SWITCH
- 30A 3P — FUSED DISCONNECT SWITCH
- 800AF 800AP 800AT LSIG CTR (N.C.) — LOW-VOLTAGE DRAWOUT POWER CIRCUIT BREAKER: E.O. DENOTES ELECTRICALLY OPERATED; LSIG DENOTES INSTALLED TRIP FUNCTIONS: L DENOTES LONG-TIME; S DENOTES SHORT-TIME; I DENOTES INSTANTANEOUS; G DENOTES GROUND FAULT; CTR DENOTES BREAKER-SPECIFIC CT AND RATIOS
- 52 — 1200A N.C. E.O. BATT. — MEDIUM-VOLTAGE DRAWOUT POWER CIRCUIT BREAKER: E.O. DENOTES ELECTRICALLY OPERATED; BATT. DENOTES BATTERY BACKUP POWER
- 100AF 100AT — ETU — 800AF 800AP 800AT LSIG — LOW-VOLTAGE MOLDED CASE CIRCUIT BREAKER: LEFT: THERMAL-MAGNETIC TRIP UNIT; RIGHT: ELECTRONIC TRIP UNIT
- 30A MCP — MOTOR CIRCUIT PROTECTOR
- GROUND
- 600:5 (3) — CT: NUMBERS DENOTE CT WINDING RATIO AND CT QUANTITY
- 50:5 (1) — GFCT: NUMBERS DENOTE GFCT WINDING RATIO AND GFCT QUANTITY
- 480:120 (2) — PT: NUMBERS DENOTE PT WINDING VOLTAGES AND PT QUANTITY
- DRAW-OUT ELEMENT

SINGLE-LINE DIAGRAMS, CONT'D.

- LEFT: PANELBOARD; RIGHT: COMBINATION POWER UNIT; X DENOTES PANEL ID
- LIGHTNING ARRESTOR
- LEFT: RESISTOR; RIGHT: LINE REACTOR: #% DENOTES IMPEDANCE
- CAPACITOR
- VOLTMETER AND SWITCH
- AMMETER AND SWITCH
- SHUNT TRIP
- SURGE PROTECTIVE DEVICE XXXkA
- KIRK-KEY INTERLOCK

100A MCP — 5% — 6 PULSE VFD | 100A MCP — ACTIVE FILTER — 6 PULSE VFD | 100A MCP — IC — 5% — 6 PULSE VFD — I — OC

LEFT: VFD WITH LINE REACTOR
MIDDLE: VFD WITH HARMONIC FILTER
RIGHT: VFD WITH LINE REACTOR AND FVNR BYPASS
X DENOTES NEMA SIZE

100A MCP — IC — RVSS — OC | 100A MCP — IC — RVSS — I — OC

LEFT: RVSS STARTER
RIGHT: RVSS STARTER WITH FVNR BYPASS

100A MCP — IC — 18 PULSE VFD — IC — RVSS — OC — OC

VFD WITH RVSS BYPASS

TRANSFORMER ID
45kVA
480-120/208V
3P/4W
DRY TRANS

SWITCHES

- WALL SWITCH: X DENOTES TYPE: NO SUBSCRIPT DENOTES SINGLE-POLE SWITCH; 3 DENOTES 3-WAY SWITCH; 4 DENOTES 4-WAY SWITCH; M DENOTES MANUAL MOTOR STARTER; # DENOTES CIRCUIT NUMBER; WPCR DENOTES WEATHERPROOF AND CORROSION RESISTANT
- COMBINATION MOTOR STARTER
- DISCONNECT SWITCH
- LOCAL CONTROL STATION

EQUIPMENT/DEVICE LOCATION SYMBOLS

- * LOCATED IN MCC
- * LOCATED IN STAND-ALONE MOTOR STARTER/CONTROLLER
- △ LOCATED IN FIELD
- LOCATED AT PANEL: X DENOTES PANEL ID; L DENOTES LOCAL CONTROL STATION

MISC PLAN VIEW SYMBOLS

- EQUIPMENT CONNECTION
- GROUND RODS: LEFT: BURIED; RIGHT: IN TESTWELL
- DUCTBANK SECTION CUT IDENTIFIER: DBXX DENOTES DUCTBANK ID; EXX DENOTES DRAWING NUMBER WHERE SECTION CUT IS LOCATED
- DUCTBANK TAG: X DENOTES DUCTBANK ID
- CABLE TRAY TAG: X DENOTES CABLE TRAY ID; Y DENOTES SCHEDULE REFERENCE
- INSTRUMENT TAG: X DENOTES INSTRUMENT TYPE; # DENOTES INSTRUMENT NUMBER. **SEE DRAWING I1 FOR INSTRUMENT ABBREVIATIONS**
- CONDUIT TAGS: P DENOTES POWER; C DENOTES CONTROL; I DENOTES INSTRUMENTATION; XXXX DENOTES CONDUIT ID; XXX-XXX DENOTES CONDUIT ID

COMMUNICATIONS

- TELEPHONE OR NETWORK DROP
- PAGER RECEPTACLE
- HORN/LIGHT DEVICE
- PA UNIT

WIRING

- CONDUIT HOME RUN
- CONDUIT EXPOSED
- CONCRETE ENCASED CONDUIT
- CONDUIT CONCEALED
- FLEXIBLE CONDUIT
- CONCRETE ENCASED DUCTBANK
- LEFT: CONDUIT RISE (TURN UP); RIGHT: CONDUIT DROP (TURN DOWN)

PANELS AND BOXES

- JB — JUNCTION BOX
- PB — PULL BOX
- CP — CONTROL PANEL

NO	ISSUED FOR	DATE	BY
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1	90% SUBMITTAL	6/16	JTH

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3/29/17

DESIGNED BY	DPW
DRAWN BY	MRB
CHECKED BY	JTH
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Hazen
HAZEN AND SAWYER
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410-539-7581

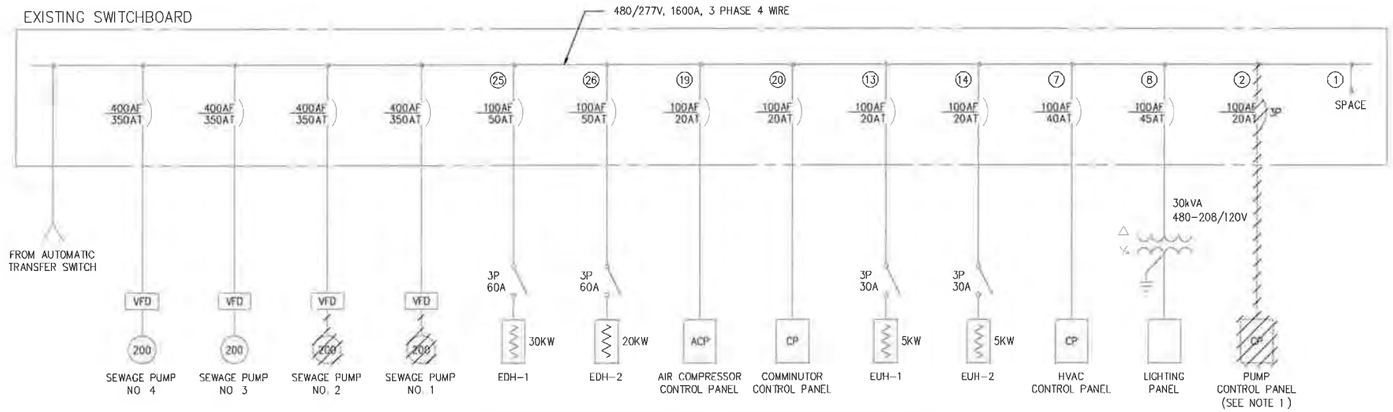
PROJECT NO.	31111-020
DATE:	MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
LEGEND, SYMBOLS, AND ABBREVIATIONS

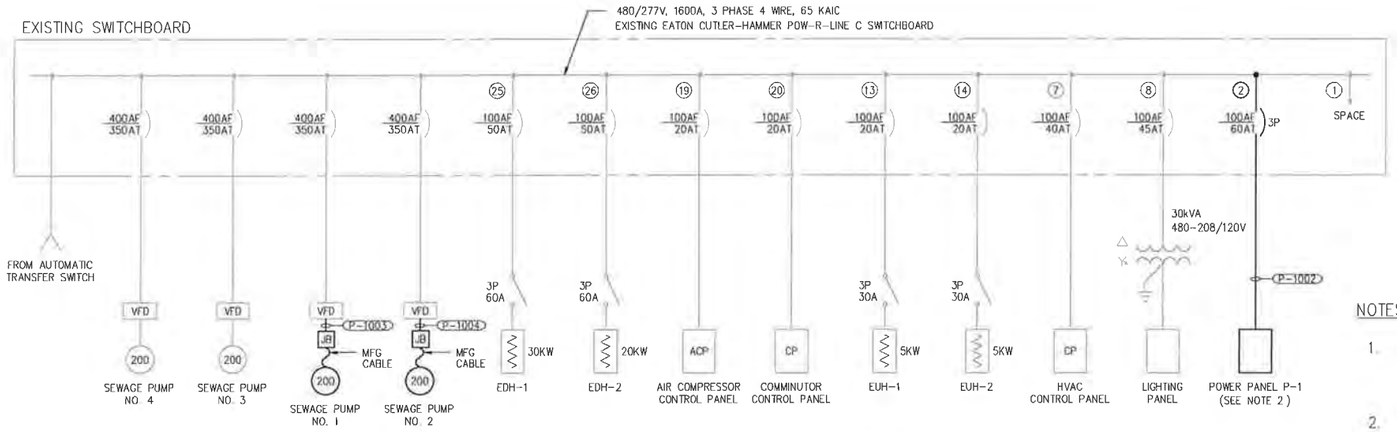
E-1
SHEET 16 OF 27

20170321 2:45P C:\31111-bal\31111-016\Drawings\03 project 2\04 Elec\E-1.dwg By MBROCATO Last Saved By: mbrocato



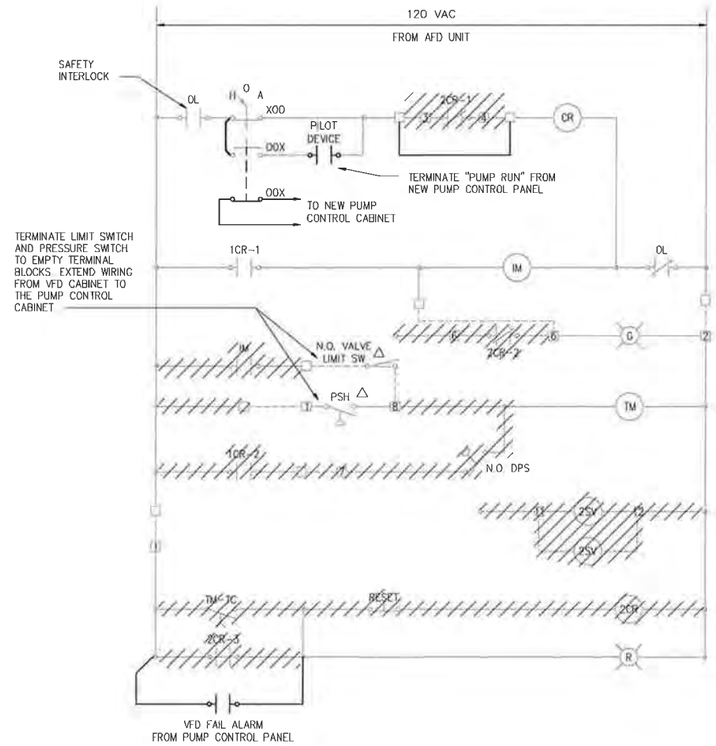
SWITCHBOARD ONE-LINE DIAGRAM - EXISTING & DEMO

NO SCALE



SWITCHBOARD ONE-LINE DIAGRAM - PROPOSED

NO SCALE



PUMP NO. 1 VFD CIRCUIT MODIFICATIONS

NO SCALE

(TYPICAL FOR PUMP NO. 2)

NOTES:

1. REMOVE EXISTING 20 AT BREAKER AND DELIVER TO THE OWNER FOR USE AS SPARE PARTS
2. PROVIDE NEW BREAKER IN EXISTING SWITCHBOARD CABINET.
3. EXISTING VFD CONTROL CIRCUITS ARE ARE CONCEPTUAL IN NATURE AND BASED ON INFORMATION PROVIDED BY OTHERS. CONTRACTOR SHALL VERIFY THE ACTUAL CIRCUIT CONFIGURATION PRIOR TO DEMOLITION.

LEGEND

- DEMOLISH/REMOVE
- EXISTING EQUIPMENT
- PROPOSED EQUIPMENT

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
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3/29/17

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DRAWN BY MRB
CHECKED BY JTH
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410-539-7681

PROJECT NO. 31111-020

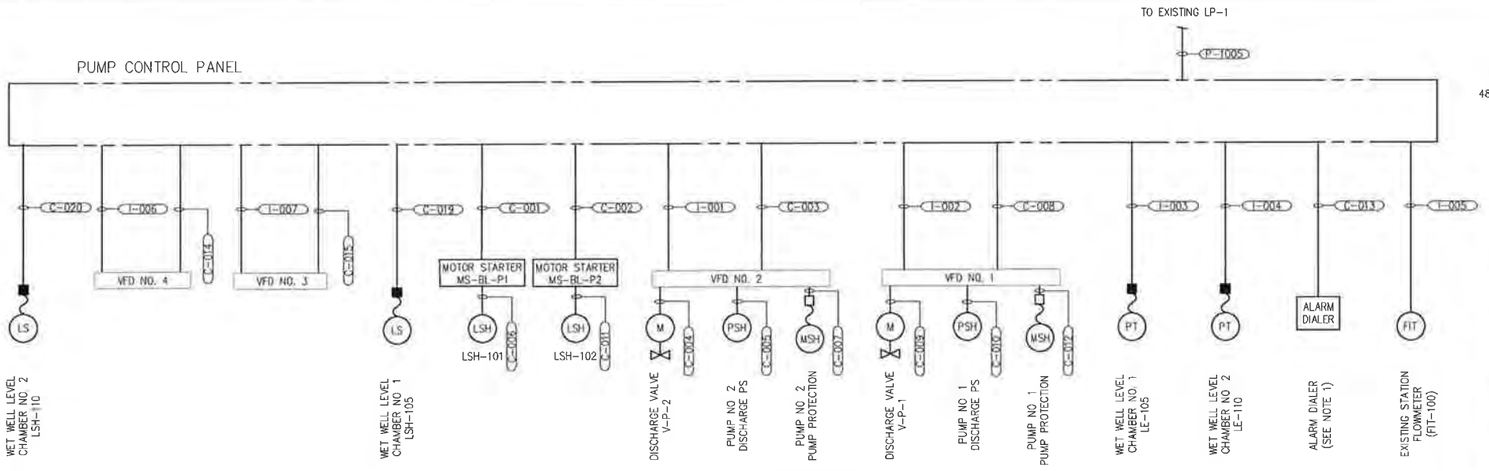
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
ONE-LINE DIAGRAMS & RISERS

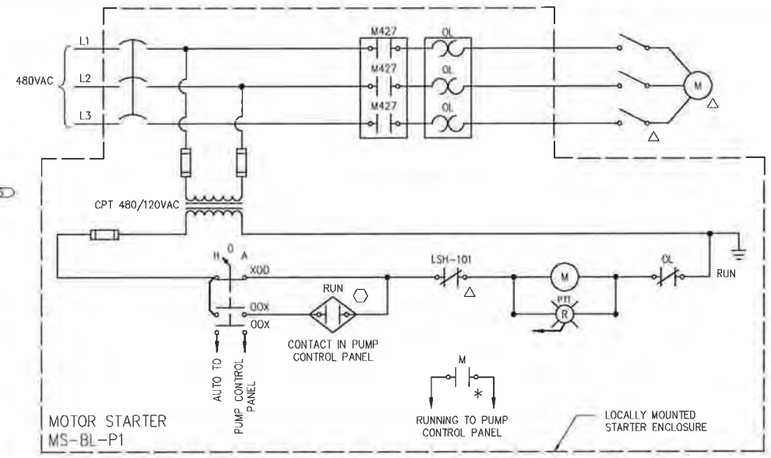
E-2

SHEET 17 OF 27



PUMP CONTROL PANEL ONE-LINE DIAGRAM

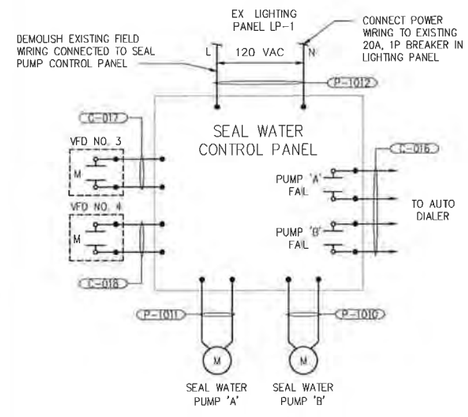
NO SCALE



MOTOR COOLING BLOWER BL-P1

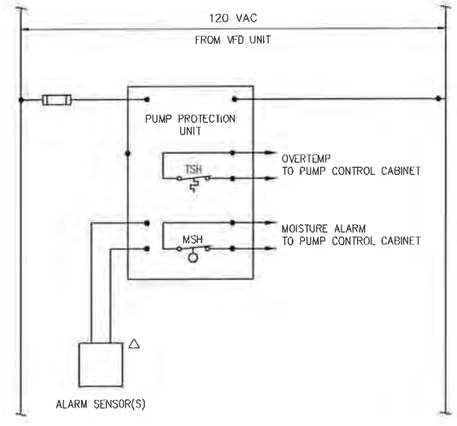
NO SCALE

(TYPICAL FOR BLOWER BL-P2)



SEAL WATER CONTROL PANEL

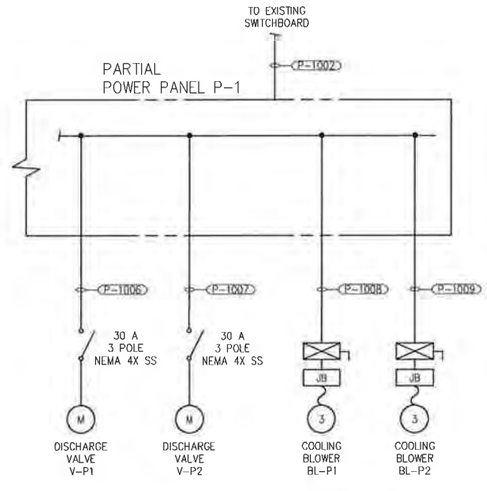
NO SCALE



PUMP NO. 1 - PUMP PROTECTION UNIT (TYPICAL FOR PUMP NO. 2)

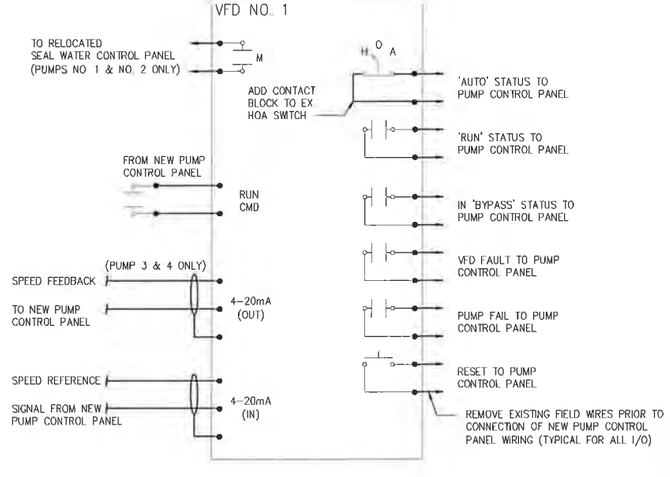
NO SCALE

(INSTALL IN EXISTING VFD CABINET)



PARTIAL PP-1 ONE-LINE

NO SCALE



PUMP NO. 1 - VFD CIRCUIT MODIFICATIONS

NO SCALE

(SEE NOTE 2)

LEGEND

- DEMOLISH/REMOVE EXISTING EQUIPMENT
- PROPOSED EQUIPMENT

NOTES:

1. REUSE EXISTING DIALER POWER CIRCUIT TO ENERGIZE THE NEW DIALER.
2. TYPICAL FOR PUMP NO. 1, NO. 2, NO. 3 AND NO. 4. ADDITIONAL CIRCUIT MODIFICATIONS SHOWN ON SHEET E-2.

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
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PROJECT NO. 31111-020	CATTAIL BRANCH SPS LEESBURG, VIRGINIA	E-3
DATE: MARCH 2017	ELECTRICAL ONE-LINE DIAGRAMS & RISERS	SHEET 18 OF 27

480/277 VOLTS
3 PHASE, 4 WIRE

POWER PANEL P1
MAIN BREAKER
60 A 3P

TYPE: NEMA 12
MOUNT: SURFACE

MODS	DESCRIPTION	WIRE	TRIP	POLE	No.	VOLT-AMPERES A	VOLT-AMPERES B	VOLT-AMPERES C	VOLT-AMPERES A	VOLT-AMPERES B	VOLT-AMPERES C	No.	POLE	TRIP	WIRE	DESCRIPTION	MODS
–	EXISTING PLC CONTROL PANEL (TEMPORARY)	P-1013	20	3	1	500			300			2					
					3		500			300		4	3	20		PUMP NO. 3 – DISCHARGE VALVE V-P-3 (FUTURE)	–
					5			–			300	6					
–	PUMP NO. 4 – DISCHARGE VALVE V-P-4 (FUTURE)		20	3	7	300			300			8					
					9		300			300		10	3	20	P-1006	PUMP NO. 1 – DISCHARGE VALVE V-P-1	–
					11			300			300	21					
–	PUMP NO. 2 – DISCHARGE VALVE V-P-2	P-1007	20	3	13	300			150			14					
					15		300			150		16	3	20		PUMP NO. 3 MOTOR COOLING BLOWER BL-P-3 (FUTURE)	–
					17			300			150	18					
–	PUMP NO. 4 MOTOR COOLING BLOWER BL-P-4 (FUTURE)		20	3	19	150			150			20					
					21		150			150		22	3	20	P-1008	PUMP NO. 1 MOTOR COOLING BLOWER BL-P-1	–
					23			150			150	24					
–	PUMP NO. 2 MOTOR COOLING BLOWER BL-P-2	P-1009	20	3	25	150			–			26					
					27		150			–		28	3	20		SPARE	–
					29			150			–	30					
–	SPARE		20	3	31	–			–			32					
					33		–			–		34	3	20		SPARE	–
					35			–			–	36					
–	SPARE		20	3	37	–			–			38					
					39		–			–		40	3	20		SPARE	–
					41			–			–	42					

TOTAL	1,400	1,400	900
PHASE TOTAL			
	2,300	2,300	1,800

900	900	900	TOTAL
TOTAL LOAD (VA)			
6,400			
TOTAL LOAD (A)			
8			

MODIFICATION (MODS) LEGEND:
GFCI – GROUND FAULT CIRCUIT INTERRUPTER
LOD – LOCK-ON DEVICE
LFD – LOCK-OFF DEVICE

NOTES:
65K AIC
100kA SPD

NO	ISSUED FOR	DATE	BY
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1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
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PROJECT NO. 31111-020
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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
POWER PANEL SCHEDULE

E-4
SHEET 19 OF 27

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
C-001	3/4"	CONTROL PANEL MS-BL-P1	PUMP CONTROL PANEL	8#14, 1#14 GND	2 SPARE
C-002	3/4"	CONTROL PANEL MS-BL-P2	PUMP CONTROL PANEL	8#14, 1#14 GND	2 SPARE
C-003	1"	PUMP NO. 2 VFD CABINET	PUMP CONTROL PANEL	34#14, 1#14 GND	6 SPARE
C-004	3/4"	PUMP NO. 2 VFD CABINET	DISCHARGE VALVE V-P-2	12#14, 1#14 GND	
C-005	3/4"	PUMP NO. 2 VFD CABINET	DISCHARGE PRESSURE SWITCH PSH-102	3#14, 1#14 GND	
C-006	3/4"	CONTROL PANEL MS-BL-P1	FLOAT SWITCH LSH-101	2#14, 1#14 GND	
C-007	1"	PUMP NO. 2 VFD CABINET	PUMP NO. 2 (MSH)	VENDOR CABLE	PUMP (MSH/TSH) SENSORS
C-008	1"	PUMP NO. 1 VFD CABINET	PUMP CONTROL PANEL	34#14, 1#14 GND	6 SPARE
C-009	3/4"	PUMP NO. 1 VFD CABINET	DISCHARGE VALVE V-P-1	12#14, 1#14 GND	
C-010	3/4"	PUMP NO. 1 VFD CABINET	DISCHARGE PRESSURE SWITCH PSH-101	3#14, 1#14 GND	
C-011	3/4"	CONTROL PANEL MS-BL-P2	FLOAT SWITCH LSH-102	2#14, 1#14 GND	
C-012	1"	PUMP NO. 1 VFD CABINET	PUMP NO. 1 (MSH)	VENDOR CABLE	PUMP (MSH/TSH) SENSORS
C-013	1"	ALARM DIALER	PUMP CONTROL CABINET	24#14, 1#14 GND	4 SPARE
C-014	1"	PUMP NO. 4 VFD CABINET	PUMP CONTROL CABINET	34#14, 1#14 GND	6 SPARE
C-015	1"	PUMP NO. 3 VFD CABINET	PUMP CONTROL CABINET	34#14, 1#14 GND	6 SPARE
C-016	3/4"	SEAL WATER CONTROL PANEL	AUTO DIALER	4 #14, 1#14 GND	
C-017	3/4"	PUMP NO. 3 VFD CABINET	SEAL WATER CONTROL PANEL	2 #14, 1#14 GND	
C-018	3/4"	PUMP NO. 4 VFD CABINET	SEAL WATER CONTROL PANEL	2 #14, 1#14 GND	
C-019	3/4"	PUMP CONTROL CABINET	LEVEL SWITCH LSH-105	2 #14, 1#14 GND	
C-020	3/4"	PUMP CONTROL CABINET	LEVEL SWITCH LSH-110	2 #14, 1#14 GND	
I-001	1"	PUMP NO. 2 VFD CABINET	PUMP CONTROL CABINET	2-(2/C#16 TSH), 1#14 GND	
I-002	1"	PUMP NO. 1 VFD CABINET	PUMP CONTROL CABINET	2-(2/C#16 TSH), 1#14 GND	
I-003	3/4"	PUMP CONTROL CABINET	PRESSURE TRANSDUCER PT-1	2/C#16 TSH, 1#14 GND	
I-004	3/4"	PUMP CONTROL CABINET	PRESSURE TRANSDUCER PT-2	2/C#16 TSH, 1#14 GND	
I-005	3/4"	PUMP CONTROL CABINET	EXISTING FLOW TRANSMITTER	2/C#16 TSH, 1#14 GND	
I-006	1"	PUMP NO. 4 VFD CABINET	PUMP CONTROL PANEL	2-(2/C#16 TSH), 1#14 GND	
I-007	1"	PUMP NO. 3 VFD CABINET	PUMP CONTROL PANEL	2-(2/C#16 TSH), 1#14 GND	

NO	ISSUED FOR	DATE	BY
2	ISSUED FOR BID	3/17	JTH
1	90% SUBMITTAL	6/16	JTH

COMMONWEALTH OF VIRGINIA
AARON W. DUKE
Lic. No. 32187
PROFESSIONAL ENGINEER
3/21/17

DESIGNED BY DPW
DRAWN BY MRB
CHECKED BY JTH
APPROVED BY AWD

Hazen
HAZEN AND SAWYER
1 SOUTH STREET, SUITE 1150; BALTIMORE, MD 21202
410-539-7681

PROJECT NO. 31111-020

DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
CONTROL SCHEDULE

E-5

SHEET 20 OF 27

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
P-1002	1" C	EXISTING SWITCHBOARD	POWER PANEL P-1	4-#6, 1#10 GND	
P-1003	4" C	PUMP NO. 1 VFD	PUMP NO. 1	VENDOR SUPPLIED CABLE	VIA JUNCTION BOX.
P-1004	4" C	PUMP NO. 2 VFD	PUMP NO. 2	VENDOR SUPPLIED CABLE	VIA JUNCTION BOX.
P-1005	3/4" C	EXISTING LIGHTING PANEL LP-1	NEW PUMP CONTROL PANEL	3#12, 1#12 GND	
P-1006	3/4" C	POWER PANEL P-1	DISCHARGE VALVE V-P-1	3#12, 1#12 GND	VIA DISCONNECT SWITCH
P-1007	3/4" C	POWER PANEL P-1	DISCHARGE VALVE V-P-2	3#12, 1#12 GND	VIA DISCONNECT SWITCH
P-1008	3/4" C	POWER PANEL P-1	COOLING BLOWER BL-P-1	3#12, 1#12 GND	VIA MOTOR STARTER
P-1009	3/4" C	POWER PANEL P-1	COOLING BLOWER BL-P-2	3#12, 1#12 GND	VIA MOTOR STARTER
P-1010	3/4" C	SEAL WATER CONTROL PANEL	SEAL WATER PUMP 'A'	2#12, 1#12 GND	
P-1011	3/4" C	SEAL WATER CONTROL PANEL	SEAL WATER PUMP 'B'	2#12, 1#12 GND	
P-1012	3/4" C	EXISTING LIGHTING PANEL LP-1	SEAL WATER CONTROL PANEL	2#12, 1#12 GND	
P-1013	3/4" C	POWER PANEL P-1	EXISTING PUMP CONTROL PANEL	2#12, 1#12 GND	TEMPORARY

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COMMONWEALTH OF VIRGINIA
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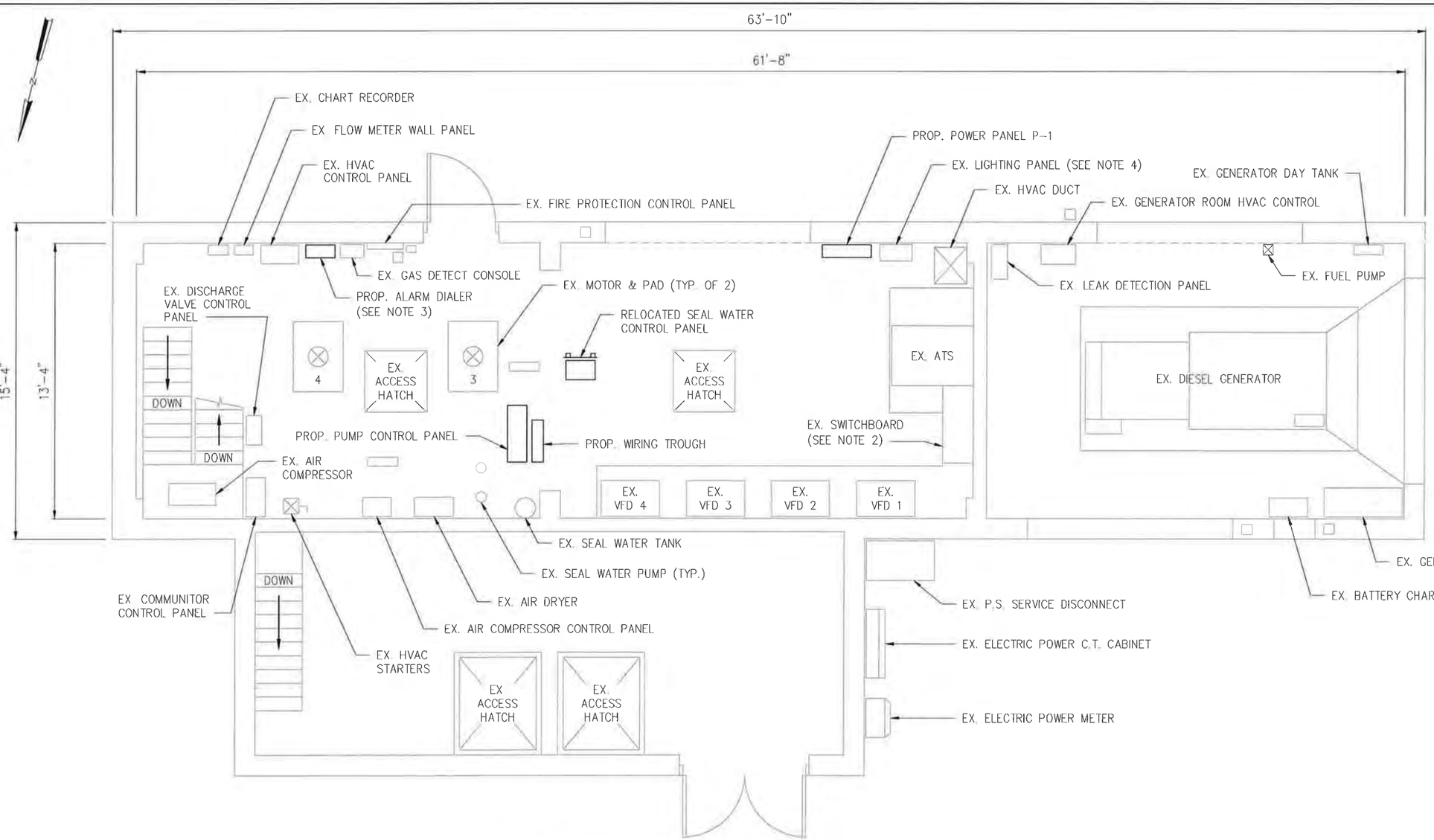
CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
POWER SCHEDULE

E-6

SHEET 21 OF 27



NOTES:

1. HVAC NOT SHOWN FOR CLARITY.
2. MODIFY EXISTING SWITCHBOARD AS INDICATED ON SHEET E-2.
3. REPLACE EXISTING ALARM DIALER WITH NEW UNIT AS SPECIFIED AND SHOWN. EXISTING DIALER LOCATION SHOWN ON DWG M-5.
4. ADD TWO NEW 20A, 1 POLE BREAKERS TO THE EXISTING LIGHTING PANEL FOR POWERING THE NEW PUMP CONTROL PANEL.
5. SEE DRAWING M-5 FOR THE LOCATION OF THE EXISTING SEAL WATER PUMP CONTROL PANEL SCHEDULED FOR RELOCATION.
6. UPPER PUMP ROOM IS CONSIDERED A DRY ENVIRONMENT.

PLAN - UPPER LEVEL @ EL. 215.10

3/16" = 1'-0"

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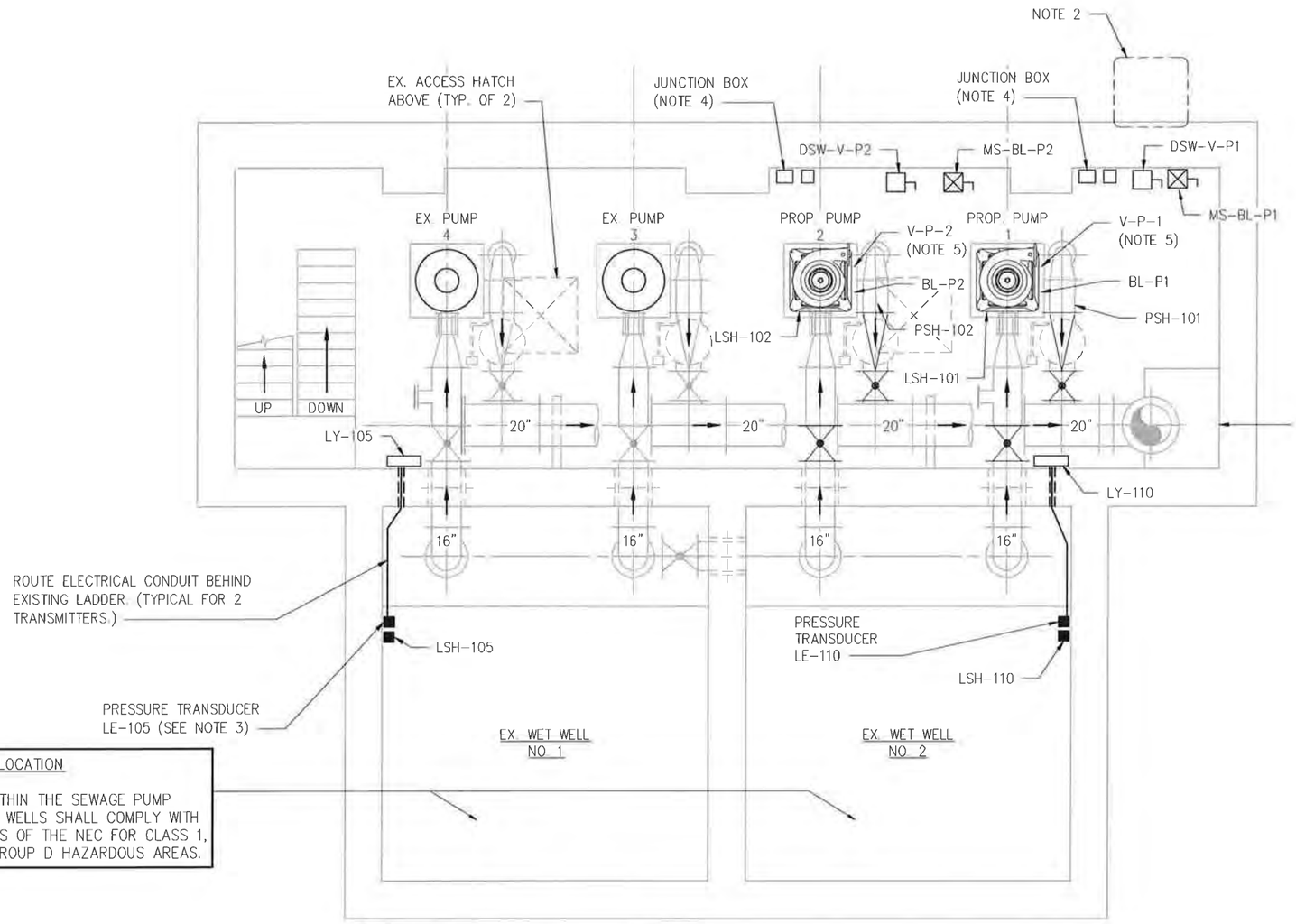
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
UPPER LEVEL PLAN

E-7

SHEET 22 OF 27



HAZARDOUS LOCATION

ALL WORK WITHIN THE SEWAGE PUMP STATION WET WELLS SHALL COMPLY WITH REQUIREMENTS OF THE NEC FOR CLASS 1, DIVISION 1, GROUP D HAZARDOUS AREAS.

NOTES:

1. HVAC NOT SHOWN FOR CLARITY.
2. SEE MECHANICAL SHEET M-2 FOR THE LOCATION OF EXISTING FLOW METER (FIT-100).
3. SEE DETAIL 2 ON SHEET E-9 FOR THE INSTALLATION REQUIREMENTS FOR THE SUBMERSIBLE PRESSURE TRANSMITTER.
4. TERMINATE VENDOR PROVIDED SUBMERSIBLE CABLE TO MOTOR FEEDERS IN A WALL MOUNTED JUNCTION BOX. SEE DETAIL 1 ON SHEET E-9. MOUNT AT ELEVATION 195'.
5. PUMP PROTECTION UNIT SENSORS (TSH/MSH) ARE MOUNTED WITHIN THE SUBMERSIBLE PUMP ENCLOSURE WITH A VENDOR PROVIDED CORD CONNECTION.
6. LOWER PUMP ROOM IS A WET ENVIRONMENT. ALL ELECTRICAL WORK PERFORMED IN THE AREA SHALL BE SUITABLE FOR THE ENVIRONMENT.

PLAN - LOWER LEVEL @ EL. 183.66

3/16" = 1'-0"

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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL
LOWER LEVEL PLAN

E-8
SHEET 23 OF 27

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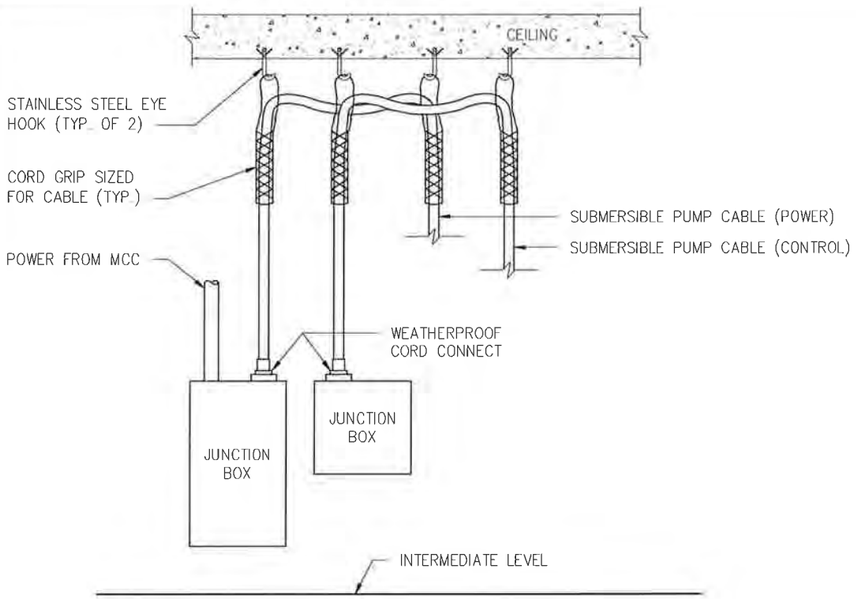


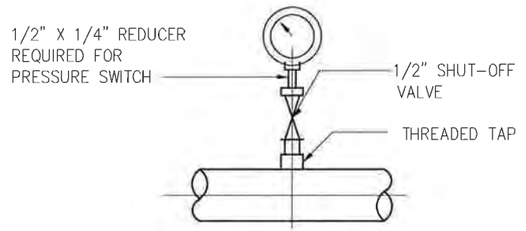
NOTES:

1. JUNCTION BOX SHALL BE WALL MOUNTED ON INTERMEDIATE LEVEL
2. CONTRACTOR SHALL COORDINATE CABLE ROUTING, GRIP, AND HANGER LOCATION WITH THE TOWN.

PUMP ELECTRIC FEED

DETAIL 1

NOT TO SCALE

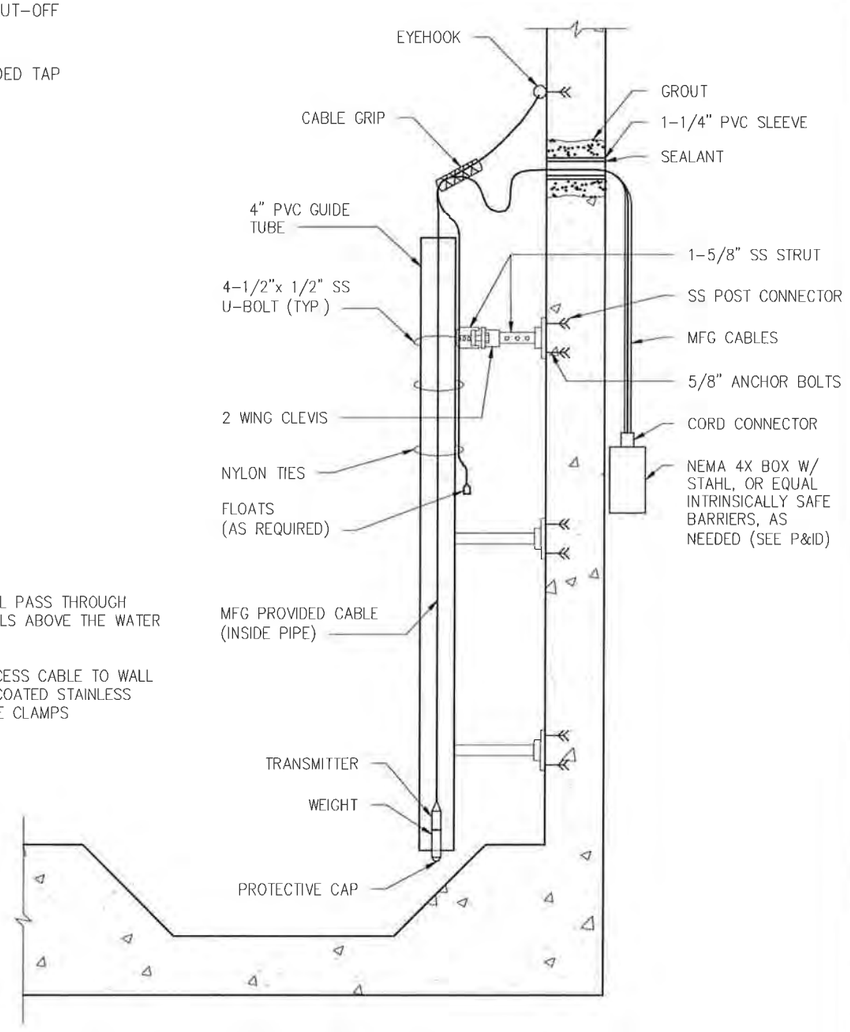


DETAIL 3

NOT TO SCALE

NOTES:

1. CABLE SHALL PASS THROUGH WETTED WALLS ABOVE THE WATER ELEVATION
2. ANCHOR EXCESS CABLE TO WALL WITH LDPE COATED STAINLESS STEEL CABLE CLAMPS



SUBMERSIBLE PRESSURE TRANSDUCER

DETAIL 2

1/8" = 1'-0"

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2	ISSUED FOR BID	3/17	JTH
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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

ELECTRICAL DETAILS

E-9

SHEET 24 OF 27

INSTRUMENT AND FUNCTION SYMBOLS

SINGLE INSTRUMENT OR OTHER DEVICE HAVING MULTIPLE FUNCTIONS OR SHARING A COMMON HOUSING

XXXX YYY — SOFTWARE LOGIC OR CONTROL MODULE XXXX AND SUB-MODULE YYY RESIDENT IN DISTRIBUTED CONTROL SYSTEM (DCS) OR PROGRAMMABLE LOGIC CONTROLLER (PLC) REFER TO CONTRACT DOCUMENTS FOR CONTROL AND MODULE DESCRIPTIONS

ZZZ — DESIGNATIONS OF CONTROL FUNCTIONS (ZZZ) ASSOCIATED WITH INSTRUMENT OR OTHER DEVICES.

AHC – AUTO/HOLD/CLOSE	OC – OPEN/CLOSE
AM – AUTO/MANUAL	OSC – OPEN/STOP/CLOSED
DEV – DEVIATION	POT – POTENTIOMETER
HOA – HAND/OFF/AUTO	RL – RAISE/LOWER
MOA – MANUAL/OFF/AUTO	RSL – RAISE/STOP/LOWER
HOR – HAND/OFF/REMOTE	SD – SHUTDOWN
LOS – LOCKOUT STOP	SEL – SELECT
LR – LOCAL/REMOTE	SP – SET POINT
LOR – LOCAL/OFF/REMOTE	SR – START/RESET
OO – ON/OFF	SS – START/STOP

A — INSTRUMENT PANEL MOUNTED WITH COMPUTING OR CONVERTING FUNCTION

CONVERT #/#

E – VOLTAGE	H – HYDRAULIC
I – CURRENT	O – ELECTROMAGNETIC, SONIC
P – PNEUMATIC	R – RESISTANCE (ELECT.)
A – ANALOG	D – DIGITAL
B – BINARY	

COMPUTE *

Σ SUMMING	x^n EXPONENTIAL
△ SUBTRACTOR	Σ/n AVERAGING
X MULTIPLYING	: RATIO
÷ DIVIDING	> HIGH SELECTING
$\sqrt{}$ ROOT EXTRACTION	< LOW SELECTING
K PROPORTIONAL	∫ INTEGRAL
d/dt DERIVATIVE	PID PID

XXX 000 — PANEL MOUNTED PILOT LIGHT

AIT 000 — ANALYZER, XXXX = TYPE

XXXX ALK	– ALKALINITY	O_3	– OZONE
CL_2	– CHLORINE CONCENTRATION	ORP	– OXIDATION/REDUCTION POTENTIAL
COMB	– COMBUSTIBLE GAS		
COND	– CONDUCTIVITY	pH	– HYDROGEN ION CONCENTRATION
DO	– DISSOLVED OXYGEN		
H_2S	– HYDROGEN SULFIDE	TH	– TOTAL HARDNESS
LEL	– LOWER EXPLOSIVE LIMIT	UV	– ULTRAVIOLET
O_2	– OXYGEN CONCENTRATION		

(*) ASTERISK IDENTIFIES FIELD INSTRUMENTS FURNISHED BY EQUIPMENT SUPPLIER

⊕ ASTERISK IDENTIFIES LOCAL CONTROL PANELS FURNISHED BY EQUIPMENT SUPPLIER

◇* OPERATIONAL INTERLOCK

◇1 COMPLEX INTERLOCK

◇# # = 1, 2, 3, etc. INTERLOCK NUMBER DESCRIPTION ON SAME SHEET

◇AND AND LOGIC

◇OR OR LOGIC

INSTRUMENT AND FUNCTION SYMBOLS, CONT'D

	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILLARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE OR BEHIND THE PANEL DEVICES OR FUNCTIONS
FIELD/PANEL EQUIPMENT	XXX 000	XXX 000	XXX 000	XXX 000
SHARED DISPLAY, SHARED CONTROL (DIT)	XXX 000	XXX 000	XXX 000	XXX 000
PROGRAMMABLE LOGIC CONTROLLER	XXX 000	XXX 000	XXX 000	XXX 000
SUPERVISORY COMPUTER FUNCTION (HMI/SERVER)	ABC 12345	ABC 12345	ABC 12345	ABC 12345

INSTRUMENT SYMBOLS

M MAGNETIC FLOW METER	VENTURI FLOW TUBE	TURBINE FLOW METER	FI ROTAMETER	ULTRASONIC FLOW METER	PADDLE WHEEL FLOW METER	VORTEX FLOW METER	POSITIVE DISPLACEMENT FLOW METER
PITOT TUBE	PARSHALL FLUME	WEIR	ORIFICE PLATE	STRAIGHTENING VANES	ULTRASONIC LEVEL SENSOR	SUBMERSIBLE LEVEL SENSOR	FLOAT TYPE LEVEL SWITCH
TAPPED RING SEAL	DIAPHRAGM SEAL	FULL LINE RING SEAL	VALVED TAP	RTD AND THERMOWELL	RADAR LEVEL SENSOR (UNGUIDED)	RADAR LEVEL SENSOR (GUIDED)	CAPACITANCE LEVEL SENSOR
SB SIGNAL BOOSTER	123 SEQUENTIAL EQUIPMENT	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT		

INSTRUMENT/DEVICE IDENTIFICATION LETTERS

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C				CONTROL	CLOSE, CLOSED
D		DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT SENSOR		
F	FLOW RATE	FRACTION RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	ELECTRICAL CURRENT		INDICATE		
J	POWER	SCANE			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M		MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE				
O			ORIFICE, RESTRICTION		OPEN, OPENED
P	PRESSURE, VACUUM		TEXT POINT CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RUN		RECORD & STORE	REPORT	
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, VOLUME MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	FAILURE OR TROUBLE	X AXIS			
Y	EVENT, STATE/PRESENCE	Y AXIS		COMPUTE, REVERT, RELAY	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

VALVE AND ACTUATOR SYMBOLS

GENERIC VALVE	PLUG VALVE	GLOBE VALVE	BALL VALVE
BALL VALVE (3-WAY)	3-WAY VALVE (GENERAL)	PINCH VALVE	COMBINATION VACUUM AND PRESSURE RELIEF VALVE
BUTTERFLY VALVE	SWING CHECK VALVE	BALL CHECK VALVE	DIAPHRAGM VALVE
NEEDLE VALVE	ANGLE VALVE	ROTARY VALVE	THROUGH PLUG VALVE
PRESSURE RELEIF OR SAFETY VALVE	VACUUM RELIEF VALVE	PRESSURE-REDUCING REGULATOR	BACKPRESSURE REGULATOR
BACKFLOW PREVENTER	SLUICE GATE	STOP/SLIDE GATE	STRAINER
V BACKFLOW PREVENTER	M ELECTRIC ACTUATOR	S SOLENOID ACTUATOR	P PNEUMATIC ACTUATOR
I/P ELECTROPNEUMATIC ACTUATOR	I/H ELECTROHYDRAULIC ACTUATOR	HAND WHEEL	HYDRANT
CENTRIFUGAL PUMP			

LINETYPE LEGEND

- MAJOR PROCESS PIPES OR CHANNELS
- SECONDARY PROCESS OR MECHANICAL CONNECTIONS
- CAPILLARY OR IMPULSE TUBING
- AIR SUPPLY OR SIGNAL
- HYDRAULIC SUPPLY OR SIGNAL
- ELECTRICAL SIGNAL
- DATA LINK OR INTERNAL SOFTWARE LINK
- PROCESS FLOW
- TYPICAL PUMP
- PUMPING STATION EQUIPMENT

NO	ISSUED FOR	DATE	BY
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AARON W. DUKE
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3/29/17

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PROJECT NO. 31111-020

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CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

INSTRUMENTATION
LEGEND, SYMBOLS, AND ABBREVIATIONS

I-1

SHEET 25 OF 27

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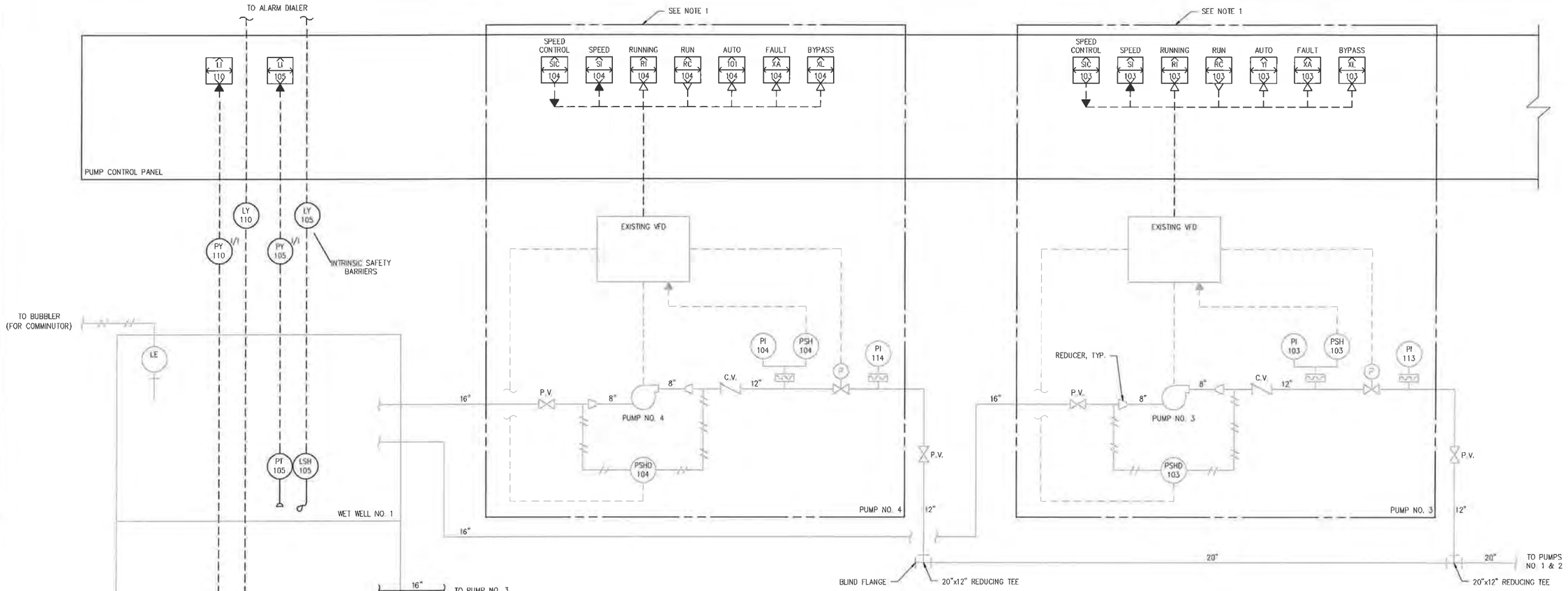

NOTES:

1. PLC I/O SHALL BE PROVIDED TO SUPPORT THE FUTURE REPLACEMENT OF PUMPS NO. 3 AND NO. 4 WITH UNITS SIMILAR TO THE DRY PIT SUBMERSIBLES SHOWN ON SHEET I-3 SEE SPECIFICATION SECTION 17920

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PROJECT NO. 31111-020

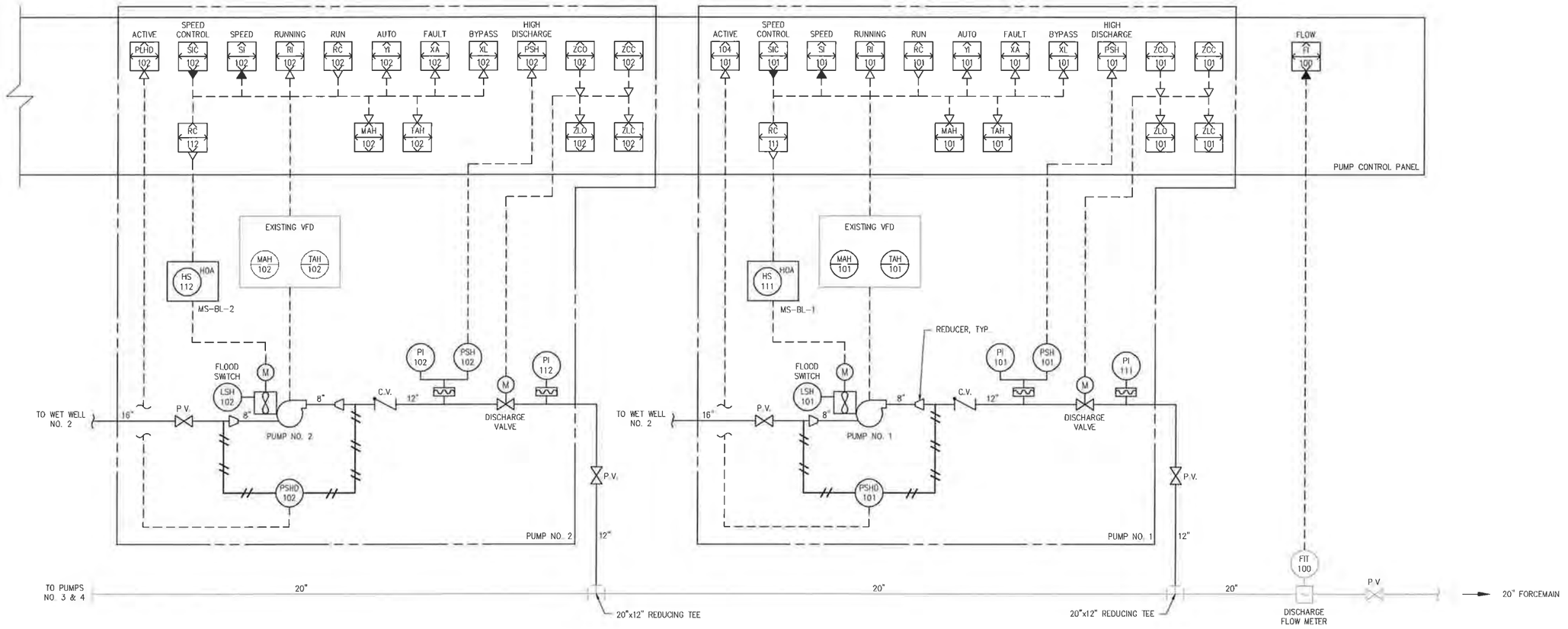
DATE: MARCH 2017

CATTAIL BRANCH SPS
LEESBURG, VIRGINIA

INSTRUMENTATION
P&ID

I-2

SHEET 26 OF 27



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INSTRUMENTATION
P&ID

I-3

SHEET 27 OF 27