TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

Addendum #1
To the Plans and Specifications
Pump Station Maintenance and Improvements Project
DPW-17-B-011

Issued November 28, 2016

GENERAL INFORMATION FOR ADDENDUM 01

- The following changes and/or additions are hereby made to the Plans and Specifications for the above-referenced project under the provisions of Section 00200, Article 7 of the Instruction to Bidders.
- The attention of all bidders submitting proposals for the above referenced project is called to the following Addendum to the drawings and specifications (Contract Documents). The items set forth herein, whether of omission, addition, substitution, or clarification, are all to be included in and form a part of the proposed work.
- Inclusion of this Addendum must be acknowledged by the bidders by inserting its number on the appropriate line on Page 00410-4 of the Form for General Bid and on Page 00420-4 of the Form for Sub-Bid. Failure to acknowledge any and all addenda in the above specified bid form may be cause for rejection of the bid by the Town of Westwood, on the grounds that the bid is not responsive.

Make the following changes, revision, additions, and/or deletions to the Contract Documents:

DRAWINGS CHANGES

Sheets 1 through 10

Add the attached new sheets 1 through 10 titled, "PUMP STATION MAINTENANCE & IMPROVEMENTS PROJECT", dated November, 2016. Original drawing size is 22"x34".

SPECIFICATION CHANGES

1. ***Delete and Replace Section 13420 - Instrumentation***

Delete Section 13420 - Instrumentation, in its entirety and replace with the attached updated Section 13420 - Instrumentation.

2. ***Insert Section 13460 – Programmable Logic Controllers (PLCs)***

Insert the attached Section 13460 – Programmable Logic Controllers (PLCs)

3. Modify Section 16050 – Basic Electrical Requirements, paragraph 1.1.A.

Modify Section 16050 – Basic Electrical Requirements, paragraph 1.1.A. to state, "…Sub-bid for Sections: 13420, ***13460****, All Division 16"*

QUESTIONS, RESPONSES AND CLARIFICATIONS

Questions Submitted from Prospective Bidders and Responses:

None to date.

Addendum 01 Attachments:

1. Drawing Sheets 1 through 10, PUMP STATION MAINTENANCE & IMPROVEMENTS PROJECT
2. Section 13420 - Instrumentation
3. Section 13460 - Programmable Logic Controllers (PLCs)

J:\W\W2061 Westwood PS Eval\Bidding\Addendum\DPW-17-C-011 Pump Station Addendum 01.doc

TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

ADDENDUM 01 RECEIPT ACKNOWLEDGEMENT FORM

PLEASE ACKNOWLEDGE RECEIPT OF THIS ADDENDUM 01 BY SIGNING BELOW AND RETURNING THIS SHEET ONLY TO WESTWOOD PROCUREMENT DEPARTMENT, PROCUREMENT@TOWNHALL.WESTWOOD.MA.US.

Addendum #1
To the Plans and Specifications
Pump Station Maintenance and Improvements Project
DPW-17-B-011

Signature _____

Name _____
(Please Print)

Title _____

Company _____

Date _____

Attachment 1

Drawing Sheets 1 through 10, PUMP STATION MAINTENANCE & IMPROVEMENTS PROJECT

PUMP STATION MAINTENANCE & IMPROVEMENTS PROJECT

BOARD OF SEWER COMMISSIONERS
TOWN OF WESTWOOD, MASSACHUSETTS

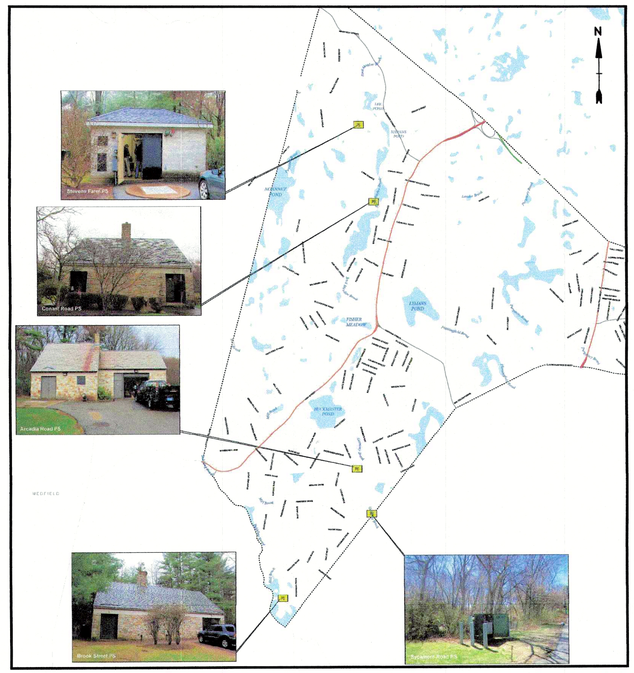
NOVEMBER 2016

BOARD OF SEWER COMMISIONERS

JAMES M. CONNORS, CHAIRMEN
FRANCIS MACPHERSON, CLERK
ANTHONY J. ANTONELLIS, THIRD MEMBER

DEPARTMENT OF PUBLIC WORKS

TODD KORCHIN, DIRECTOR



LOCATION PLAN
NO SCALE

SHEET NO.	TITLE
1	COVER SHEET
2	LEGEND, ABBREVIATIONS, AND GENERAL NOTES
3	DEMOLITION - MECHANICAL
4	CONANT ROAD PUMP STATION MECHANICAL LOWER LEVEL
5	BROOK STREET PUMP STATION MECHANICAL LOWER LEVEL
6	BROOK STREET PUMP STATION ELECTRICAL PLAN
7	CONANT ROAD PUMP STATION ELECTRICAL PLAN
8	STEVENS FARM ROAD PUMP STATION ELECTRICAL PLAN
9	ARCADIA ROAD PUMP STATION ELECTRICAL PLAN
10	SYCAMORE DRIVE PUMP STATION ELECTRICAL PLAN

Tighe&Bond
Consulting Engineers

COMMONWEALTH OF MASSACHUSETTS
IAN B. GATLOW
CIVIL
NO. 48112
REGISTERED PROFESSIONAL ENGINEER
11-23-16

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. SEIGAL
REGISTERED PROFESSIONAL ENGINEER

COMPLETE SET 10 SHEETS

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET1.DWG
SAVE DATE: 11/22/2016 2:56 PM
PLOT DATE: 11/28/2016 12:51 PM

LEGEND

SANITARY SEWER	SFM
GAS	G
ELECTRICAL	E
STORM DRAIN	
EDGE OF PAVEMENT	
UTILITY POLE	
CATCH BASIN	
MANHOLE	
BOLLARD	
SLUICE GATE	
PUMP	
DRAIN GRATING	

ELECTRICAL LEGEND

	CONDUIT
	CONDUIT TO BE REMOVED
J	JUNCTION BOX
	30 AMP UNFUSED DISCONNECT SWITCH
5	MOTOR, 5 HP
PS	PRESSURE SWITCH
	WALL MOUNTED LIGHT FIXTURE
	CEILING MOUNTED LIGHT FIXTURE
	EXIT SIGN
M	MOTORIZED DAMPER
	EMERGENCY LIGHT
$	WALL MOUNTED TOGGLE SWITCH
PS	PRESSURE SWITCH
	DUPLEX RECEPTACLE
TH	THERMOSTAT
FS	FLOW SWITCH
PC	PHOTOCELL
	UTILITY METER
EUH-1	ELECTRIC UNIT HEATER
1	PHOTOGRAPH LOCATION
	EQUIPMENT, STRUCTURES, PIPING AND/OR CONDUIT TO BE DEMOLISHED
5	KEYED ELECRTRICAL NOTE
	PUSHBUTTON STATION
	ELECTRICAL EQUIPMENT
CLASS I DIV. 1 DAMP/CORROSIVE / NEMA 3R	SPACE RATING FOR ALL ELECTRICAL EQUIPMENT

GENERAL NOTES

1. CONTRACT DRAWINGS BASED ON THE FOLLOWING RECORD DRAWINGS:

   CONTRACT NO.1: PUMPING STATIONS NO. 4 & 5, WESTWOOD, MA. WHITEMAN & HOWARD 1977.

   CONTRACT NO. 93–1: REVOCATIONS & ADDITIONS TO ARCADIA PUMP STATION, WESTWOOD, MA. VOLLMER ASSOCIATES 1993.

   CONTACT NO. 11: GRINDER PUMPING STATION, WESTWOOD, MA. WHITMAN & HOWARD 1983.

   STEVENS FARM ESTATES, WESTWOOD, MA. ROTANDO/CARLGEN, INC. 1996.

2. ALL UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM AVAILABLE RECORD PLANS FROM VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD. BEFORE EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION OR REPAIRING, ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE CONTACTED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS GENERAL LAWS. WE ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE APPROPRIATE UTILITY ENGINEERING DEPARTMENT MUST BE CONSULTED. CALL DIGSAFE AT 1–888–344–7233.

3. ALL UNPAVED AREAS DISTURBED BY THE WORK SHALL BE REGRADED TO ORIGINAL CONTOURS OR PROPOSED CONTOURS AS REQUIRED BY THE DRAWINGS. THE CONTRACTOR SHALL LOAM AND SEED OR RESTORE TO EXISTING SURFCE TREATMENT IN KIND ALL UNPAVED AREAS DISTURBED BY THE WORK.

4. THE CONTRACTOR SHALL REPAIR/REPLACE ALL PAVED SURFACES DISTURBED BY THE WORK WITH A BITUMINOUS CONCRETE TRENCH REPAIR AS SPECIFIED IN THE PROJECT MANUAL.

5. UNDER NO CIRCUMSTANCE SHALL EMERGENCY ACCESS BE RESTRICTED DURING THE PROJECT.

6. LIGHT LINES AND TEXT INDICATE APPROXIMATE EXISTING CONDITIONS.

7. BOLD LINES AND TEXT INDICATE PROPOSED WORK.

8. ALL STRUCTURES, UTILITIES, EQUIPMENT AND PIPING LAYOUT ELEVATIONS AND DIMENSIONS SHALL BE FIELD VERIFIED AND COORDINATED WITH EQUIPMENT SUPPLIED, AND/OR EXISTING CONDITIONS. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AS REQUIRED PRIOR TO BEGINNING CONSTRUCTION OF ALL NEW FACILITIES, EQUIPMENT OR PIPING THAT MAY BE AFFECTED.

9. PROTECT ALL PIPELINES AND STRUCTURES INSTALLED UNDER THIS CONTRACT AGAINST DAMAGE.

10. COMPLY WITH OSHA'S LATEST STANDARDS FOR EXCAVATION SAFETY, INCLUDING THE PROVISION FOR A COMPETENT PERSON ON SITE AND ANY REQUIRED DOCUMENTATION THAT MAY REQUIRE CERTIFICATION BY A PROFESSIONAL ENGINEER.

11. LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE SPECIFIED.

12. PUMP STATIONS SHALL REMAIN FULLY OPERABLE AT ALL TIMES. IF A PUMP STATION IS REQUIRED TO SHUT DOWN BY CONTRACTOR OR SUBCONTRACTOR, THEN TEMPORARY BYPASS PUMPING SHALL BE PROVIDED AT NO COST TO THE OWNER.

GENERAL ELECTRICAL NOTES

1. EQUIPMENT SHALL BE FASTENED USING THE FOLLOWING MEANS BASED ON THE TYPE OF WALL OR SURFACE:

   a. FOR MOUNTING TO CONCRETE (CMU OR PRECAST), USE CRACKED–CONCRETE RATED EXPANDING SHEATH CONCRETE ANCHORS.

   b. FOR MOUNTING TO METAL COLUMNS, METAL EQUIPMENT FRAME, OR METAL MOUNTING PLATES, USE STAINLESS STEEL STUD WELD WITH STAINLESS STEEL ACORN NUT.

   c. FOR MOUNTING TO INSULATED METAL PANELS (IMP), USE POPNUT OR PLASTISOL COATED JACKNUT THREADED INSERT MANUFACTURED BY EMHART TECHNOLOGIES OR AU–VE–CO PRODUCTS WITH STAINLESS STEEL SCREWS.

2. REFER TO DIVISION 16 SPECIFICATIONS FOR ADDITIONAL INFORMATION.

3. UNLESS OTHERWISE INDICATED ON DRAWINGS, ELECTRICAL DUCT BANK CONCRETE ENCASING SHALL BE CONTINUOUS ALONG THE ENTIRE LENGTH OF THE DUCT BANK.

4. WHERE CONCRETE ENCASING IS NOT SHOWN FOR DUCT BANKS, PROVIDE #8 WASHED GRAVEL FILL. A VIBRATORY PLATE SHALL BE RUN OVER THE TOP TO SETTLE THE GRAVEL TO NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY STANDARD COMPACTION TESTS, AASHTO T180 OR ASTM D698. GRAVEL FILL SHALL PROVIDE COVERAGE OF 6" AROUND THE CONDUIT IN ALL DIRECTIONS.

5. PROVIDE SAND FILL AROUND POWER, LIGHTING AND SECURITY CONDUITS PER DETAIL SD–101

6. FASTENERS AND MATERIALS SHALL BE OF THE MATERIAL TYPE SPECIFIED BY THE NEMA CLASSIFICATION FOR THE AREA, UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS OR DETAILS.

Tighe&Bond
Consulting Engineers
www.tighebond.com

COMMONWEALTH OF MASSACHUSETTS STEPHEN E. SEIGAL No. 32031 REGISTERED PROFESSIONAL ENGINEER
11/28/16

COMMONWEALTH OF MASSACHUSETTS IAN R. CATLOW CIVIL NO. 46112 REGISTERED PROFESSIONAL ENGINEER
11-28-16

Board of Sewer Commissioners

Pump Station Maintenance & Improvements Project

Westwood, Massachusetts

Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET2.dwg
DRAWN BY:	TMP, DOR
CHECKED:	IBC
APPROVED BY:	SES

LEGEND, ABBREVIATIONS, AND GENERAL NOTES

SCALE: NO SCALE

SHEET 2

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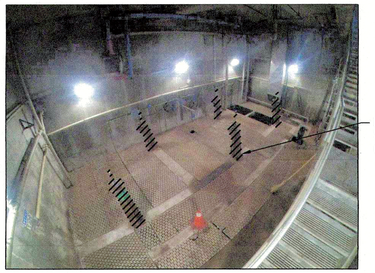
PLOT DATE: 11/28/2016 12:51 PM

PHOTO #1
BROOK STREET PUMP STATION



REMOVE EXISTING SLUICE GATES (TYP OF 5)

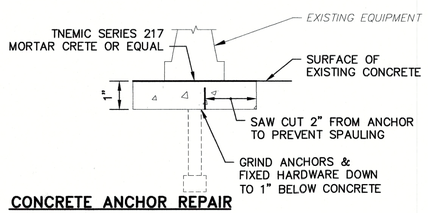
PHOTO #2
BROOK STREET PUMP STATION

REMOVE EXISTING SLUICE GATES (TYP OF 5)

PHOTO #3
BROOK STREET PUMP STATION

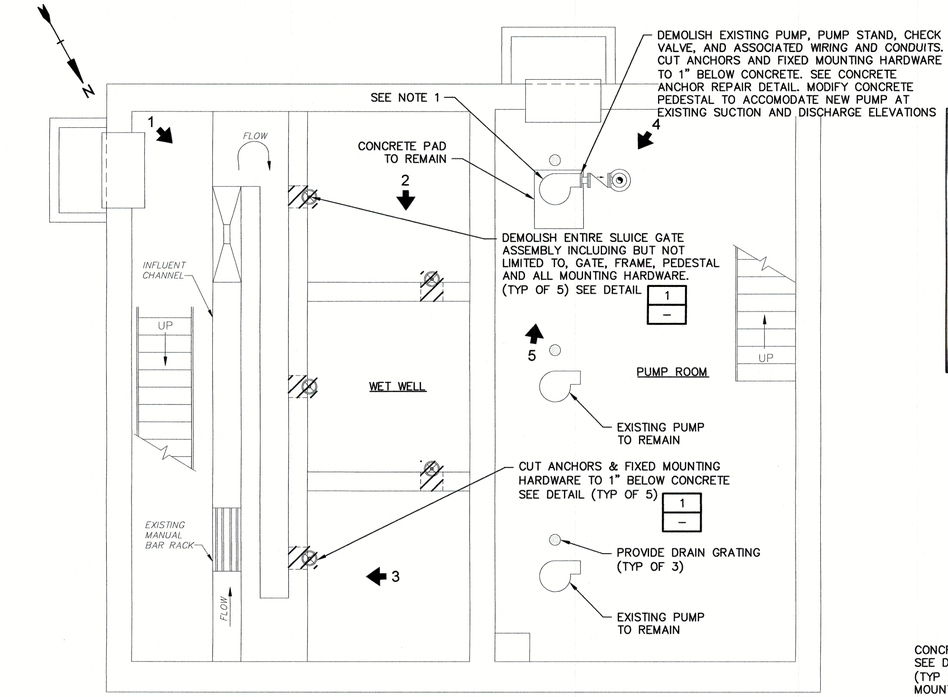
NOTES:

1. DIMENSIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED BY CONTRACTOR.
2. A DEPRESSION FILLED WITH GROUT, ASPHALT OR OTHER MATERIAL MAY BE LOCATED ON WET WELL TANK BOTTOM AT OPENING INTERFACE. CLEAN OUT DURING REMOVAL AND RE-OGROUT DURING GATE INSTALLATION.
3. CONTRACTOR TO MODIFY EXISTING GRATING TO ACCOMODATE NEW SLUICE GATES. PROVIDE ADDED GRATING SUPPORT AS NEEDED TO PREVENT DEFLECTION.
4. MANUFACTURER TO PROVIDE HAND CRANK TYPE SLUICE GATE IN LIEU OF HAND WHEEL TYPE CRANK.

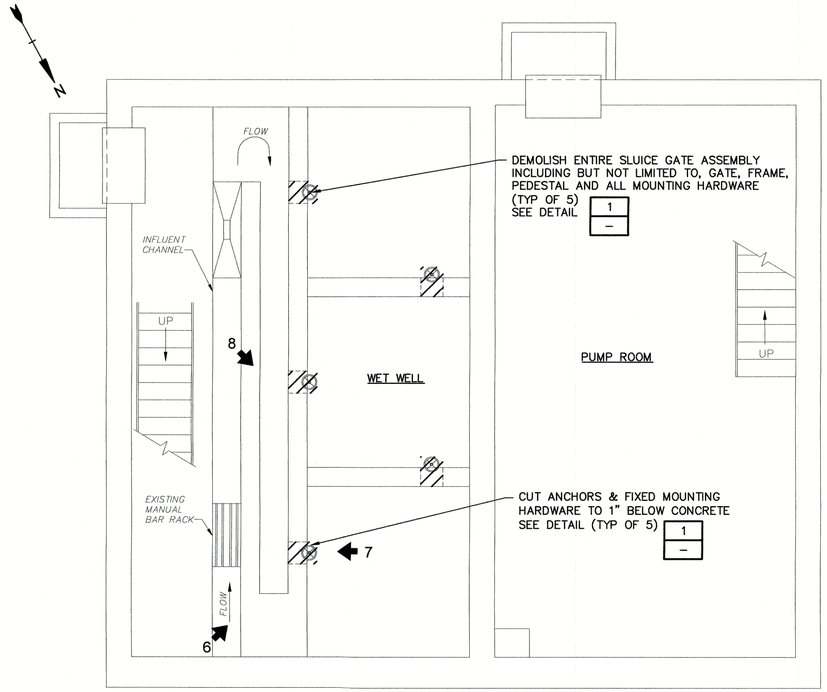


CONCRETE ANCHOR REPAIR

DETAIL	1
NO SCALE	–



BROOK STREET PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"



CONANT ROAD PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

PHOTO #4
BROOK STREET PUMP STATION

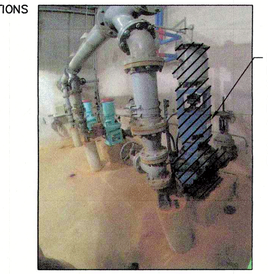
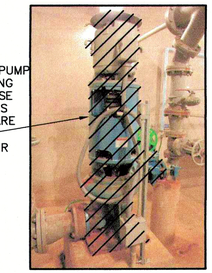
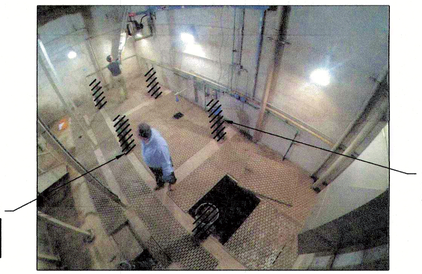


PHOTO #5
BROOK STREET PUMP STATION



REMOVE EXISTING FAIRBANKS MORSE PUMP, CHECK VALVE, PUMP STAND, AND ASSOCIATED WIRING AND CONDUITS. CONCRETE BASE PAD TO REMAIN. CUT ANCHORS AND FIXED MOUNTING HARDWARE TO 1" BELOW CONCRETE. SEE CONCRETE ANCHOR REPAIR DETAIL.

PHOTO #6
CONANT ROAD PUMP STATION



REMOVE EXISTING SLUICE GATES (TYP OF 5)

CONCRETE REPAIR SEE DETAIL 1 – (TYP ALL MOUNTING HARDWARE)

PHOTO #7
CONANT ROAD PUMP STATION

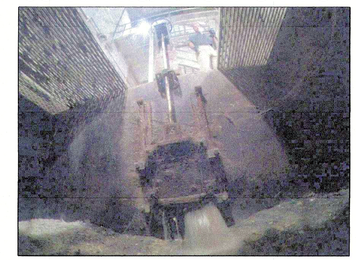
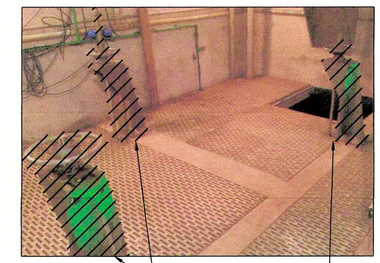


PHOTO #8
CONANT ROAD PUMP STATION



REMOVE EXISTING SLUICE GATES (TYP OF 5)

GENERAL DEMOLITION NOTES:

1. OWNER RETAINS RIGHT OF FIRST REFUSAL FOR ALL ITEMS TO BE REMOVED OR DEMOLISHED. CONTRACTOR SHALL TAKE REASONABLE CARE TO AVOID DAMAGE TO ALL ITEMS TO BE RETAINED BY OWNER.
2. COORDINATE SEQUENCE OF DEMOLITION AND REMOVAL WITH INSTALLATION OF NEW EQUIPMENT.
3. CONANT ROAD FLOOR PLAN COPIED FROM PLAN SET TITLED "CONTRACT NO. 1; PROPOSED PUMPING STATIONS NO. 4 & 5 WESTWOOD, MA" BY WHITMAN & HOWARD, INC., DATED 1977. ADDITIONAL CONANT ROAD AND BROOK STREET PUMP STATION PLAN DRAWN BASED ON APPROXIMATE FIELD MEASUREMENTS.
4. FOR ITEMS BEING DEMOLISHED, REMOVE EXISTING MOUNTING HARDWARE. FILL OPENINGS WITH TNEMIC SERIES 217 MORTAR CRETE AND REPAINT OR COAT TO MATCH EXISTING ADJACENT SURFACE. APPLY SIMILAR FINISH TO CONCRETE SURFACES DAMAGED BY CONSTRUCTION.
5. DEMOLITION ACTIVITIES SHALL BE PROVIDED IN ACCORDANCE WITH AN ENGINEER APPROVED DEMOLITION SCHEDULE.
6. CONTRACTOR AND SUBCONTRACTOR SHALL NOT ACTIVATE OR DEACTIVATE ANY EQUIPMENT OR DEVICES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY AND/OR PERMANENT RELOCATION OF PIPE, CONDUIT AND WIRE, OR OTHER UTILITIES NECESSARY FOR DEMOLITION OF EXISTING EQUIPMENT, OR INSTALLATION OF NEW EQUIPMENT.
8. DEMOLITION OF ELECTRICAL EQUIPMENT SHALL OCCUR ONLY AFTER THE UNIT/SYSTEM IS DE-ENERGIZED BY THE OWNER, AND ELECTRICALLY DISCONNECTED (AT THE POWER SOURCE) BY THE ELECTRICAL SUBCONTRACTOR.
9. LIGHT LINES AND TEXT INDICATE APPROXIMATE EXISTING CONDITIONS. BOLD LINES AND TEXT INDICATE ITEMS TO BE DEMOLISHED.

LEGEND:

EQUIPMENT, STRUCTURES, PIPING AND/OR CONDUIT TO BE DEMOLISHED

1 PHOTOGRAPH LOCATION

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Consulting Engineers
www.tighebond.com

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. SEIGAL
No. 30031
REGISTERED PROFESSIONAL ENGINEER
11/28/16

COMMONWEALTH OF MASSACHUSETTS
IAN B. CATLOW
CIVIL
NO. 48112
REGISTERED PROFESSIONAL ENGINEER
11-28-16

Board of Sewer Commissioners

Pump Station Maintenance & Improvements Project

Westwood, Massachusetts

Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET3.dwg
DRAWN BY:	JMH, TMP, DOR
CHECKED:	IBC
APPROVED BY:	SES

DEMOLITION - MECHANICAL

SCALE: AS SHOWN

SHEET 3

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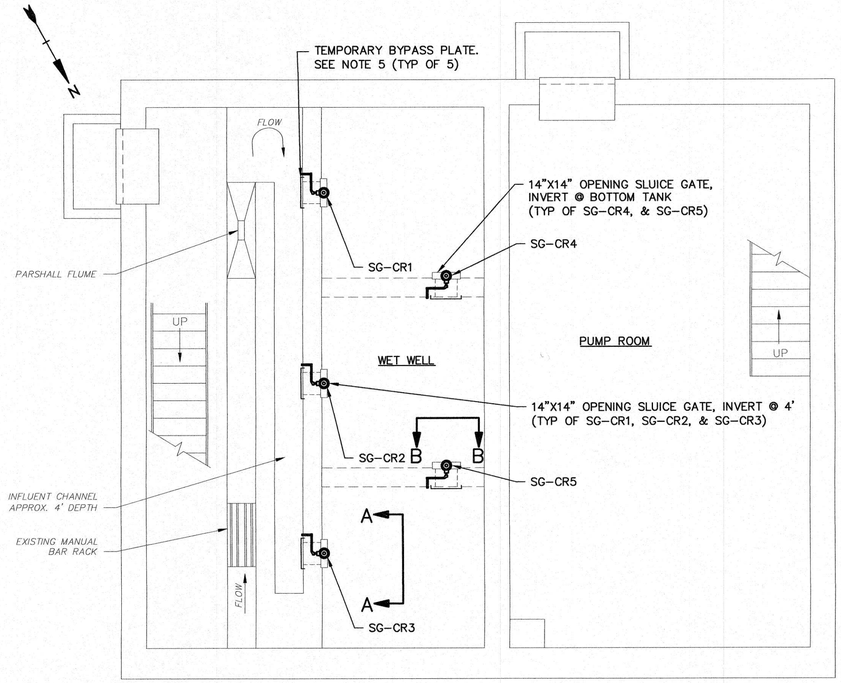
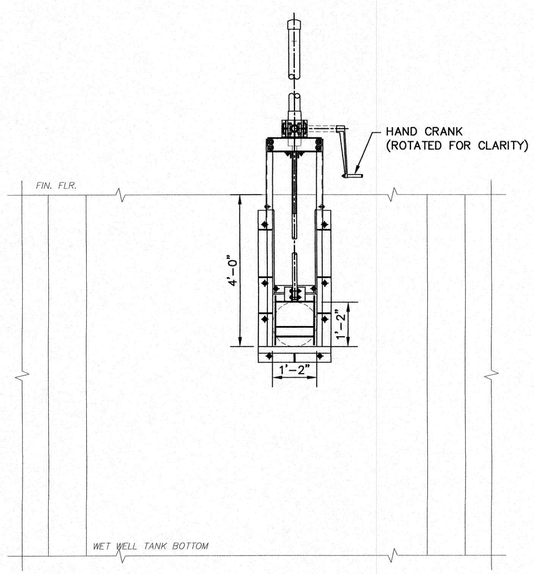


NOTE: REPLACE GATES IN ACCORDANCE WITH SECTIONS A-A AND B-B BELOW.

CONANT ROAD PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

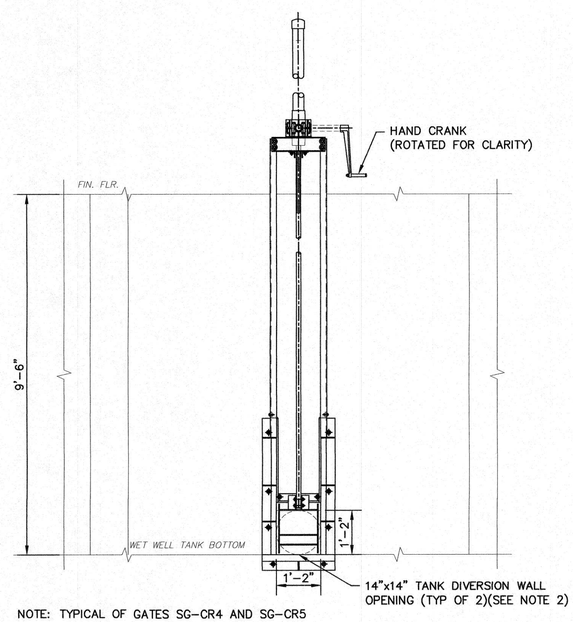
NOTES:

1. DIMENSIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED BY CONTRACTOR.
2. A DEPRESSION FILLED WITH GROUT, ASPHALT OR OTHER MATERIAL MAY BE LOCATED ON WET WELL TANK BOTTOM AT OPENING INTERFACE. CLEAN OUT DURING REMOVAL AND RE-OGROUT DURING GATE INSTALLATION (SG-BS4, SG-BS5).
3. CONTRACTOR TO MODIFY EXISTING GRATING TO ALLOW FOR NEW SLUICE GATES AND FRAMES. SUPPORT REMAINING GRATING AS NEEDED TO MAINTAIN 125 LB/SF LOAD RATING.
3. MANUFACTURER TO PROVIDE HAND CRANK TYPE SLUICE GATE IN LIEU OF HAND WHEEL TYPE CRANK.
4. CONTRACTOR TO PROVIDE TEMPORARY PLATING OF CHANNEL OPENING (OR OTHER ENGINEER APPROVED METHOD) TO ALLOW FOR BYPASS OF WET WELL TANKS, AND DRY WORKING CONDITIONS FOR SLUICE GATE INSTALLATION. CHANNEL OPENING AND WET WELL TANK WALL CONDITIONS SHALL BE CLEANED, DRIED AND PREPARED FOR SLUICE GATE INSTALLATION IN ACCORDANCE WITH SLUICE GATE MANUFACTURER'S REQUIREMENTS. CONTRACTOR MAY BYPASS WET WELLS BY PROVIDING BYPASS PUMPING IN ACCORDANCE WITH SECTION 01580.
5. AT LEAST ONE WET WELL TANK AND 2 PUMPS SHALL BE FULLY OPERABLE DURING ENTIRE PROJECT.



NOTE: TYPICAL OF GATES SG-CR1, SG-CR2 AND SG-CR3

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



NOTE: TYPICAL OF GATES SG-CR4 AND SG-CR5

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

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IAN B. CATLOW
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REGISTERED PROFESSIONAL ENGINEER
11-28-16

Board of Sewer Commissioners

Pump Station Maintenance & Improvements Project

Westwood, Massachusetts

Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET4.dwg
DRAWN BY:	TMP
CHECKED:	IBC
APPROVED BY:	SES

CONANT RD PUMP STATION
MECHANICAL LOWER LEVEL

SCALE: AS SHOWN

SHEET 4

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET4.DWG
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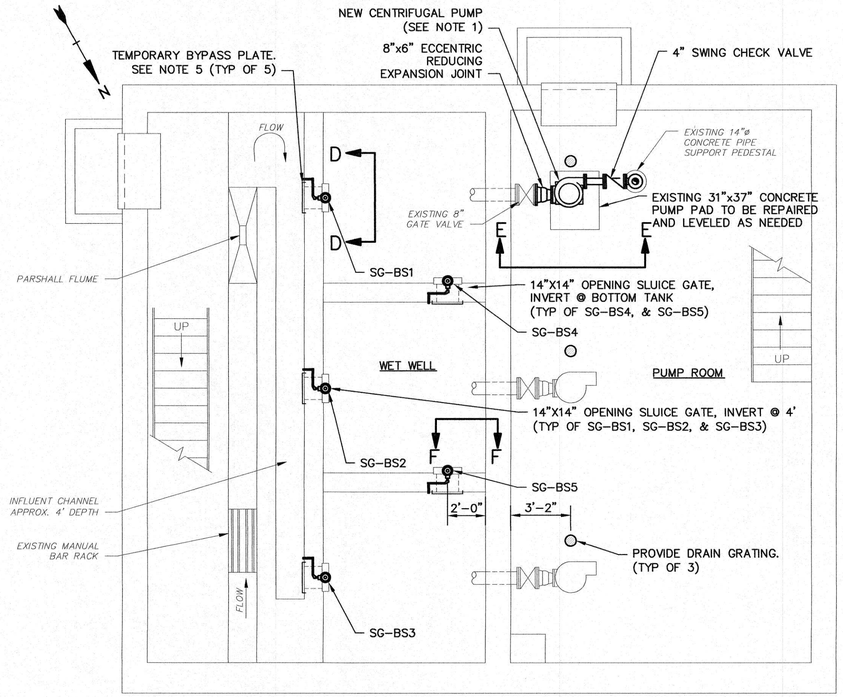
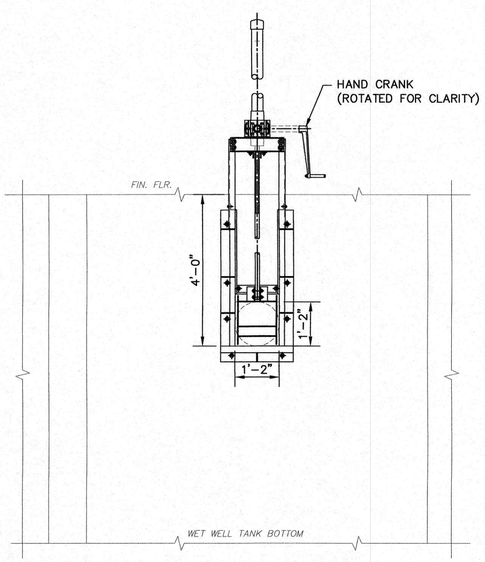


BROOK STREET PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

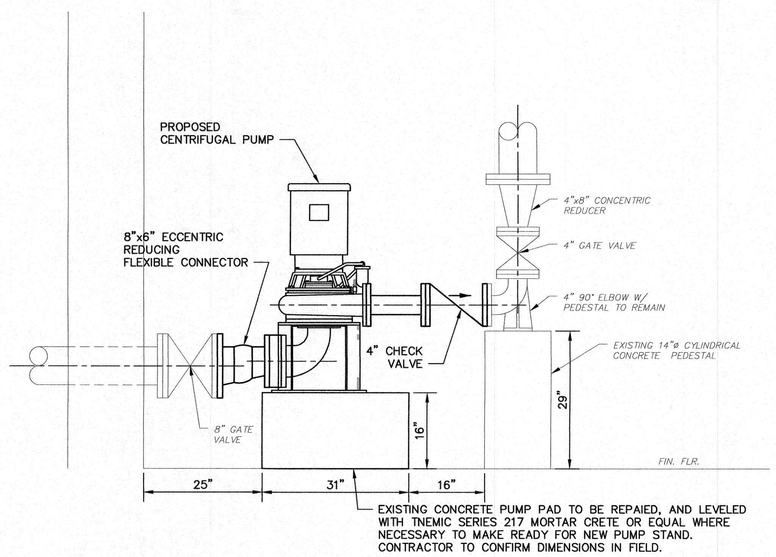
NOTES:

1. DIMENSIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED BY CONTRACTOR.
2. A DEPRESSION FILLED WITH GROUT, ASPHALT OR OTHER MATERIAL MAY BE LOCATED ON WET WELL TANK BOTTOM AT OPENING INTERFACE. CLEAN OUT DURING REMOVAL AND RE-GROUT DURING GATE INSTALLATION (SG-CR4, SG-CR5).
3. CONTRACTOR TO MODIFY EXISTING GRATING TO ALLOW FOR NEW SLUICE GATES AND FRAMES. SUPPORT REMAINING GRATING AS NEEDED TO MAINTAIN 125 LB/SF LOAD RATING.
4. MANUFACTURER TO PROVIDE HAND CRANK TYPE SLUICE GATE IN LIEU OF HAND WHEEL TYPE CRANK.
5. CONTRACTOR TO PROVIDE TEMPORARY PLATING OF CHANNEL OPENING (OR OTHER ENGINEER APPROVED METHOD) TO ALLOW FOR BYPASS OF WET WELL TANKS, AND DRY WORKING CONDITIONS FOR SLUICE GATE INSTALLATION. CHANNEL OPENING AND WET WELL TANK WALL CONDITIONS SHALL BE CLEANED, DRIED AND PREPARED FOR SLUICE GATE INSTALLATION IN ACCORDANCE WITH SLUICE GATE MANUFACTURER'S REQUIREMENTS. CONTRACTOR MAY BYPASS WET WELLS BY PROVIDING BYPASS PUMPING IN ACCORDANCE WITH SECTION 01580.
5. AT LEAST ONE WET WELL TANK AND TWO PUMPS SHALL BE FULLY OPERABLE DURING ENTIRE PROJECT. IF REQUIREMENT CANNOT BE MET, TEMPORARY BYPASS PUMPING SHALL BE REQUIRED. EXTERIOR BYPASS PUMPING PIPES ARE LOCATED AT THE BROOK STREET PUMP STATION.
6. PUMP STAND TO BE CUSTOM FABRICATED BY PUMP MANUFACTURER TO ENSURE PUMP LINES UP WITHIN EXISTING PIPE DIMENSIONS. CONTRACTOR TO COORDINATE WITH MANUFACTURER.

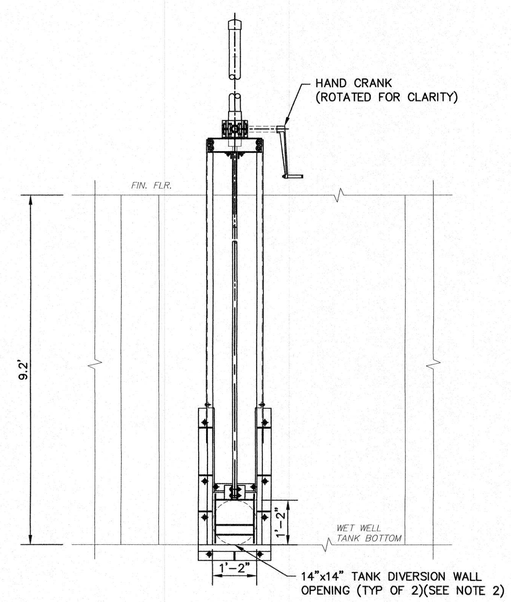


NOTE: TYPICAL OF GATES SG-BS1, SG-BS2 AND SG-BS3

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



SECTION E-E
3/4"=1'-0"



NOTE: TYPICAL OF GATES SG-BS4 AND SG-BS5

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

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Board of Sewer Commissioners

Pump Station Maintenance & Improvements Project

Westwood, Massachusetts

Mark	Date	Description

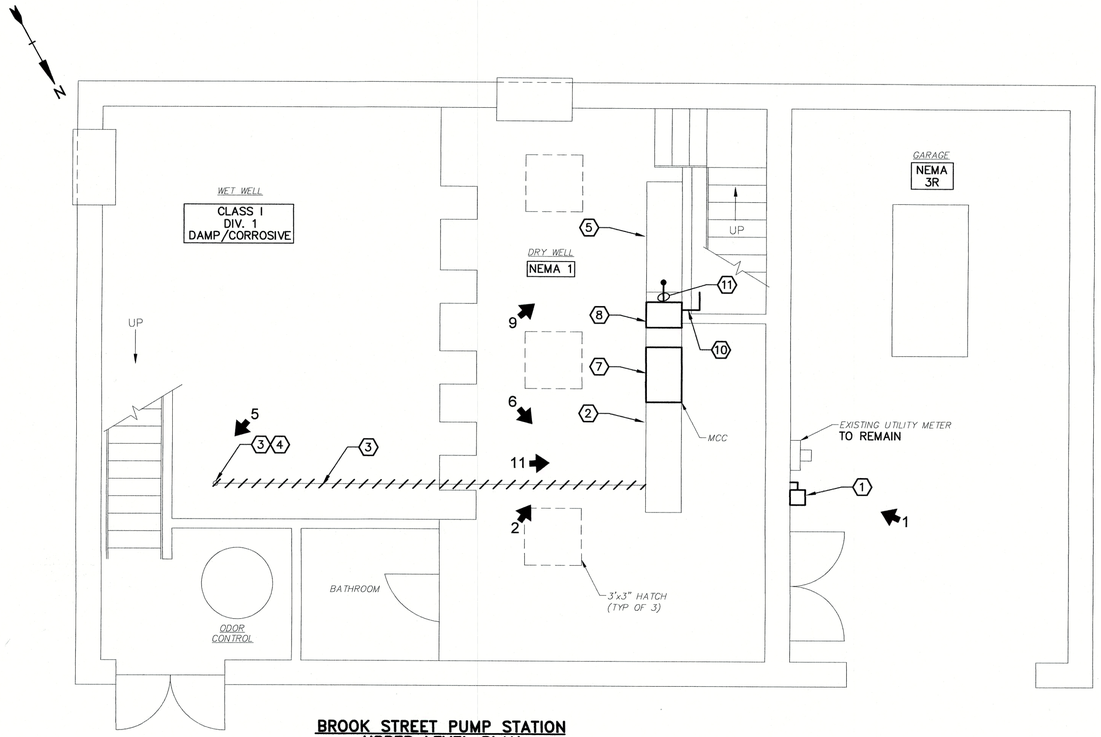
PROJECT NO:	W2061
FILE:	SHEET5.dwg
DRAWN BY:	JMH, TMP
CHECKED:	IBC
APPROVED BY:	SES

BROOK STREET PUMP STATION
MECHANICAL LOWER LEVEL

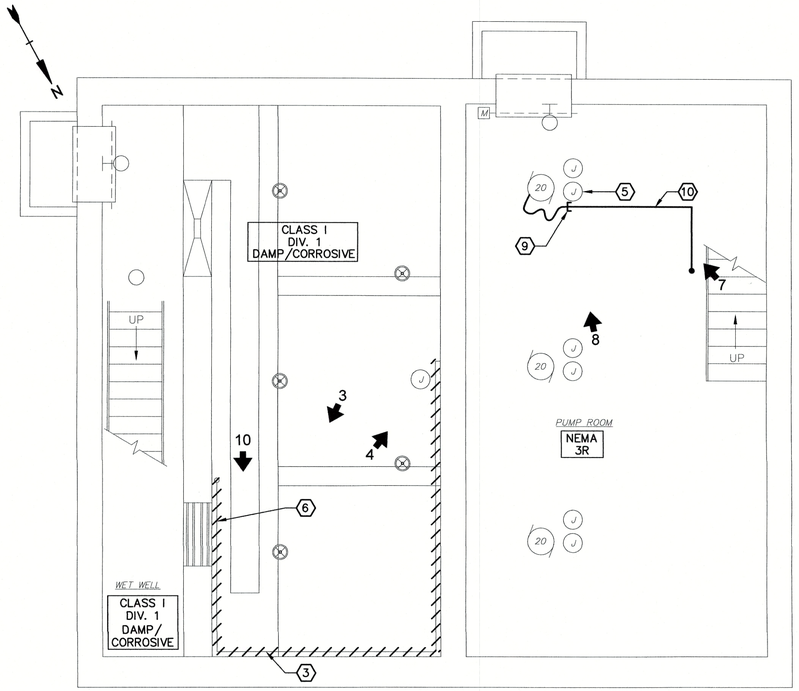
SCALE: AS SHOWN

SHEET 5

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET5.DWG
SAVE DATE: 11/22/2016 3:27 PM
PLOT DATE: 11/28/2016 12:51 PM



BROOK STREET PUMP STATION
UPPER LEVEL PLAN
1/4"=1'-0"



BROOK STREET PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

ELECTRICAL KEYED NOTES:

1. SEAL CONDUIT ENTERING MAIN DISCONNECT SWITCH. SEE PHOTO 1.
2. ADD INTAKE AND EXHAUST LOUVER TO MCC. ADD EXHAUST FAN ON MCC. SEE PHOTO 2.
3. REMOVE PVC CONDUIT AND WIRING SEE PHOTOS 3, 4, 5, AND 6.
4. PATCH FLOOR WHERE CONDUIT WAS REMOVED. SEE PHOTO 5.
5. REPLACE STARTER AND PROVIDE NEW FEEDER TO NEW 20 HP MOTOR SEE PHOTOS 7, 8, AND 9.
6. PROVIDE EXPLOSION PROOF JUNCTION BOX COVER. REFER TO PHOTO #10
7. RELOCATE EXISTING ATS TO MAKE ROOM FOR DISCONNECT SWITCH SEE PHOTOS 2 AND 9.
8. DISCONNECT SWITCH (30A) FOR PUMP. MOUNT ABOVE TRANSFORMER. SEE PHOTOS 2 AND 9.
9. MANUFACTURER'S CABLE SUPPORTED BY WIRE CAGE GRIP FROM UNDER DECK.
10. 1" CONDUIT WITH INSULATED BUSHING FROM MANUFACTURER'S CABLE TO DISCONNECT SWITCH.
11. 3#10, 1#10G IN 1"C

NOTE: SEE SHEET 2 FOR ELECTRICAL LEGEND AND GENERAL ELECTRICAL NOTES.

SHEET SPECIFIC NOTES:

1. AT LEAST ONE WET WELL TANK AND TWO PUMPS SHALL BE FULLY OPERABLE DURING ENTIRE PROJECT. IF REQUIREMENT CANNOT BE MET, TEMPORARY BYPASS PUMPING SHALL BE REQUIRED. EXTERIOR BYPASS PUMPING PIPES ARE LOCATED AT THE BROOK STREET PUMP STATION.

PHOTO #1

PHOTO #5

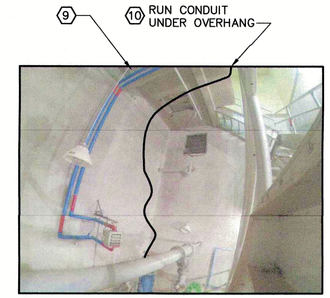


PHOTO #8

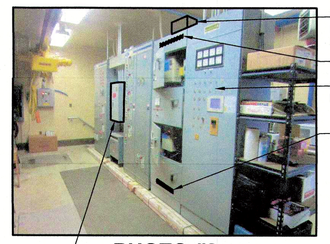


PHOTO #2

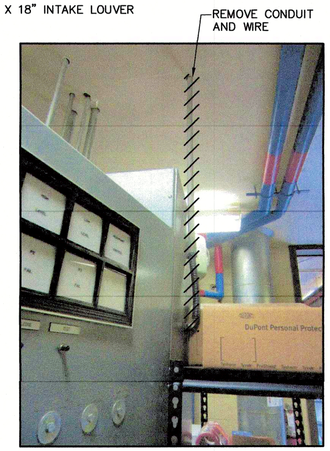


PHOTO #6

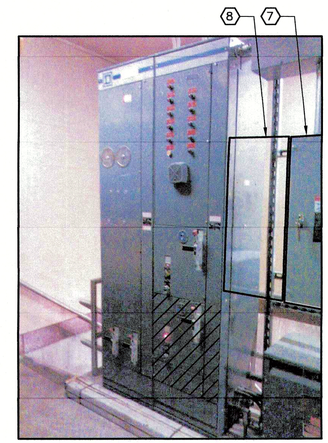


PHOTO #9

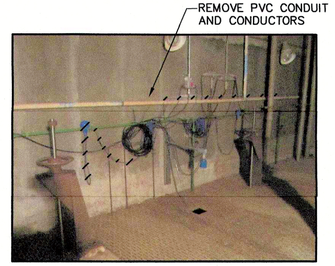


PHOTO #3

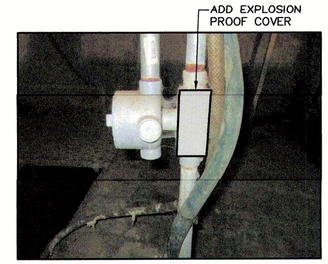


PHOTO #10

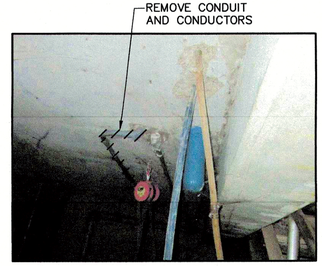


PHOTO #4

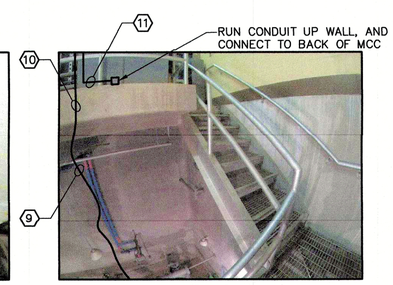


PHOTO #7

EXISTING SIEMENS S7-200 PLC TO BE REMOVED AND REPLACES WITH A SIEMENS S7-300 PLC. REUSE EXISTING WIRING. REWIRE POINTS AND UPGRADE PROGRAMMING.

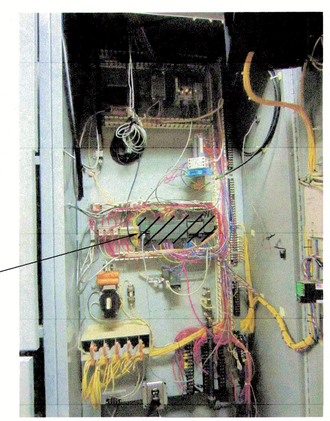


PHOTO #11

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Westwood, Massachusetts

Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET6.dwg
DRAWN BY:	JMH,TMP
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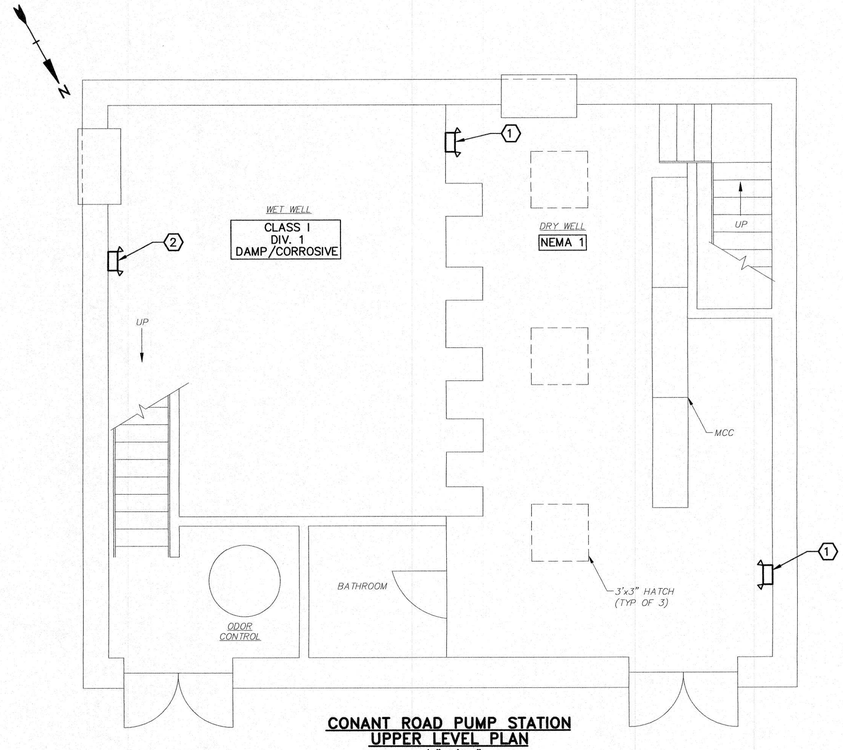
APPROVED BY:	SES

BROOK STREET PUMP STATION
ELECTRICAL PLAN

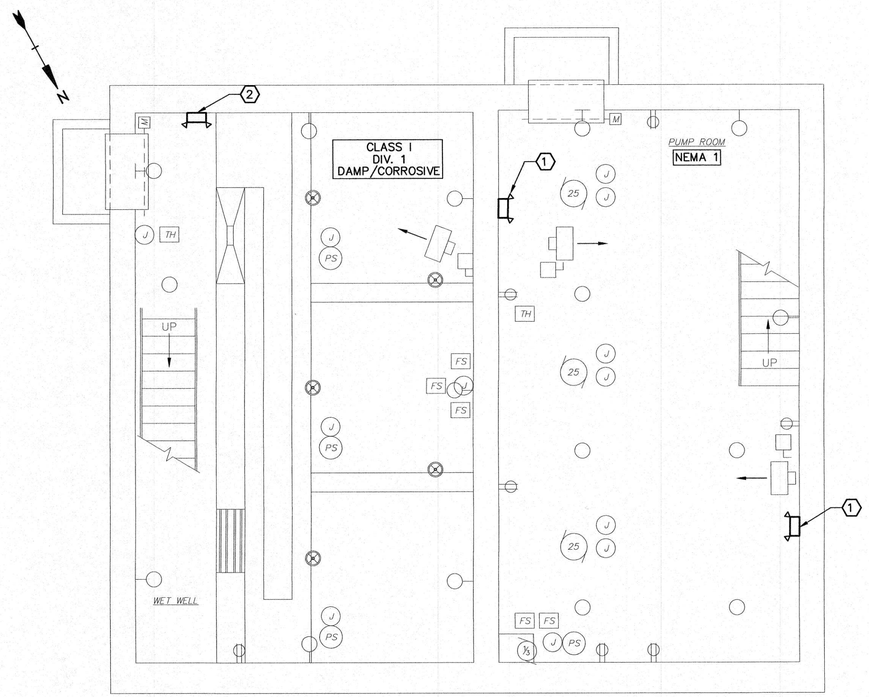
SCALE: 1/4"=1'-0"

SHEET 6

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET6.DWG
SAVE DATE: 11/28/2016 3:14 PM
PLOT DATE: 11/28/2016 3:39 PM



CONANT ROAD PUMP STATION
UPPER LEVEL PLAN
1/4"=1'-0"



CONANT ROAD PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

ELECTRICAL KEYED NOTES:

1. DUAL HEAD WALL MOUNTED BATTERY POWERED EMERGENCY LIGHT COOPER #12AN72-V OR ENGINEER APPROVED EQUAL. WIRE TO LOCAL LIGHTING CIRCUIT AHEAD OF LOCAL SWITCHING WITH 2#12 AND 1#12 GROUND IN ¾" RIGID STEEL CONDUIT.

2. NEMA 7 CLASS 1 DIV II DUAL HEAD WALL MOUNTED BATTERY POWERED EMERGENCY LIGHT COOPER #ELPS502 OR ENGINEER APPROVED EQUAL.

NOTE: SEE SHEET 2 FOR ELECTRICAL LEGEND AND NOTES.

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CONANT ROAD PUMP STATION
ELECTRICAL PLAN

SCALE: 1/4"=1'-0"

SHEET 7

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET7.DWG
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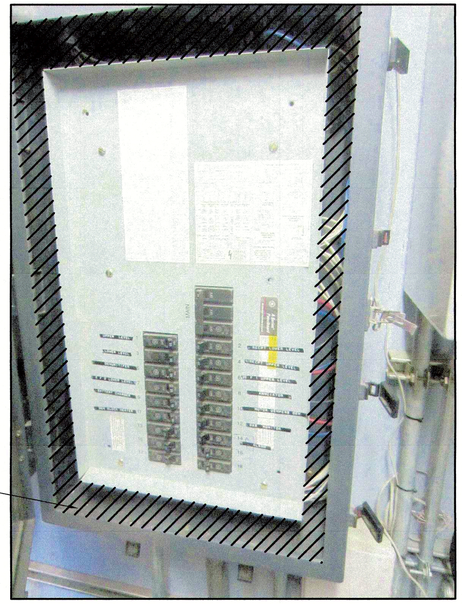
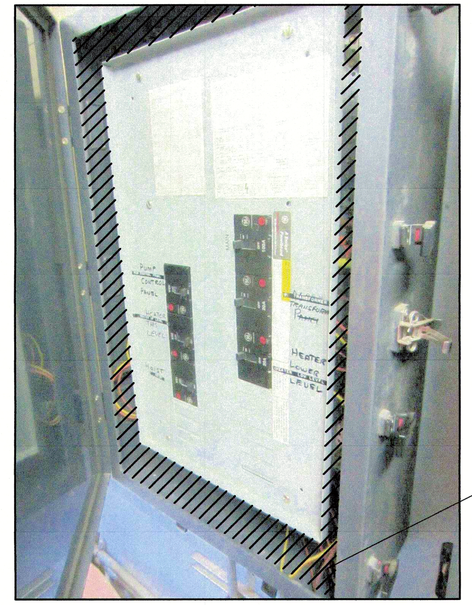
PLOT DATE: 11/28/2016 12:51 PM

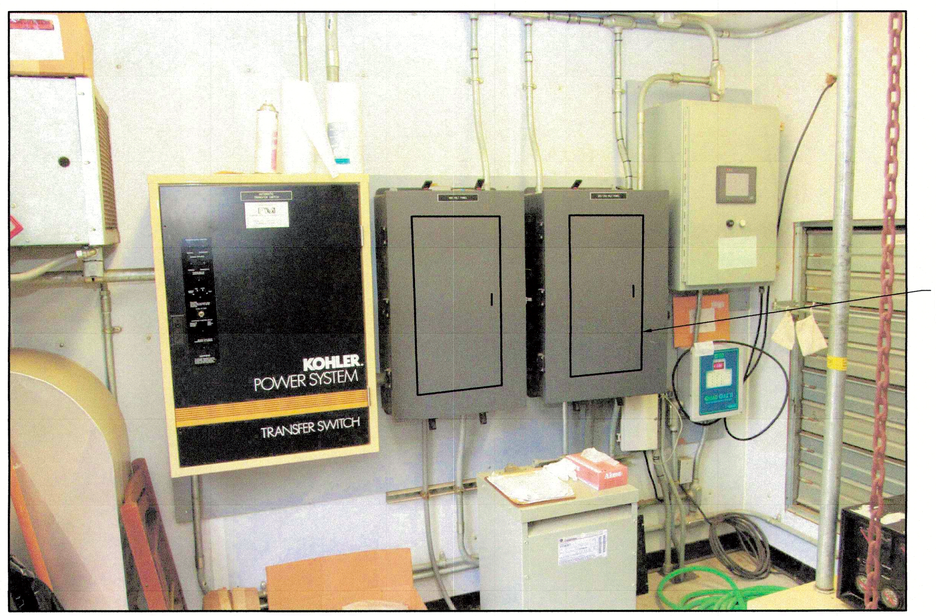




STEVENS FARM ROAD
PUMP STATION OPTION #2
NO SCALE

NOTE:

(1) PROVIDE REMOVABLE CUSTOM SHEET METAL COLLAR AROUND DEADFRONT TO PROTECT OPERATOR FROM EXPOSED CONDUCTORS. (TYP OF 2)



PROVIDE LOCKABLE HINGED DOORS IN PANEL BOARD COVERS. (TYP OF 2)

STEVENS FARM ROAD
PUMP STATION OPTION #1
NO SCALE

NOTE:

THE CONTRACTOR SHALL PROVIDE THE UPGRADE SHOWN IN EITHER OPTION 1 OR OPTION 2 TO IMPROVE SAFETY OF THE INDICATED PANEL.

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PROJECT NO:	W2061
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CHECKED:	IBC, RMM
APPROVED BY:	SES

STEVENS FARM ROAD
PUMP STATION ELECTRICAL

SCALE: NO SCALE

SHEET 8

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET8.DWG
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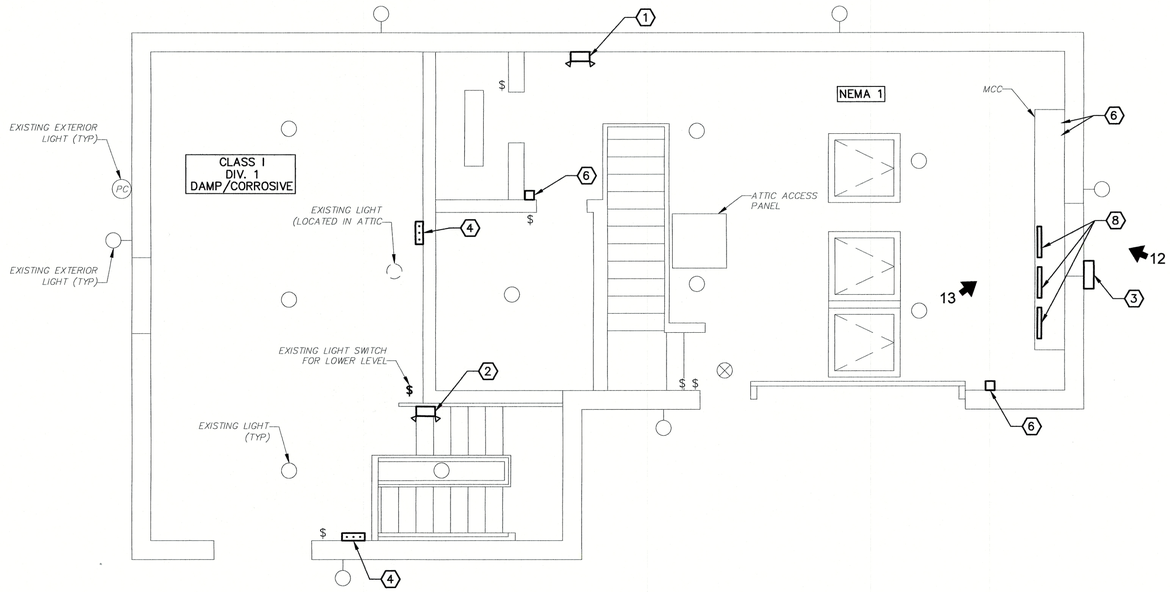
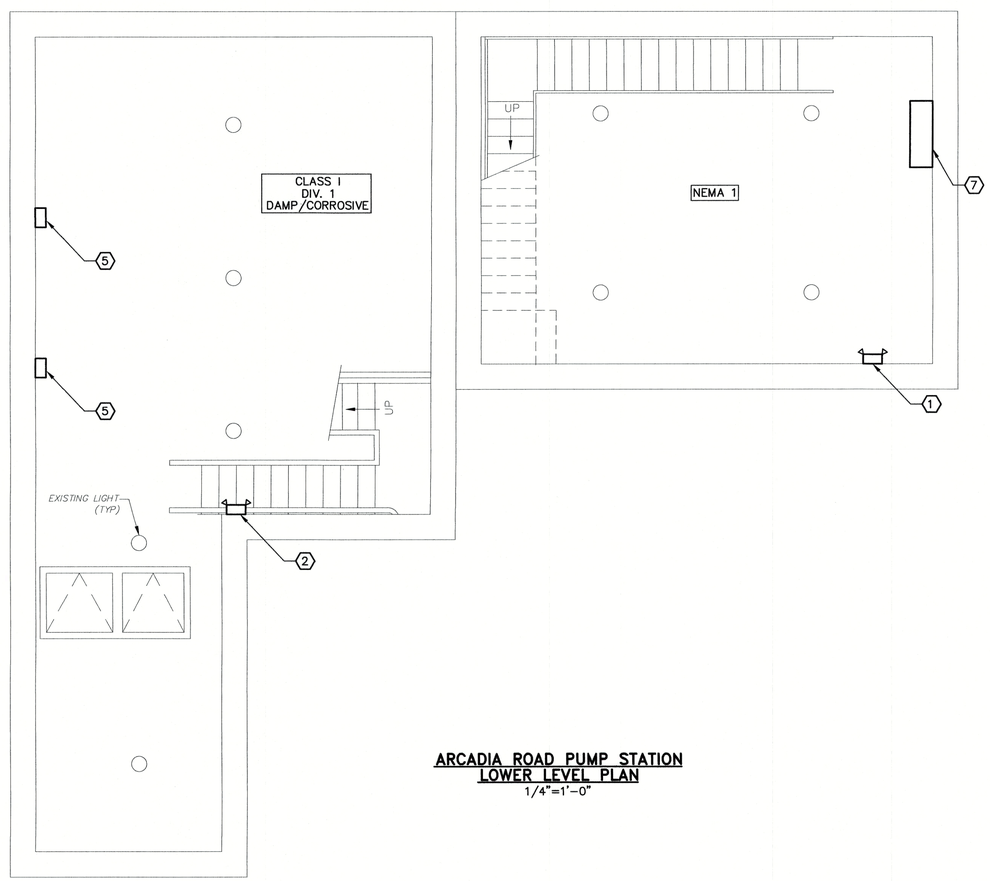
PLOT DATE: 11/28/2016 12:51 PM



ARCADIA ROAD PUMP STATION
UPPER LEVEL PLAN
1/4"=1'-0"

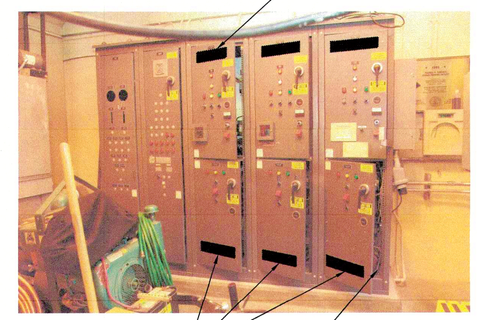


ARCADIA ROAD PUMP STATION
LOWER LEVEL PLAN
1/4"=1'-0"

REPLACE EXISTING ENCLOSURE WITH A NEMA 3R ENCLOSURE. REUSE EXISTING BELL, PUSHBUTTONS, SIREN AND INTERIOR

PHOTO #12

2" X 12" INTAKE LOUVER (TYPICAL OF 6)



THERMOSTATICALLY CONTROLLED POSITIVE PRESSURE EXHAUST FAN. SEE NOTE 8. (TYPICAL OF 3)

PHOTO #13

ELECTRICAL KEYED NOTES:

1. DUAL HEAD WALL MOUNTED BATTERY POWERED EMERGENCY LIGHT COOPER #12AN72-V OR ENGINEER APPROVED EQUAL. WIRE TO LOCAL LIGHTING CIRCUIT AHEAD OF LOCAL SWITCHING WITH 2#12 AND 1#12 GROUND IN ¾" RIGID STEEL CONDUIT.
2. NEMA 7 CLASS 1 DIV II DUAL HEAD WALL MOUNTED BATTERY POWERED EMERGENCY LIGHT COOPER #ELPS502.
3. EXISTING CONTROL PANEL TO BE REPLACED WITH NEW NEMA 3R CONTROL PANEL
4. EXISTING PUSH BUTTONS TO BE REPLACED WITH EXPLOSION PROOF PUSH BUTTONS
5. REMOVE EXISTING JUNCTION BOXES AND PROVIDE WITH EXPLOSION PROOF BOXES
6. PATCH HOLES IN ENCLOSURE
7. REMOVE ABANDONED WIRING BACK TO SEAL WATER CONTROL PANEL
8. CUT TWO 2" X 12" HOLES IN EACH OF THE THREE VFD SECTIONS AND PROVIDE LOUVER. PROVIDE AND INSTALL POSITIVE PRESSURE FAN INSIDE SECTION FOR VENTILATION. POWER WITH WIRING HARNESS FROM 120 VAC CONTROL POWER. (TYPICAL OF 3)

NOTE: SEE SHEET 2 FOR ELECTRICAL LEGEND AND GENERAL ELECTRICAL NOTES.

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Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET9.dwg
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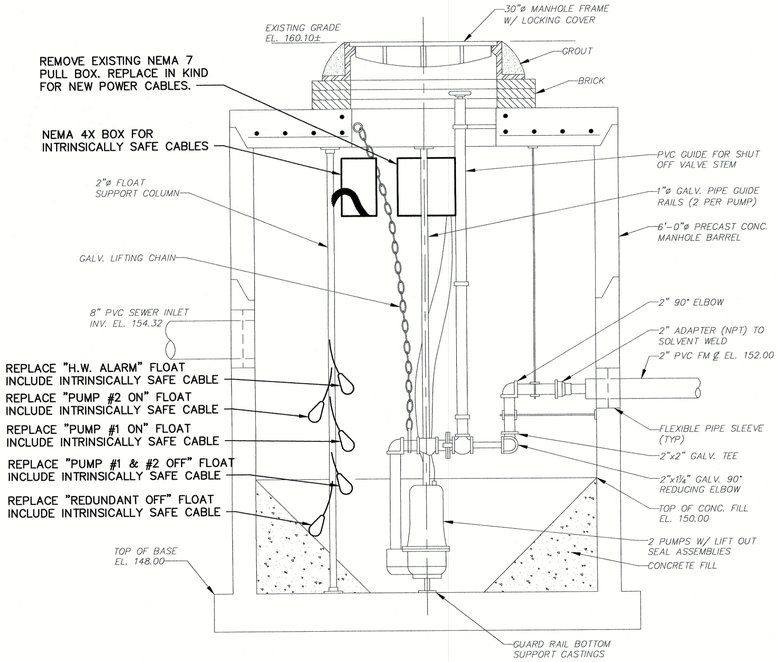
APPROVED BY:	SES

ARCADIA ROAD PUMP STATION ELECTRICAL

SCALE: 1/4"=1-0"

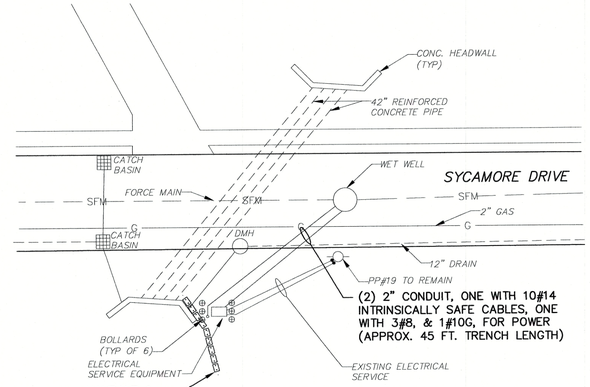
SHEET 9

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET9.DWG
SAVE DATE: 11/23/2016 2:44 PM
PLOT DATE: 11/28/2016 12:52 PM

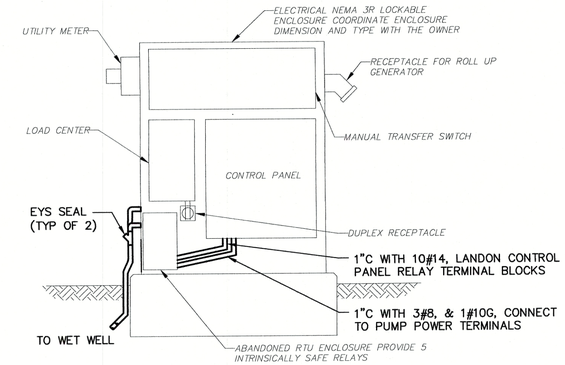


SYCAMORE STREET SECTION
LOWER LEVEL PLAN
3/4"=1'-0"

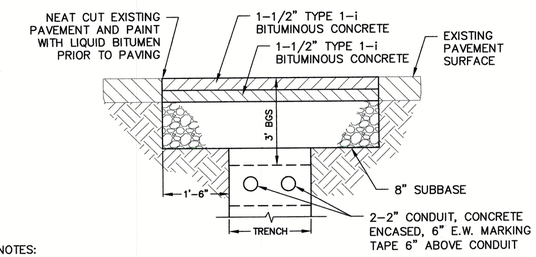
NOTE:
MATCH NEW FLOAT SWITCH LOCATIONS WITH EXISTING CONTROL ELEVATIONS.



SITE PLAN
NO SCALE



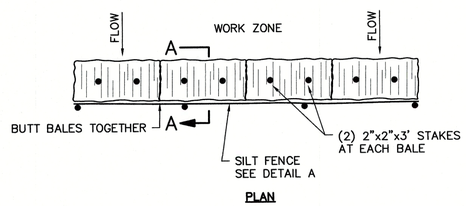
ELECTRICAL ENCLOSURE
NO SCALE



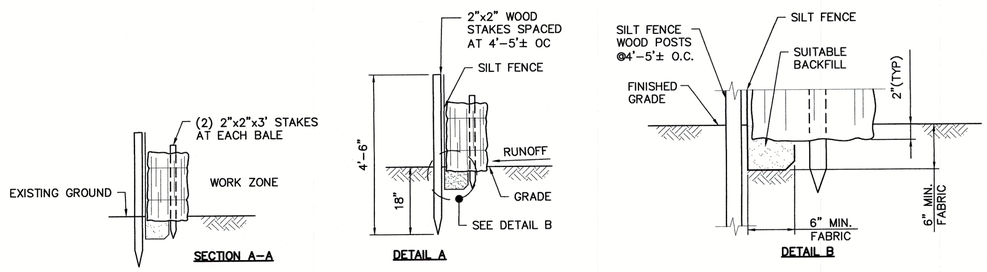
NOTES:

1. ALL BITUMINOUS CONCRETE, AGGREGATE, STABILIZED COURSE, SUBBASE AND LIQUID BITUMEN SHALL CONFROM TO THE MATERIALS EQUIPMENT AND CONSTRUCTION REQUIREMENTS AS PER STATE SPECIFICATIONS.
2. THE CONTRACTOR SHALL MAINTAIN A MINIMUM 15' WIDE TRAVEL WAY AT ROAD CROSSINGS AT ALL TIMES DURING CONSTRUCTION. THE USE OF STEEL PLATES IS PERMITTED.
3. CONTRACTOR RESPONSIBLE FOR TRENCH EXCAVATION, CONCRETE ENCASEMENT, AND TRENCH REPAIR. ELECTRICAL SUB-CONTRACTOR RESPONSIBLE FOR CONDUIT INSTALLATION.

PERMANENT PAVEMENT REPAIR
NO SCALE



PLAN



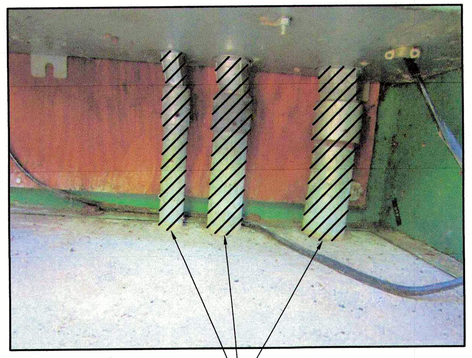
SECTION A-A

DETAIL A

DETAIL B

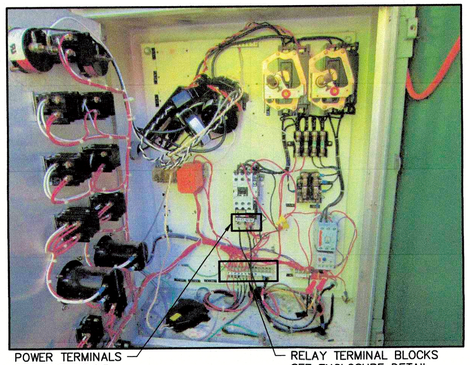
HAY BALES & SILTATION FENCE
NO SCALE

PHOTO #1



CUT AND SEAL EXISTING
CONDUITS. PATCH ALL HOLES
IN CONTROL PANEL ENCLOSURE.

PHOTO #2



POWER TERMINALS
SEE ENCLOSURE
DETAIL ABOVE

RELAY TERMINAL BLOCKS
SEE ENCLOSURE DETAIL
ABOVE

PHOTO #3

NEW CONTROL
WIRING NEMA 4X BOX

REPLACE EXISTING EXPLOSION
PROOF BOX IN KIND

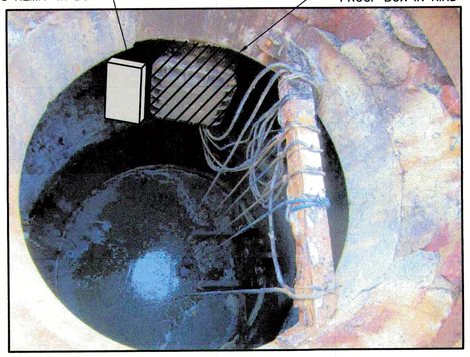


PHOTO #4

CONTROL PANEL.
CONNECT POWER CONDUIT.

EXPLOSION PROOF SEALS
(TYP)

POWER
CONDUIT

CONTROL
CONDUIT

ABANDONED RTU
ENCLOSURE. PROVIDE 5
INTRINSICALLY SAFE RELAYS.

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Westwood, Massachusetts

Mark	Date	Description

PROJECT NO:	W2061
FILE:	SHEET10.dwg
DRAWN BY:	JMH
CHECKED:	IBC, RMM
APPROVED BY:	SES

SYCAMORE DRIVE ELECTRICAL

SCALE: NO SCALE

SHEET 10

FILENAME: J:\W\W2061 WESTWOOD PS EVAL\DRAWINGS\SHEET10.DWG
SAVE DATE: 11/28/2016 12:50 PM
PLOT DATE: 11/28/2016 12:52 PM

Attachment 2

Section 13420 - Instrumentation

SECTION 13420

INSTRUMENTATION

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This section is part of filed Sub-Bid – Electrical.

1.2 SUMMARY

A. Section Includes

1. Installation and start-up of instrumentation provided under this section.

B. Related Sections

1. Refer to Division 11 for equipment furnished by other sections but requiring wiring diagrams developed under this section to reflect complete integration of the systems, instrumentation, interlocking, interfacing and installation under this section.

2. Refer to Division 16, Electrical for wiring standards and practices.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications - Firms regularly engaged in the manufacture of instrumentation systems (the "System Supplier"), whose products have functioned satisfactorily in similar service, and has demonstrated proficiency and extensive experience with current technology.

B. Installer’s Qualifications - Firms regularly engaged in the installation, calibration, and adjustment of instrumentation systems, with a minimum of five years of experience, whose systems have functioned satisfactorily in similar service and have demonstrated proficiency and extensive experience with current technology.

1.4 SUBMITTALS

A. Provide complete equipment specifications, details of connections, wiring, range and dimensions. Submittals consisting of only general sales literature will not be acceptable. Shop drawings shall be bound in separate three ring binders with an index and section, sub-section, etc., dividers. The dividers shall be arranged so its individual tabs can locate each item being referenced.

B. Submit detailed information for each instrument or control device, including manufacturer's descriptive literature and a specific data sheet for each device which shall include as a minimum:

1. Product (item) name used herein and Tag number as shown on the Contract Drawings.

2. Manufacturers complete model number.

3. Location of the device.

4. Input - output characteristics.

5. Range, size, and graduations.

6. Physical size with dimensions, enclosure NEMA classification and mounting details.

7. Materials of construction of all components.

8. Calibration sheet verifying the instrument is working properly over the complete range.

C. Exceptions to the Specifications or Drawings shall be clearly defined by the System Supplier. Data shall contain sufficient details so the Engineer may make a proper evaluation.

1.5 PRODUCT HANDLING

A. Identification

1. Each component shall be tagged per the users standard numbering system or as defined herein and in the contract drawings. To identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

2. A permanent stainless steel tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment supplied under this section. In the case where any supplied instrument is too small or of such a material as to make a stainless steel tag impossible to attach, a method of indelible marking, demonstrating the intent of this paragraph shall be submitted to the engineer for approval.

B. Storage

1. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, the System Supplier at his own cost and expense shall repair such damage. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the System Supplier, or the System Supplier at his own expense shall replace the apparatus.

1.6 INSTRUMENTATION GENERAL

A. Type

1. Instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals that are established standards for the water and wastewater industries.

2. Electronic instrumentation shall be of the solid-state type. Analog control signals shall be linear and be industry standard currents of 4 to 20 mA DC (milliampere direct current), however, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current), or the like. No zero based signals shall be allowed.

3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standards signals for remote transmission. No zero-based signals shall be allowed.

4. Instruments shall be provided with stainless steel mounting hardware and/or galvanized steel floor stands, wall brackets, or instrument racks as appropriate for each location.

5. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.

6. Indicators and recorder readouts shall be linear in the process units.

7. Transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to ± 2 percent.

8. Electronic equipment shall be of the manufacturer's latest design. Circuit boards and associated components shall have suitable conformal coating to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose to assure optimum long-term performance and dependability over normally anticipated atmospheric conditions of temperature, pressure and humidity. The field-mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

9. Equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models that are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.

1.7 ELECTRICAL

A. Equipment shall be designed to operate on a 60 Hertz alternating current power source at a nominal 110 volts, plus or minus 10 percent except where specifically noted. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

B. Analog transmitter and controller outputs shall be 4-20 milliamps into a minimum load range of 0-750 ohms, unless specifically noted otherwise.

C. Switches shall have double-pole, double-throw contacts rated at a minimum of 600 VA unless specifically noted otherwise.

D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

E. Equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation upon manual resetting when power is restored.

1.8 LIGHTNING/SURGE PROTECTION

A. General - Lightning/surge protection shall be provided to protect the system from inducted surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance-free and self-restoring. Instruments shall be housed in a suitable metallic case, properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground, and where practical each ground wire run individually and insulated from each other. These protectors shall be mounted within the instrument enclosure or a separate NEMA 4X junction box coupled to the enclosure. The units shall be as manufactured by EDCO, MCG Electronics, MTL Electronics, Or equal.

1. Power Supply - Protection of all instrument power supply lines shall be provided. Cabinet(s)/Panel(s) and groups of field instruments, as approved by the Engineer shall be protected by isolation transformers and surge suppressors. Individual gas-tube surge suppressors shall protect individual field instruments.

2. Communication Line - Protection of all communication lines shall be provided. Protection devices shall be installed at both ends and as close to the equipment being protected as possible. Protection devices shall provide the equipment manufacturer's recommended protection levels but shall not interfere with communication. The protection devices shall be standard devices listed by the protection device manufacturer as suitable for the specific type of communication line.

PART 2 PRODUCTS

2.1 PUMP CONTROLLERS

A. Controller:

1. Existing Brook Street Pump Station Pump Controllers shall be utilized.

2.2 LEVEL SWITCH (BALL TYPE)

A. Type

1. Tilting float actuation.

2. SPDT non-mercury switch.

3. Polypropylene casing.

B. Operation

1. Function – To produce a contact output at a predetermined liquid level. Multiple switch functions shall be provided where shown on the drawings.

2. Operating Principle – the tilting motion of the float actuates a sealed switch encased in a weighted float freely suspended from a cable when the liquid level displaces it.

C. Functional

1. Output – Form C (SPDT) micro switch, rated 10 amps at 250 volts AC resistive.

D. Physical

1. Float – molded polypropylene casing.
2. Cable – Three conductor PVC – jacketed.
3. Mounting – Cable suspended by waterproof compression connector.
4. Support bracket with adjustable clamp for setting switch height.

E. Manufacturers

1. Flygt Corporation - type ENM-10
2. Equivalent by Hitech Technologies, Inc.
3. Equivalent by Conery Mfg. Inc.
4. Or equal

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The location of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as requested by the Engineer. Furnish all labor and materials necessary to complete the work in an approved manner.

B. The System Supplier shall make all necessary mechanical changes to install new instrumentation equipment provided under this Contract. This work includes all fittings, fabrications, supports, guides, restraints, bolting, gaskets, and accessories. All work shall be done in a workmanlike manner.

C. The instrumentation drawings indicate the intent of the interconnections between the individual instruments. Any exceptions should be noted.

D. Work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances, and regulations, the System Supplier shall bear full responsibility for such violations and assume all costs arising there from.

E. Equipment used in areas designated as hazardous shall be designed for the Class, Group and Division as required on the Electrical Drawings for the locations. All installations shall be in strict accordance with codes.

F. Instrument cabinets located outdoors or in unheated locations shall be provided with heating and/or cooling devices as necessary to maintain all instruments and or electronics installed in those cabinets within their design temperature limits.

G. Brackets and hangers required for equipment mounting shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The System Supplier shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the System Supplier shall be required to ship his material in sections sized to permit passing through restricted areas in the building. The System Supplier shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure, and panel to ensure proper space and access (front, rear, side).

I. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment, but in no case shall more than one ground point be employed for each shield.

J. Lifting rings from cabinets/assemblies shall be removed. Hole plugs shall be provided for the holes of the same color as the cabinet.

K. The System Supplier shall coordinate the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to ensure a satisfactory functioning installation.

3.2 SYSTEM TESTS AND ACCEPTANCE

A. After the equipment has been delivered and installed at the site, a field acceptance test shall be performed to verify the integrity of the system. The Engineer shall witness the test. Satisfactory completion of the test, as approved in writing by the Engineer, shall constitute conditional approval of the system. The system must operate without failure for a period of 100 hours before this test will be considered successful, and the system fully accepted.

B. Before this test is started, the System Supplier shall satisfy himself that the system is operating correctly with live plant data.

C. Any malfunctions during the test shall be analyzed and corrections made by the System Supplier. The Owner's Project Representative will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

3.3 FIELD TESTS

A. The System Supplier shall furnish the services of the Manufacturer's servicemen, all special tools, calibration equipment and labor to perform the tests. Certified copies of the tests shall be furnished in duplicate to the Engineer.

B. Following connection, checkout, and final adjustment of all panels, instruments, meters, monitoring, and control devices, a performance check shall be made on each. Analog inputs shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale, as required. All status and alarm switches as well as all monitoring and control functions shall also be checked. Each device on the Electrical Schematic\Logic Diagrams must be signed-off by the Engineer as being acceptable.

C. If, during running of the tests, one or more points appear to be out by more than the specified amount, the Manufacturer's servicemen shall make such adjustments or alternations as are necessary to bring equipment up to specification performance. Following such adjustments, the tests shall be repeated for all specified points to ensure compliance.

3.4 INSTRUCTION - STAFF TRAINING

A. All plant personnel will need training on the instrument systems. The System Supplier shall be responsible for providing detailed Operation and Maintenance (O&M) Manuals. The O&M Manuals shall include specific details of equipment supplied and details of operations specified to this project. The training will be conducted at the facilities.

B. The O&M Manuals shall include descriptions of all equipment, the nature and intended modes of operation, testing procedures of all units in the System, and safety measures to be taken in operation. All necessary procedures and methods for effective operation of the System shall be included.

C. O&M Manuals shall include record drawings and instructions necessary for the planned maintenance of all equipment in the system. The O&M Manuals will incorporate maintenance procedures and schedules, and they will coordinate and be cross-referenced to detailed operation procedures provided by the manufacturers.

D. The system training shall be structured such that the operating personnel will understand the system's operation, and the functions available in the system. The amount of training will be a minimum of 1 day, scheduled as convenient for the Owner. Preventive and corrective maintenance of hardware shall be presented.

3.5 MAINTENANCE CONTRACT

A. Maintenance Contract: After the final acceptance of the instrument system, the vendor shall furnish to the Owner a one-year contract for complete maintenance service of the instrument system. The services under the Maintenance Contract will take place at the plant site. The contract will include preventive maintenance and calibration, emergency service repairs, replacement of defective or worn parts or device and accessories and expendable items, and verification of correct software operation. The service shall be performed by the manufacturer and shall provide for a minimum of one inspection during the contract year. The service technicians shall be equipped with all tools and test equipment necessary for calibration and repair.

B. Preventive or corrective maintenance shall include a systematic and periodic examination of each device supplied under this section. This equipment shall be calibrated, cleaned, lubricated, adjusted or aligned to insure proper operation. This preventive maintenance shall be rendered generally such that each component will be tested at least four times annually. The calibration shall include the simulation of the process variable system where applicable.

C. Emergency Service: Emergency service shall be provided during normal working hours (8:00 a.m. to 5:00 p.m. Monday through Friday) to correct any hardware defect or failure and to apply the appropriate corrective action to restore the defective device to the manufacturer's original specifications or tolerances. A

qualified instrument technician directly employed by the manufacturer within 24 hours after notification shall provide this service.

D. Parts: As part of this maintenance service, all parts shall be provided by the manufacturer at no additional cost. Transfer of ownership shall take place when a part is installed in the Owner's instrumentation or other equipment covered by the Contract.

PART 4 SYSTEM DETAILS

4.1 SYSTEM DETAILS

A. Unless specifically stated otherwise, the System Supplier shall be responsible for providing all instrumentation, control equipment and auxiliary devices necessary to perform the functions specified herein and as shown and described on the contract drawings.

B. Any auxiliary devices such as lightning/surge protectors, relays, times, signal isolators, signal boosters, etc., which are necessary for complete operation of the system, or to perform the functions specified, shall be included, whether or not they are specifically shown or tabulated on the diagrams.

END OF SECTION

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Attachment 3

Section 13460 – Programmable Logic Controllers (PLCs)

SECTION 13460

PROGRAMMABLE LOGIC CONTROLLERS (PLCs)

PART 1 GENERAL

1.1 SUB BID REQUIREMENTS

A. This section is a part of filed sub-bid - Electrical

1.2 SUMMARY

A. Section Includes

1. Programmable Logic Controllers
2. PLC Programming Software
3. Specialty/Communications Module Programming software
4. Remote Input/Output Rack
5. Operator Interface Programming Software
6. Processors Power Supplies
7. Support Software
8. For programming of PLC, reuse existing PLC programming with upgraded software.
9. For programming of OI, reuse existing PLC programming with upgraded software.

1.3 REFERENCES

A. Definitions:

1. PLC means Programmable Logic Controller
2. OI means Operator Interface
3. CPU means Central Processing Unit
4. I/O means Input / Output

1.4 SUBMITTALS

A. Product Data: Provide catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product. Include equipment installation outline, connection diagram for external cabling, internal wiring diagram, and written instruction for installation.

C. Submit Manufacturer's programming manuals. Software HELP files and ONLINE HELP alone will not be acceptable.

D. PLC ladder logic code including I/O configuration, tag database with descriptions, communication configuration for PLC ports and communication modules, comments in the ladder logic, and cross reference on CD.

E. Control Panel wiring diagrams.

F. Screens for Operator Interfaces with tag database (including alarms), and communication configuration.

G. A written Sequence of Operations representative of the system as initially programmed which includes OI screen printouts.

H. Submit 1 copy of the programming software and communications interface software for the PLCs licensed to the Owner.

I. Submit 1 copy of the programming software for the OI licensed to the Owner.

J. Submit 1 copy of the programming software for any Specialty/Communications Modules licensed to the Owner.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data

1. The manuals shall be original copies, published by the Manufacturer of the PLC, and shall be of the most recent publication. The manuals shall be provided for and encompass all PLC hardware.

2. Manufacturers O&M's

a. Operation Data: Description of operating procedures.

b. Maintenance Data: Description of servicing procedures; list of major components, recommended remedial and preventive maintenance procedures; spare parts list.

c. Manuals for I/O modules, etc. shall be the full versions (not abridged) as published by the Manufacturer.

3. O&M shall include final as-built PLC ladder logic files digitally stored on CD with all comments and all associated requirements referenced in the submittal subsection per final sign-off from Engineer.

4. O&M shall include final as-built OI Screens and configuration files digitally stored on CD with all comments and all associated requirements referenced in the submittal subsection per final sign-off from Engineer.

5. O&M shall include final as-built Sequence of Operations per final sign-off from Engineer.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts

1. 5 fuses for each size used

2. 5 control relays for each type and size provided

PART 2 PRODUCTS

2.1 GENERAL

A. The PLC, and OI programming software shall be provided under this Section. It shall be capable of communicating and programming the PLC, and OIs provided on the Project. The programming shall be of the same manufacture as existing and compatible with the Owner's existing control system. The Owner shall not be required to provide any additional software necessary to program the PLCs, and OIs on the Project.

B. The internal wiring of the controller is to be fixed, with the logic functions it must perform in a given application to be programmed into its memory. The controller shall be supplied with the CPU, module chassis, input/output scanner, inputs, outputs, memory, power supply, and all power and interface cables necessary to function as a complete and operable programmable controller system.

C. PLCs hardware and programming software shall be by the same manufacturer.

D. PLCs and OIs shall be housed in the control cabinet(s) as specified in Division 16. Power provided to the control panel shall be 120 VAC, 60 Hz, single phase.

E. Minimum PLC input/output (I/O) requirements are indicated on the instrumentation PI drawings and in the I/O list herein. Provide an additional 20% active spare I/O wired to a terminal block.

F. PLC back plane shall accommodate 20% spare slots for future expansion.

G. The PLCs shall be microprocessor based devices and shall be furnished with power supplies, processors, process input and output modules, communication cards as required, rack mounted in the retrofitted control panel.

1. Power supplies shall be sized to accommodate all analog signals including all spares. The power supply shall accommodate the card's entire I/O capacity (i.e. if 5 analog outputs is required, the power supply shall be sized to handle the full 8 analog outputs of an 8 point card).

H. The PLC shall be capable of stand-alone operation in the event of a future installed network or central operator computer failure.

I. The programmable controller system shall use a modular, field expandable design. The capability shall exist to allow for expansion of the system by the addition of hardware and/or user software.

J. Modules are defined herein as devices that plug into a chassis and are keyed to allow installation in only one direction. The design must prohibit upside down insertion of the modules.

K. All hardware of the programmable controller shall operate at an ambient temperature of 0 degrees to 60 degrees C (32 degrees to 140 degrees F), with an ambient temperature rating for storage of minus 40 degrees to plus 85 degrees C (minus 40 degrees to plus 185 degrees F).

L. The programmable controller hardware shall function continuously in the relative humidity range of 5% to 95% non-condensing.

M. The programmable controller system shall be designed and tested to operate in the high electrical noise environment of an industrial plant.

N. PLC manufacturer must offer telephone technical support by speaking with an applications engineer or programming specialist. Web based technical support will not be allowed.

O. The Programmable controller system shall be UL listed.

P. PLC Manufacturers:

1. PLC shall be:

a. Siemens S7-300 series

2.2 PROCESSOR

A. The CPU shall be a self-contained unit, and will provide Ladder Rung program execution and support remote or local programming. This device will also supply I/O scanning and inter- processor and peripheral communication functions.

B. Communications

1. The PLC shall be provided with a module or a communications port with a protocol/network converter that will be connected to the AFDs via Ethernet Communications Network or equal communications. The Contractor will provide all communications cables, connectors, converters, power supplies, fusing and any other supplies as necessary to establish a reliable communication connection.

a. The Contractor shall provide all communications configuration hardware and software.

b. With written approval of the Engineer, the communications network may be either Devicenet or Profibus DP. It shall be the responsibility of the contractor to ensure that all hardware, adjustable frequency drives, PLCs, Operator Interfaces and any and all other equipment specified, including the PLCs furnished under any and all parts of this specification be compatible with each other and have all necessary hardware interfaces and software tools required for a fully functioning control system. It is further the responsibility of the contractor to ensure that all software furnished under any and all parts of these specifications provide current, tested, released and supported software for the protocol submitted.

2. The PLC CPU front panel shall include both an Ethernet connector that provides inter-processor communication to peripheral support devices, and communication to a programming device.

3. The PLC system shall be capable of controlling remote I/O racks, Variable Frequency Drives, and the Operator Interface Terminals (OIT). This shall be

accomplished through a rugged Industrial Control Network with the following criteria:

a. The network shall be capable of controlling remote output modules and reading the status of remote input modules.

C. Each modular I/O PLC unit shall handle the required number of process inputs and outputs as tabulated on the input / output (I/O) list, plus 20 percent active spares, plus capacity to accommodate 20 percent future inputs and outputs by the addition of circuit cards.

D. The CPU within the system shall perform internal diagnostic checking and give visual indication to the user by illuminating an indicator when no fault is detected and an indicator when a fault is detected.

E. The processor front panel shall include two-color indicators showing the following status information:

1. Non-run or Run mode of the CPU.

2. The fault status of the CPU.

3. Battery status.

4. Communication status for all communication channels.

5. Forces Present/Active.

F. A toggle/key switch mounted on the front panel of the CPU shall select processor mode.

G. Non-volatile memory shall store the operating system information to protect against loss in the case of power loss or system shutdown. Only at the time of a hardware change shall this configuration status be altered or re-entered.

H. Programming Language

1. The PLC shall be programmable using one of the following standard programming formats as set forth in the IEC 1131 standard. The standard programming formats include ladder logic, instruction list, and structured text. The PLC shall allow on-line program changes.

2. Programming of the PLCs shall be accomplished directly via software running on the programmer's laptop computer.

3. The capability shall exist to change a contact from normally open to normally closed, add instructions, change addresses, etc. It shall not be necessary to delete and reprogram the entire rung.

4. It shall be possible to insert relay ladder diagram rungs anywhere in the program, even between existing rungs, insofar as there is sufficient memory to accommodate these additions.

5. It shall be necessary to issue a two-part command in order to delete all relay ladder rungs from memory.

6. A clock/calendar feature shall be included within the CPU. Access to the time and date shall be from the programming terminal, user program, or message generation.

7. Latch functions shall be internal and programmable.

8. The system shall be capable to address software timers and software counters in any combination and quantity up to the limit of available memory. The CPU shall handle all management of these instructions into memory. Instructions shall permit programming timers in the "ON" or "OFF" delay modes. Timer programming shall also include the capability to interrupt timing without resetting the timers. Counters shall be programmable using up-increment and down-increment.

9. Timer instructions shall include selectable time bases. The timing range of each timer shall be from 0 to 32,767 increments. It shall be possible to program and display separately the timer's preset and accumulated values.

10. The programmable controller shall use a signed integer format ranging from minus 32,768 to plus 32,767 for data storage of the counter preset and accumulated values.

11. The programmable controller shall store data in the following formats:

    a. Signed Integer Numbers ranging from minus 32,768 to plus 32,767.

    b. Floating Point Numbers consisting of at least a six (6) digit mantissa. For numbers larger than six digits the CPU shall convert the number into exponential form with a range of plus 1.17550 E minus 38 to plus 3.40282 E plus 38.

    c. Unsigned Integer Numbers ranging from 0 to 32,767.

12. The programmable controller shall have signed math functions consisting of addition, subtraction, multiplication, division, and square root

13. The programmable controller shall have the ability to Program PID control blocks as necessary for process control functions.

14. The programmable controller shall have a jump instruction that will allow the programmer to jump over portions of the user program to a portion marked by a matching label instruction.

15. The software and hardware shall support the use of subroutines.

16. It shall be a function of the CPU to automatically manage all data types. For example, if a word stored in the Integer section of memory is transferred into the Floating Point section, the CPU shall convert the integer value into floating point prior to executing the transfer.

17. The system shall have rung comments entered above each ladder logic rung or network for all such rungs or networks programmed.

18. The capability shall exist for adding, removing, or modifying ladder logic rungs during program execution. When changes to ladder logic are made or

new logic rungs are added, it shall be possible to test the edits of such rungs before removal of the prior logic rung is executed.

19. It shall be possible to manually set (force) either on or off all hardwired input or output points from the CRT programming panel or the main chassis front panel. Removal of these forced I/O points shall be either individually or totally through selected keystrokes. The programming terminal shall be able to display forced I/O points.

20. A means to program a fault recovery routine shall exist. When a major system fault occurs in the system, the fault recovery routine shall be executed and then the system shall determine if the fault has been eliminated. If the fault is eliminated, program execution resumes. If the fault still exists, the system will shut down.

21. The ability to program ladder logic via symbols from the global database of the programmable controller shall exist.

22. The means to indicate contact or output status shall be by intensification of the contact or output on the programming screen. Each element's status shall be shown independently, regardless of circuit configuration.

23. An instruction shall be supported to incorporate closed loop control systems. The "proportional", "integral", and "derivative" elements shall be accessible to the user in order to tune a closed loop system.

24. The system shall support both bit and word level diagnostic instructions.

25. The Contractor as described above shall provide all programming capabilities with the system.

I. Program Storage

1. The processor shall have non-volatile storage of the application program, process data, and alarm status. This memory shall be either battery backed up RAM, Flash or EEPROM or a combination of these techniques.

2. The programmable controller system shall be capable of addressing up to 16 K words, where each word is comprised of 16 data bits.

3. Memory capacity shall be sized to allow for the most economical match to the intended application. There shall be 30% of the memory unused after final programming to allow for future expansion. As a means of upgrading the system each memory segment shall be field expandable up to the maximum number of memory words addressable by the programmable controller.

4. Memory shall contain battery back up capable of retaining all stored program data through a continuous power outage for at least 12 months under worst case conditions. The capability shall exist to replace the CPU's battery without incurring a loss of user program. A low battery condition must be detectable in ladder logic or a PLC status register, but shall not automatically generate a major fault.

5. The programmable controller system should provide the capability to use EEPROM as a backup for volatile memory. The EEPROM backup memory

shall have the capability to automatically reload the memory on a power cycle. Provide EEPROM sized to match CPU memory.

6. All user memory not used for program storage shall be accessible from main memory for the purpose of data storage. The programmable controller system shall be capable of storing the following data types:

   a. External Output Status

   b. External Input Status

   c. Timer Values

   d. Counter Values

   e. Signed Integer Numbers (16 bit)

   f. Floating Point Data

   g. Binary Numbers

   h. Direct and Indexed addressing

   i. Internal Processor Status Information

   j. ASCII Character Data

   k. The above listed data types shall be distinguishable to the CPU by the addressing format. Management of the data types into memory subsections shall be an automatic function of the CPU operating system. Any data can be displayed in Binary, Octal, Hexadecimal, Decimal, or ASCII radices.

7. The number of times a normally open (N.O.) and/or normally closed (N.C.) contact of an internal output can be programmed shall be limited only by the memory capacity to store these instructions.

J. All set-points and variables entered into the PLC by an operator via the OI (or SCADA) shall be stored in the CPU's internal memory.

2.3 POWER SUPPLIES

A. The programmable controller shall have a modular power supply that mounts directly to the I/O chassis and can be easily serviced or replaced. The system shall be capable of being powered on 120VAC, 1Φ, 60 Hz.

B. A single main power supply shall have the capability of supplying power to the CPU and local input/output modules. Auxiliary power supplies shall provide power to remotely located racks.

C. The power supply shall automatically shut down the programmable controller system whenever its output current is detected as exceeding 125% of its rated current.

D. The power supply shall function properly within the range of 85 to 132 VAC. The power supply shall provide surge protection, isolation, and outage carry-over of at least 1 cycle of the AC line.

2.4 INPUT AND OUTPUT – GENERAL (PLC)

A. The process interface modules shall be capable of accepting switch contacts, solid state switch, and high-level logic inputs; 4-20 mA, 1-5 VDC, thermocouple, RTD, and pulse rate analog inputs; and shall provide momentary, latched contact, or 4-20 mA analog outputs as required.

B. The programmable controller manufacturer shall offer discrete input/output hardware consisting of the following types:

1. Inputs:

a. AC/DC input for devices that operate at 24 VAC, 50/60 Hz. or 24 VDC.

b. AC input: for devices that operate at 120 or 240 VAC, 50/60 Hz.

c. DC input for devices that operate at 5 to 30 VDC.

2. Outputs:

a. AC output for devices that operate at 120 VAC, 50/60 Hz.

b. AC output: for devices that operate at 220/240 VAC, 50/60 Hz.

c. AC output: for devices that operate at 24 VAC, 50/60 Hz.

d. DC output for devices that operate at 10 to 60 VDC.

e. Isolated Contact output: which provides 8 isolated outputs capable of switching 120 VAC, 220 VAC, or 24 VDC power. Use 16 if available.

C. Each input or output module shall be a self-contained unit housed within an enclosure.

D. Spare slot shall contain filler modules or bus connection covers.

E. Analog I/O modules of the following types shall be offered by the manufacturer:

1. Analog input that accepts analog signals and converts them to 12 bit binary values. Analog inputs shall be differential. Analog inputs shall be available in the following ranges:

a. Voltage range: -10 to +10 VDC.

b. Current range: -20 to +20 mA.

2. Analog output which converts a 15 bit current or 16 bit voltage binary number (14 bit resolution) into an equivalent single-ended analog output signal. Analog outputs shall be available in the following ranges:

a. Current range: 0 to +20 ma.

b. Voltage range: -10 to +10 VDC

F. The chassis shall be of the universal type and compatible with several CPU's and specialty modules that are manufactured by the supplier.

G. It shall be possible to replace any input or output module without disturbing field wiring.

H. Discrete I/O modules shall be provided with self-contained fuses for overload and short circuit protection of the module. These cards shall also be capable of having fused swing arms per point so as not to disturb the card and/or wiring while changing a blown fuse. If internal fusing not available, I/O modules shall be externally fused local to the PLC cabinet.

I. All field wiring to I/O modules shall be through a heavy-duty terminal strip as specified under Division 16, Control Cabinets. Pressure-type screw terminals shall be used to provide fast, secure wire connections.

J. All 16 point, 32 point, and specialty input/output modules shall be color coded and titled with a distinctive label.

2.5 DISCRETE INPUTS

A. Each I/O module shall contain a visual indicator to display ON/OFF status of individual input points.

B. Each digital input point shall be fused externally local to the PLC cabinet. Fuses shall be properly rated for each input point per manufacturer's recommendation. One fuse for each input module shall not be acceptable.

C. Switch contact input modules shall provide power to dry-field contacts or transistor switches, or accept high level logic input signals. Contact inputs shall be optically isolated. The input circuits shall be designed to withstand transients and surges without damage.

2.6 DISCRETE OUTPUTS

A. The switch contact output modules shall be capable of providing dry-contact or solid state switches in either momentary (pulsed), or latched (sustained) mode to control AC or dc powered loads.

B. Each digital output point shall be externally local to the PLC cabinet. Fuses shall be properly rated for each output point per manufacturer's recommendation. One fuse for each output card shall not be acceptable.

C. Dry contact output contacts shall be rated 2 amps at 120 VAC minimum. Output failure mode shall be selectable so that upon PLC or network failure all outputs shall be placed in the non-conducting mode, or remain as were prior to failure. Isolation resistance shall be 1000 ohms minimum at 300 VDC between any set of field terminals and any other set or earth ground. Isolation voltage shall be 500 VAC RMS minimum between any set of field terminals and any other set or earth ground.

D. Each I/O module shall contain a visual indicator to display ON/OFF status of individual output points.

2.7 ANALOG INPUTS

A. The analog input modules shall accept -20 to 20 mA dc, 4 to 20 mA dc, 1-5 VDC, thermocouple, RTD, inputs from field mounted transmitters.

B. Input signal conversion shall be a minimum of 12-bit word (11-data bits plus 1-sign bit).

C. Input accuracy shall be 0.1 percent of full scale. The control console shall provide dc power for the field transmitters as required.

D. A power supply shall be provided to power all analog inputs, including the active spares.

E. Each analog input point shall be fused externally local to the PLC cabinet. Fuses shall be properly rated for each input point per manufacturer's recommendation. One fuse for each input module shall not be acceptable.

2.8 ANALOG OUTPUTS

A. Analog output modules shall convert binary data words into proportional, isolated 4 to 20 mA dc, or 1 to 5 VDC analog output signal to adjust set points of local process controllers, pump speed, and valve position. Accuracy shall be 0.1 percent of full-scale output span.

B. Response to station or communication system failure shall be selectable such that upon failure the output shall either remain at the last value, or goes to zero (4 mA), as required by the process.

C. A power supply shall be provided to power all analog outputs, including the active spares.

D. Each analog output point shall be fused externally local to the PLC cabinet. Fuses shall be properly rated for each output point per manufacturer's recommendation. One fuse for each input module shall not be acceptable.

2.9 SUPPORT SOFTWARE

A. One copy of both the PLC and OI programming software shall be provided under this Section. The copies of the original programs on the Manufacturer's diskette/CD ROM shall be provided to the Owner with all necessary licensing requirements to own and maintain the software.

B. Program Version: The programming package shall be the latest version provided by the Manufacturer of the approved software at the time of the purchase, after award of the Contract and approval of the software. All upgrades and service packs for the approved and supplied software shall be provided through the Warranty period of the Project.

C. All upgrades and service packs shall be licensed to the Owner and shall be supplied by the Contractor as part of this Contract.

PART 3 EXECUTION

3.1 ASSEMBLED SYSTEMS

A. The PLC shall be provided in the existing cabinet.

B. Within the enclosure all PLCs, processor racks, and power supplies shall be grounded to meet the manufacturer's specifications and installation recommendations.

C. All field wiring shall terminate at terminal blocks within the PLC enclosure.

D. All I/O provided, including the spares, shall be wired to terminal blocks ready for field wiring connection.

E. All empty slots shall be provided with factory filler modules or backplane port covers.

F. Upon complete installation, wiring and programming of the controls, the contractor shall schedule a Field Acceptance Test with the Engineer. Five working days notice shall be provided to the Engineer for scheduling of the test. During the test the contractor or system integrator shall demonstrate to the satisfaction of the Engineer that each and every input, output, OI screen, analog value, and control sequence operates to the complete satisfaction of the Engineer and the Owner.

G. Contractor shall coordinate with a system integrator to backup existing PLC logic prior to demolition and reinstall logic on the new PLC so that all I/O and functionality is fully replicated.

3.2 I/O LIST

A. The I/O list shall be identical to existing.

END OF SECTION

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