

- NOTES:
1. CONTRACTOR TO VERIFY AIC RATING WITH POWER COMPANY AND PROVIDE CORRESPONDING AIC CIRCUIT BREAKER RATING IN CONTROL PANEL.
  2. FOR ADDITIONAL INFORMATION, REFERENCE DESCRIPTION OF PUMP CONTROL PANEL AND PUMP OPERATION AND INFORMATION ON CIVIL DRAWINGS.
  3. SUBMERSIBLE TRANSDUCER REQUIRED IF SCADA PANEL IS REQUIRED.

**PUMP STATION SINGLE LINE DIAGRAM**

**SINGLE PHASE PUMP SCHEDULE**

HORSEPOWER	SERVICE	FUSED DISCONNECT	SERVICE CONDUCTOR	PUMP BREAKER	PUMP CONDUCTOR
5	120/240, 1 $\phi$	60/2 FUSED AT 60A	3#6 & 1#10G - 1" C	15/2	1#12 & 1#12G - 3/4" C
(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)

**THREE PHASE PUMP SCHEDULE**

HORSEPOWER	SERVICE	FUSED DISCONNECT	SERVICE CONDUCTOR	PUMP BREAKER	PUMP CONDUCTOR
5	120/240, 3 $\phi$	60/3 FUSED AT 60A	4#6 & 1#10G - 1" C	15/3	3#12 & 1#12G - 3/4" C
(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)	(EXAMPLE)

**ELECTRICAL SPECIFICATIONS:**

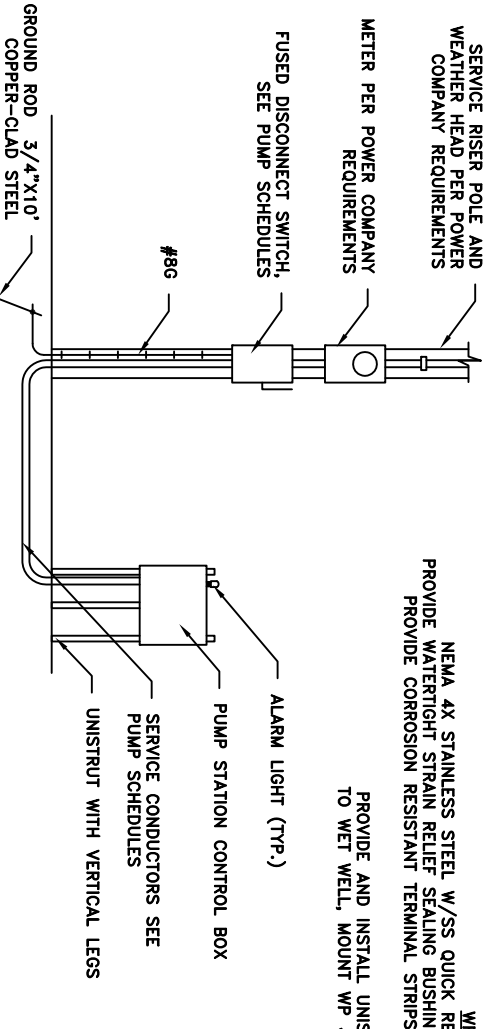
1. SCOPE:
  - 1.1. THE WORK INCLUDED UNDER THIS CONTRACT CONSISTS OF THE FURNISHING OF ALL LABOR, MATERIALS, TOOLS, TRANSPORTATION, SERVICES, ETC., NECESSARY TO COMPLETE THE INSTALLATION OF THE ELECTRICAL SYSTEMS AND OTHER ITEMS HEREIN LISTED. ALL AS DIRECTED BY THE ARCHITECT OR ENGINEER, WHICH WORK IS COMPRISED OF, BUT NOT LIMITED TO THE FOLLOWING PRINCIPAL ITEMS:
    - 1.1.1. ELECTRICAL SYSTEM FOR LIGHT AND POWER:
      - 1.1.1.1. ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM REVISIONS.
      - 1.1.1.2. ALL SYSTEMS, WIRING AND CONDUIT AS REQUIRED.
    - 1.1.2. CONTROL WIRING AND ELECTRICAL INSTALLATION AND CONNECTIONS FOR ITEMS IN OTHER CONTRACTS AS MAY BE LISTED IN THE DRAWINGS.
2. RACEWAYS:
  - 2.1. ALL ELECTRICAL CONDUCTORS ARE TO BE INSTALLED IN METAL RACEWAYS, UNLESS SPECIFICALLY SPECIFIED OR NOTED OTHERWISE. GALVANIZED STEEL CONDUIT AS PERMITTED BY CODE. NO CONDUIT SMALLER THAN 3/4" TO BE USED. PROVIDE FLEXIBLE CONDUIT CONNECTION FOR FINAL CONNECTION TO EACH MOTOR NOT TO EXCEED 3' IN LENGTH AND RECESSED LIGHTING FIXTURES NOT TO EXCEED 6' IN LENGTH. PROVIDE PULL WIRES IN ALL EMPTY CONDUIT SYSTEMS. IDENTIFY TERMINUS OF EACH PULL WIRE. ALL EXPOSED RACEWAYS SHALL BE INSTALLED WITH RUNS PARALLEL AND/OR PERPENDICULAR WITH BUILDING WALLS. FASTEN ALL CONDUIT EVERY 8' AND 2' FROM EACH BOX.
3. WIRES AND CABLES:
  - 3.1. ELECTRICAL CONDUCTORS, SOFT ANNEALED COPPER WITH CONDUCTIVITY 98% OF THAT OF PURE, STRANDED COPPER, 90 DEGREE - 600V INSULATION AND EQUAL TO GENERAL CABLE COMPANY. WIRE AND CABLE FOR ALL FEEDERS, SUBFEEDERS, MOTOR CIRCUITS AND HIGH AMBIENT LOCATION TYPE SHALL BE THHN. ALL OTHER BRANCH CIRCUIT WIRING, SHALL BE TYPE XHHN OR THHN. MINIMUM WIRE SIZE SHALL BE #12 GAUGE AWG. CONTROL WIRING MAY BE #14 GAUGE.
4. GROUNDING:
  - 4.1. GROUND ALL ELECTRICAL APPARATUS IN ACCORDANCE WITH N.E.C. AND AS SPECIFIED HEREIN. PROVIDE A SEPARATE GROUNDING CONDUCTOR FOR ALL LIGHTING, RECEPTACLE AND EQUIPMENT CIRCUITS. ALL CABINETS, SWITCHBOARDS, EQUIPMENT CASES, MOTOR FRAMES, INTERIOR METAL COLD WATER PIPING SYSTEMS, AND SYSTEM NEUTRAL CONDUCTORS SHALL BE EFFECTIVELY GROUNDED. USE SOLDERLESS PRESSURE TYPE CONNECTORS. NO PERFORATED STRAP CONNECTORS WILL BE ALLOWED. INSURE CONTINUOUS BOND WHERE FLEXIBLE CONDUIT IS USED. PROVIDE BONDING JUMPER INSIDE ALL FLEXIBLE CONDUIT. GROUNDING PER N.E.C. 250, AND ANY LOCAL REQUIREMENTS.
5. CABINETS, JUNCTION AND PULL BOXES:
  - 5.1. FLUSH OR SURFACE MOUNTED AS INDICATED ON DRAWINGS. PROVIDE WHERE DIRECTED BY ENGINEER AND WHERE REQUIRED BY CODE. CONSTRUCT OF CODE GAUGE STEEL FOR FLUSH SURFACE MOUNTING.
6. OUTLET BOXES:
  - 6.1. GENERAL ELECTRIC, APPLETON, STEEL CITY OR RACO HOT DIPPED GALVANIZED STEEL BOXES, OR EQUAL. INSTALL AT TERMINAL OF EACH CONDUIT RUN, EACH OUTLET, OR DEVICE. PROVIDE SIZE, TYPE AND DESIGN TO SUIT STRUCTURAL CONDITIONS. ADJUSTIVE TO ACCOMMODATE SIZE AND NUMBER OF RACEWAYS, CONDUCTORS, DEVICE OR FIXTURE SERVED. PROVIDE PLASTER RINGS OR COVERS ON BOXES WHERE REQUIRED ON EXPOSED WORK, USE APPROVED CAST FERROUS ALLOY OUTLET, JUNCTION BOXES AND FITTINGS. FIXTURE OR DEVICE COVER SHALL COMPLETELY CONCEAL THE SIZE OUTLET BOX USED.
7. DISCONNECT SWITCHES:
  - 7.1. HEAVY DUTY NEMA TYPE 'HD' - SAME MANUFACTURER AS PANELBOARDS. PLASTIC NAMEPLATE PROPERLY ENGRAVED WITH NAME OF EQUIPMENT SERVED, SECURED TO SWITCH COVER. FUSES SHALL BE BUSSMANN OF SIZES AND TYPES SCHEDULED.
8. MOTOR AND CONTROL WIRING AND CONNECTIONS:
  - 8.1. THIS CONTRACTOR TO PROVIDE ALL NECESSARY CONDUIT, BOXES AND SUPPORTS TO EQUIPMENT FURNISHED BY OWNER AND AS INDICATED ON DRAWINGS. PROVIDE A DISCONNECT SWITCH AND STARTER IF REQUIRED.

**DESCRIPTION OF CONTROL PANEL:**

1. PANEL SHALL BE PROVIDED AS PART OF PUMP STATION PACKAGE WITH MANUFACTURER UNIT SOURCE RESPONSIBILITY. BASE PANEL SHALL INCLUDE ALL CIRCUITRY TO CONTROL PUMPS INCLUDING CONTACTS, MICROPROCESSOR, MAGNETIC STARTER, CIRCUIT BREAKERS (MAIN, INDIVIDUAL PUMP, AND CONTROL FUNCTIONS), ETC. PANEL SHALL BE A DUPLEX PUMP CONTROL PANEL. PANEL OPTIONS SHALL INCLUDE THE FOLLOWING:
    - 1.1. DUPLEX PUMP CONTROLLER.
    - 1.2. LAMINATED, ENGRAVED ID TAGS FOR EACH SWITCH AND LIGHT ON PANEL FACE.
    - 1.3. LOCAL INDICATING LIGHTS FOR PUMP RUN STATUS, SEAL FAILURE ALARM, THERMAL OVERLOAD ALARM, AND LAG PUMP ON/HIGH WATER ALARM.
    - 1.4. PROVIDE 120V, 15 AMP SINGLE POLE BREAKER TO SUPPLY POWER TO CONTROL TRANSFORMER FOR INSTRUMENT CONTROL POWER.
    - 1.5. NEMA 3R STAINLESS STEEL ENCLOSURE, LOCKABLE.
    - 1.6. PUMP ALTERNATOR RELAY (SEE NOTE 2 OF "PUMP OPERATION")
    - 1.7. LIGHTNING ARRESTOR.
    - 1.8. SIX-DIGIT ELAPSED TIME METER FOR EACH PUMP, NON-RESETTABLE.
    - 1.9. PROVIDE 120V, 15 AMP SINGLE POLE BREAKER TO SUPPLY POWER TO THE SCADA SYSTEM SUPPLIED BY OWNER.
    - 1.10. H-0-A SWITCH FOR EACH PUMP.
    - 1.11. AUXILIARY TELEMETRY DRY CONTACT FOR HIGH WATER LEVEL, PUMP RUN STATUS AND PUMP FAIL TO START.
    - 1.12. INTEGRATED LEVEL CONTROL SYSTEM.
    - 1.13. VOLTAGE MONITOR TO TAKE PUMP STARTERS OUT OF SERVICE, IF THE VOLTAGE DROPS BELOW AN ADJUSTABLE PERCENT OF NORMAL VOLTAGE.
    - 1.14. A LINE VOLTAGE RATED SURGE CAPACITOR DESIGNED TO WORK ON MOTOR INSTALLATIONS AND EQUIPPED WITH AN INTERNAL AUTOMATIC DISCHARGING CIRCUIT.
    - 1.15. ELECTRONIC SURGE PROTECTOR FOR 120V CIRCUIT.
    - 1.16. RED FLASHING LIGHT TO ENGAGE UPON ANY ALARM CONDITION IN ITEM "C" WITH AUDIBLE HORN AND TEST BUTTON FOR ALL LIGHTS AND HORN.
- DESCRIPTION OF PUMP OPERATION:**
1. WHEN SEWAGE RISES TO THE FIRST HIGH WATER LEVEL, THE LEAD PUMP SWITCH SHALL START THE LEAD PUMP. SEWAGE LEVEL WILL DECREASE TO THE LOW LEVEL SWITCH SETTING AND THE PUMP SHALL STOP.
  2. AN ALTERNATING RELAY SHALL INDEX ON STOPPING OF THE PUMP SO THAT THE SECOND PUMP WILL START FIRST ON THE NEXT CYCLE.
  3. IF THE WET WELL, LEVEL CONTINUES TO RISE WHEN THE LEAD PUMP IS IN OPERATION, THE LAG PUMP SWITCH SHALL START THE LAG PUMP. BOTH PUMPS SHALL OPERATE TOGETHER UNTIL THE LOW LEVEL SWITCH TURNS OFF BOTH PUMPS.
  4. IF THE LEAD PUMP SHOULD FAIL TO START, THE SECOND PUMP SHALL BE ENERGIZED BY THE LAG PUMP SWITCH AND AN ALARM SHALL BE INITIATED FOR LEAD PUMP START FAILURE.
  5. IF THE SEWAGE LEVEL CONTINUES TO RISE AFTER THE LAG PUMP HAS BEEN STARTED THE HIGH LEVEL ALARM SHALL BE ACTIVATED.
  6. IF THE SEWAGE LEVEL DROPS TO THE LOW-LEVEL ALARM, BOTH PUMPS SHALL SHUT-OFF.

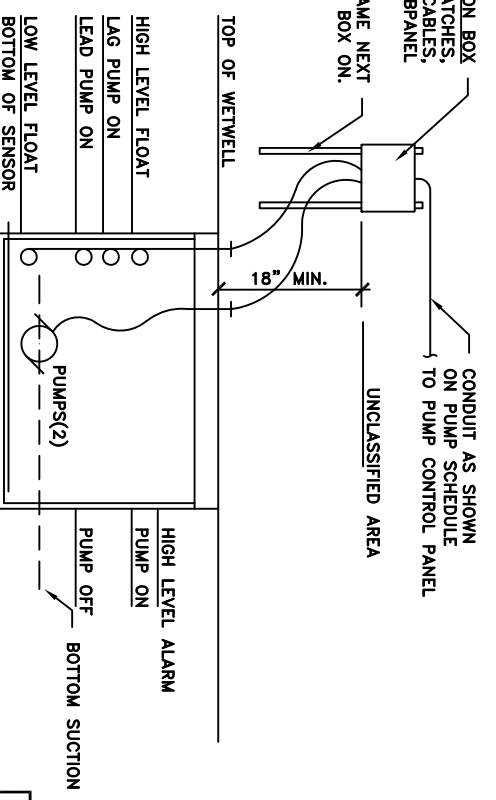
**ELECTRICAL GENERAL PROVISIONS:**

1. STANDARDS, REGULATIONS AND CODES:
  - 1.1. THE WORK SHALL COMPLY WITH THE EDITION OF THE APPLICABLE STANDARDS, REGULATIONS AND CODES CURRENTLY IN FORCE OF ALL STATE AND LOCAL AUTHORITIES HAVING JURISDICTION, WHERE QUANTITIES, SIZES, OR OTHER REQUIREMENTS INDICATED ON THE DRAWINGS OR HEREIN SPECIFIED ARE IN EXCESS OF THE STANDARD OR CODE REQUIREMENTS. THE SPECIFICATIONS AND/OR DRAWINGS SHALL GOVERN, IN THE ABSENCE OF OTHER APPLICABLE LOCAL CODES. ACCEPTABLE TO THE ARCHITECT/ENGINEER, THE NATIONAL ELECTRICAL CODE SHALL APPLY TO THIS WORK.
  - 1.2. THE CONTRACTOR SHALL COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND LOCAL DEPARTMENTS AFFECTED BY CONNECTIONS OF SERVICES. THE CONTRACTOR SHALL PAY ALL FEES ASSOCIATED THERE WITH.
  - 1.3. THE ELECTRICAL CONTRACTOR SHALL BE LICENSED TO PERFORM ELECTRICAL WORK IN THE LOCAL AREA IN WHICH THE PROJECT IS LOCATED.
  - 1.4. ALL PRODUCTS AND TYPES OF CONSTRUCTION SHALL MEET OR EXCEED THE LATEST EDITION OF APPLICABLE STANDARDS OF MANUFACTURER, TESTING, PERFORMANCE AND INSTALLATION.
2. SEE AMERICAN WATER STANDARD ELECTRICAL PROVISIONS SPECIFICATIONS



**ELECTRICAL SERVICE RISER**

- NOTES:
1. FUSED DISCONNECT SHALL BE IN DIRECT LINE OF SIGHT TO WETWELL. IF NOT AN ADDITIONAL DISCONNECT SWITCH SHALL BE INSTALLED WITHIN LINE OF SIGHT.



**WET WELL**

- NOTES:
1. CONTRACTOR TO INSTALL FLOAT CABLES AND PUMP CABLES WITHIN 2" CONDUITS.

REVISIONS	AMERICAN WATER MILITARY SERVICES GROUP
6/13 - MSG EDITS	STANDARD LIFT STATION ELECTRICAL PLAN
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DRAWN BY Z. ALAM  
PROJECT ENGR PDK  
APPROVED

DATE 04-30-2010  
PROJECT N/A  
SCALE N.T.S.

USE DIMENSIONS ONLY  
USE APPROVED DIMENSIONS ONLY  
FOR CONSTRUCTION PURPOSES

MSG-WW-02

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