

## SECTION 13150

### SWIMMING POOL

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Pool mechanical systems, including piping, circulation pump and filter.
- B. Miscellaneous pool testing, safety, and control equipment as required by the Department of Public Health.
- C. Pool start-up, closing, and instruction of Owners personnel.

##### 1.2 REFERENCES

- A. ASTM D1785 – Specification for Standard specification polyvinyl chloride (PVC) plastic pipe schedules 40, 80, and 120.
- B. ASTM D1784 – Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds.
- C. ASTM D2564 – Specifications for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings.
- D. ASTM D2855 – Practice for Making Solvent-Cemented Joints with PVC Pipe and Fittings.
- E. NSF – Seal for Potable Water.

##### 1.3 DEFINITIONS

- A. The term “pool” as used in this Section shall refer to the lap pool and activity pool.
- B. The term “Architect / Engineer” as used in this Section shall refer to the pool filtration system design only.

##### 1.4 SYSTEM DESCRIPTION

- A. Provide all labor and materials necessary for renovation of the existing pool filtration systems. The above will be complete will all equipment as indicated on the construction documents. Construction shall be in accordance with State and Local Codes.

##### 1.5 SUBMITTALS

- A. Product Data: Provide Manufacturer’s/Installer’s written installation instructions.

- B. The Contractor shall submit for approval to the Architect/Engineer complete lists, including descriptions catalog cuts, etc., and where applicable dimensioned shop drawings of all material, fixtures and equipment to be furnished and installed under this specification. Submittal shall adequately and completely describe the equipment, including where necessary or requested complete construction and installation dimensions, complete capacity and performance data, all accessory and auxiliary equipment, and all pertinent details of manufacture. Shop drawings for equipment shall be submitted and approval of shop drawings shall be obtained before proceeding with fabrication. Shop drawings shall not be "doctored" reproducibles of Architects/Engineers drawings.
- C. Shop Drawings:
1. Submit shop drawings as required by Parts 2 and 3 of this Section.
  2. The drawings accompanying this specification are essentially diagrammatic in nature and show the general arrangement of all equipment and piping. Because of the small scale of the drawings, it is not possible to show all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the structural and finish conditions of all his work and shall arrange such work accordingly, furnish all fittings, pipe and accessories that may be required to meet such conditions. Where conditions necessitate a rearrangement, the Contractor shall obtain the Architect/Engineer's approval. Locate all valves for maximum operation accessibility.
- D. Operation and Maintenance Manuals: Submit 4 copies of the operation and maintenance manuals for the filter, pump and heat exchanger.
- E. Required Submittals:
1. Pump, Strainer
  2. Variable Frequency Drive
  3. Gauges, Flow Sensors
  4. Piping Materials, Valves
  5. Shop Drawings:
    - a. Filter
  6. Test Results:
    - a. Piping Pressure Testing
  7. Guarantees Warrantees:
    - a. Standard (1) Year
    - b. Filter Tank (15)
  8. Close Out Documents:

- a. O&M Manuals
- b. As Built Drawings
- c. Owners Certification Of Instruction

#### 1.6 QUALITY ASSURANCE

- A. Qualifications of Pool Contractor: Work of this Section shall be performed by a contractor who has a proven record of competence and experience in the construction of similar facilities of this size and complexity for not less than 5 years. References will be required by the Owner.
- B. Performance Criteria: Certain sections of the Specifications contain performance criteria rather than product descriptions. It shall be the obligation of the contractor to insure that all criteria are satisfied and the burden or proof of conformance shall rest with the contractor. The Architect / Engineer shall require past performance records and, if required, inspection trips of similar facilities to substantiate conformance with these criteria. The Architect / Engineer shall be sole judge of conformance. The Pool Contractor is cautioned that he will be required to provide a finished product meeting all stated criteria and meeting or exceeding Department of Health requirements.

#### 1.7 REGULATORY REQUIREMENTS

- A. All applicable local building and health codes.
- B. National Electrical Code (NEC)
- C. National Sanitation Foundation (NSF): Seal of approval program.
- D. Illinois Department of Public Health Swimming Pool and Bathing Beach Code

#### 1.8 REQUIRED PERMITS

- A. Illinois Department of Public Health by Architect / Engineer.
- B. Local Building Department: Pool Contractor.

#### 1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials and equipment to the Work Site in original packages fully identified, with manufacturer's label.
- B. Protect plastic pipe from exposure to chemicals (aromatic hydrocarbons, halogenated hydrocarbons and other esters and ketones) that might attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.

#### 1.10 WARRANTY

- A. Warranty: Provide one (1) year warranty covering all pool workmanship, material and equipment.
- B. All standard manufacturer's warranties shall apply to all equipment and products

provided by this Contractor.

Filter Tank shall have a fifteen (15) year warranty.

## PART 2 - PRODUCTS

### 2.1 FILTRATION SYSTEM

#### A. General:

1. Purpose of the bid is to purchase and have installed a complete filtration and recirculation system for each pool. It is intended to limit the bidding to a style of product and company that has a proven history and record of performance.
2. Due to the specialized nature of certain components required for this project, these specifications, in some instances refer to various components by trade or manufacturers name.
3. Whenever a proprietary (trade) name is used within this Specification Section, it is used for informational purposes to describe a standard of required function, dimension, appearance and quality. References to materials by trade name, make or model number shall not be construed as limiting competition.

#### B. Quality Assurance:

1. Due to the specialized nature of the specified work and products, all bidders shall be required to have a minimum of five (5) years of operating history. The equipment described herein shall be products of a manufacturer regularly engaged in the fabrication of filtration and circulating systems for at least fifteen (15) years and shall be a professional engineering corporation.
2. The owner requires that filters bear the National Sanitation Foundation (NSF) seal for Standard #50. This NSF listing is required by the owner regardless of local health department regulations.
3. The specified filter system shall have had an NSF listing for at least two (2) years prior to the project bid date.
4. As assurance that each item of apparatus is properly sized to perform in conjunction with each other, the owner requires bidders to use the filter manufacturer as a single source of supply for the items of equipment as listed and described herewith.
5. The "EQUIPMENT SUPPLIER" shall be:
  - a. Neptune-Benson, Inc.; Coventry, Rhode Island; 1-800-832-8002

#### C. Guarantee:

1. The "EQUIPMENT SUPPLIER" shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other, that if the installation is made in accordance with the project drawings and operated in accordance with the suppliers instructions, the system will perform the prescribed functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, and will be sanitary to the satisfaction of all authorities having jurisdiction.

#### D. Filter Requirements

1. Each filter system under this section shall consist of a Defender regenerative media filter as detailed on the drawings or equal.
2. It is the intent of these specifications to describe a filter system complete with all accessory items supplied and warranted by one manufacturer.
3. The primary components of the system consist of the main filter tank, flexible tube filter elements, element assembly, bump mechanism, vacuum transfer system, sight glass, pressure gauge panel, inspection (viewing) window, valves and automatic regeneration controller.
4. All components and related subassemblies shall be factory assembled and tested prior to shipment.

#### E. Filter System Capacity:

1. Each system shall consist of the regenerative media filter tank(s) with a total effective filter surface area as shown on the drawings and operate at a rate not exceeding 1.5 gallons per minute per square foot of filter area.

#### F. Filter Tank:

1. The filter tank shall not be less than the diameter noted on the drawings with a 60 inch side shell, suitable for 50 psi working pressure and hydrostatically tested to 75 psi. Tank shell shall be not less than 1/4 inch thick. Bottom dished head shall be not less than 1/4 inch thick. Top flat head shall be not less than 1 1/2 inch thick. All material to be Type A-36 carbon steel. Type 304L stainless steel with no interior or exterior coatings is acceptable.
2. All welding shall be performed by qualified operators. Joints shall be butt or fillet welded inside and out by manual or automatic process. Welded joints shall have complete penetration and fusion with little or no reduction of the thickness of the base metal. Welds shall be free of coarse ripples, grooves, overlaps, abrupt ridges or valleys. All welded surfaces shall be chipped and brushed clean, when necessary, leaving no slag or splatter.
3. Tank legs shall be constructed of 6" x 2 1/2" channel legs 1/4" thick. 24", 27" and 33" filters shall have (3) legs. 41", 49" and 55" filters shall have (4) legs. The material shall be Type A-36 carbon steel. Bearing plates shall be 10" x 5" x 1/4" type 304L stainless steel. Each bearing plate shall have (2) 5/8" drilled holes to secure to the

floor with the ½" x 4 ½" stainless steel concrete anchors provided. The legs shall be designed with bolted connections to minimize overall tank heights for shipping and access into the mechanical room.

4. The tank head shall be bolted to the shell with 7/8 inch diameter T304 stainless steel studs and nuts, 9" on center around the tank perimeter.
5. Tank shall be equipped with a UL listed grounding lug.
6. Tank shall incorporate connections for filter influent, effluent and drain sizes as showing on drawings; 1 1/2" vacuum transfer piping, 4" viewing window, and lift shaft gland.
7. Tank shall include brackets for mounting of automatic controller, gauge panel, filter / regulator, vacuum transfer blower and vacuum hose rack.
8. Tank shall include integrally mounted hydraulic lifting device (David). The Davit Assembly shall be designed to lift the filter head and include a pivot mechanism allowing the head to rotate 180° for access to tube sheet (model SP-24-42-327 excludes David requirement.)

G. Flexsol 3000 interior Lining:

1. All interior surfaces shall be grit blasted to white metal condition with a 2-3 mil profile. Blasted surfaces shall be cleaned of all dust or blast residue and primed as soon as is practical on the same day blasting is done.
2. When priming has dried the lining process will begin. If prime has sat for over twenty-four hours, a refresher coat will be applied.
3. Flexsol 3000® shall be a elastomeric polyurethane, 100 percent solid plural component lining. Hardness shall be 70 durometer on the shore D scale. Break tensile strength shall be 24600 psi with elongation of 25-30 percent.
4. Application of Flexsol 3000® lining shall be done by experienced applicators using a high pressure, high temperature plural component system. All wetted surfaces including flange faces, manway rings and manway covers shall be lined to 120 mils +/- 5 mils DFT.
5. Hardness shall be verified after curing to ASTM D 2240 standard.
6. Flexsol 3000® lining shall meet the NSF toxicity standard unconditionally and shall be approved for use with the NSF approved filter.
7. Flexsol 3000® lined vessels shall carry a ten (10) year limited non-prorated warranty.
8. The filter manufacturer shall bear the responsibility for suitability of lining and shall be the sole source for the specified warranty.

H. Exterior Coatings:

1. All exterior surfaces shall be grit blasted to white metal condition with a 2-3 mil profile. Blasted surfaces shall be cleaned of all dust or blast residue and primed as soon as practical on the same day blasting is done.
2. When priming has dried the coating process will begin. If prime has sat for over twenty-four hours, a refresher coat will be applied.
3. Two coats of high solids enamel shall be applied for a total developed film thickness of 5-8 mils.
4. Manufacturer is to supply min. 16 oz. of high solids enamel touch-up paint.

I. Internal Components:

1. Internally, the filter shall consist of flexible tube elements, filter assembly plate, stainless steel lift shaft and internal flow diversion assembly.
2. The filter elements shall be flexible tubes that provide the support structure for the media. The outer wall of each element shall be fabricated of multi-filament high strength polyester braid. Each element shall have an internal stainless steel spring, which acts a support structure for the braided filament.
3. The filter element assembly plate shall be fabricated of T304 stainless steel and provide both support for the top of the element cluster as well as water tight seal to prevent media from escaping the filter tank.
4. The lift shaft shall be fabricated from T304 stainless steel and provide the internal connection between the filter element assembly plate and the external bump mechanism.
5. The filter influent connection shall be fitted with a T316 stainless steel flow diversion assembly to eliminate disturbance to the filter elements during operation.
6. All stainless steel wetted internals shall be Type 304.

J. Bump Mechanism:

1. The bump mechanism shall include a pneumatically operated tire mounted externally on the filter tank head. The tire is alternately pressurized then depressurized causing the connected filter element assembly to move in an upward then downward fashion. This movement shall provide the means of dislodging the media and accumulated solids, which then recoat the filter element.

K. Vacuum Transfer System:

1. The vacuum transfer system shall be provided to allow the recharging of media into the filter for either bag or bulk media.
2. The vacuum blower shall include a 1.5 h.p. (for SP-27-SP-55) or .5 h.p. (for SP-24) TEFC 115/230v single phase motor 50/60 Hz.

3. An in-line filter with dual connections shall be provided to prevent dust and media from being drawn into the blower.
4. Provide three (3) 1 1/2" SCH 80 PVC ball valves: For the vacuum drain line, the blower inlet and the vacuum hose.
5. Provide 10 feet of 1 1/2" vacuum hose with fittings.

L. Automatic Controller (Alternate Only):

1. The automatic controller shall provide total control of the system's filtration and regeneration cycles, and provide all necessary equipment interlocks and timing mechanisms to execute the filter program.
2. The controller shall include an adjustable pressure switch, factory set to 50 psi. The switch shall stop the recirculating pump and close the pneumatic valves if air pressure falls to 50 psi.
3. The controller shall contain a microprocessor that will activate the following functions of the system:
  - a. Bump cycle/manual or automatic.
  - b. Precoat of filter elements.
  - c. Stopping and starting of the main recirculating pump.
  - d. Opening and closing of pneumatically operated valving.
  - e. Vacuum transfer system.
  - f. Heater cool down delay.
  - g. Auxiliary contacts to interlock chemical control or other equipment.
  - h. Keyed switch to activate a continuous, intermittent bump cycle for flex tube cleaning.
4. The controller panel shall display the following function:
  - a. Filter status.
  - b. Precoat status.
  - c. Recirculating pump status.
  - d. Vacuum transfer pump status.
  - e. System power.
5. The controller enclosure shall be NEMA 12.
6. The RMF automatic controller will provide signal power to the main recirculating pump motor starter. The unit is required to be a device or variable frequency drive (VFD) and is to be installed with control wiring by the electrical contractor.
7. The RMF shall be 120v, 1-phase, 30 amp rated and shall be UL labeled

M. Flow meter:



1. A digital flow meter shall be included with a 4-20mA 0-10 VDC analog output.
2. The flow meter shall be wired into the VFD to provide automatic speed control of the filter pump motor.
3. The VFD shall compensate for varying filter head losses by maintaining the specified flow rate with the 4-20mA output signal of the flow meter.

N. Filter/Regulator:

1. Each filter shall include a combination filter / regulator. The regulator shall be adjustable from 0 – 120 psi. 1/2 inch F.P.T. connections shall be provided for field installation of air lines.

O. Water Separator:

1. One water separator with automatic drain shall be included for each air compressor supplied. 1/2 inch F.P.T. connections shall be provided for field installation of air lines.

P. Air compressor:

1. The system will require (1) air compressor per mechanical room that shall include:
  - a. 30 gallon tank
  - b. 2 HP, electric motor 120v, 1 phase, 15 amp.
  - c. Air pressure gauge.
  - d. Pressure relief valve.
  - e. Belt guard.
  - f. Pressure switch.
  - g. Air filter.
  - h. 5.5 CFM @ 90 psi.

Q. Pneumatic Actuators:

1. Each filter shall include pneumatic actuators for (1) check valve, (1) effluent valve and (1) precoat valve.
2. The actuators shall be double acting with valve mounted drilling to ISO 5211.
3. The actuators shall include (2) 1/4 inch FPT ports for open / close connections. Flow control valves with quick connect fittings shall be provided at each port to allow speed control adjustment for the open / close function of the actuators.
4. Materials of Construction
  - a. Body: aluminum alloy, extruded acc. To ASTM 6063, anodized acc. To UNI 4522.
  - b. Ends: Die-cast in aluminum alloy acc. To ASTM B179, epoxy-polyester coated.
  - c. Pistons: Die-cast in aluminum alloy acc. To ASTM B179.

- d. Pinion: Nickel-plated steel.
- e. Slideways: Acetal resin (LAT LUB 731320T).
- f. Fasteners: AISI 304 Stainless steel.
- g. Springs: Epoxy coated steel, pre-compressed.
- h. Seals: NBR Nitrile rubber.
- i. Lubricant: MoS2.

R. Solenoid Valve:

1. Each filter shall include pneumatic actuators for (1) check valve, (1) effluent valve and (1) precoat valve.
2. The solenoid valves shall include lighted DIN connectors.
3. The solenoid valves shall be factory lubricated and shall not require any field lubrication.
4. The solenoid valves with multi-station manifold shall be located on the bottom of the automatic controller, factory wired and include quick connect fittings for attachment to the pneumatic actuators and bump mechanism.
5. The solenoid valves shall be SMC Series SY 7000.

S. Valves:

1. All Valves 3 inches – 12 inches shall be constructed with cast aluminum ASTM SI2A housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and T304 stainless steel shaft. Valves 14 inches and larger shall be constructed with cast iron housing fully coated with nylon and nylon coated ductile iron disc. Valves shall be butterfly valves and shall be provided for the influent, effluent and precoat lines.

T. Media:

1. Media shall be expanded perlite with a median particle size of 37 microns. Percentage retained on a +150 Tyler Mesh shall not be less than 8% or more than 25%. Darcy permeability shall be between 1.2-1.85.
2. The media shall contain no more than 1 tenth of one percent (.001) or crystalline silicate.
3. The media shall be certified by the manufacturer for use in the Defender Filter. The media shall be NSF listed in Std. 61 and Std. 50.
4. The media shall be Celaperl 1400P as supplied by EP Minerals.

U. Warranty:

1. Defender filter tanks with Flexsol 3000 shall carry a 10 year fully rated warranty as regularly offered by the tank manufacturer.

2. Bump tire and internal tube elements shall carry a fully rated 3 year warranty.
3. Valve bodies shall carry a 5 year fully rated warranty.
4. Valve operators and system accessories including the RMF controller, quick exhaust valve and solenoid valve shall carry one year warranty as provided by the product manufacturer.
5. Unless otherwise specified, workmanship is to be guaranteed first class and carry a one (1) year warranty.

## 2.2 WATER TREATMENT SYSTEM

- A. Re-install existing chemical system as shown and scheduled on Contract documents. All in accordance with manufacturer's recommendations.
- B. Furnish Owner with written water treatment program complete with written basic water chemical analysis and verbal instructions as to operate of system.

## 2.3 PUMPS [FLOODED SUCTION]

- A. Furnish and install circulation pumps as manufactured by Marlow, Sulzer/Paco, Aurora or approved equal. See contract documents for horsepower, voltage, phase, flow rate, NPSH-A, pump and motor efficiency, VFD, flow meter and pipe size information.
- B. Furnish and install pressure and vacuum gauges where called for on Drawings and as required by Code. Pressure and vacuum gauges shall be Trerice #700 Liquid Filled, 0-60 PSI, vacuum 30 Hg – 30 PSI, all gauges with gauge cocks.
- C. To insure cavitations-free operation, each pump's NPSH requirements must be low enough to permit stable, continuous operation at 120 percent or greater of best efficiency point.
- D. Pump casing shall be close grain cast iron fitted with a replacement bronze case wear ring. Minimum 1/4 inch NPT suction and discharge gauge taps. Pumps with a specific speed greater than 1600 shall have double volute casings with suction splitter to reduce radial loading and shaft deflection.
- E. Pump impeller shall be of the enclosed type of cast bronze, lead free, zinc free, aluminum bronze and shall be statically and dynamically balanced. Impeller diameter shall be trimmed for the specified design conditions.
- F. Pumps mounted vertically to have recirculation line pipe from seal cavity to suction of the pump.
- G. Pumps to be mounted on a cast iron fabricated steel base, epoxy coated, and stainless steel hardware.
- H. Pump shall be fitted with a leakless mechanical seal. John Crane type 1 BUNA elastomers ceramic stationary seat carbon rotating stainless steel metal parts.

- I. Shaft to have a replaceable lead free, zinc free, bronze shaft sleeve.
- J. Pump to have an epoxy coating on all interior cast iron parts. All pump fasteners to be 300 series stainless steel and should have a never seize application to threads prior to assembly , or approved equal.
- K. Pump motor to 3-phase, 60 cycle, Totally Enclosed Fan Cooled, with horse power and voltage as shown on drawings, 1.15 service factor, inverter duty, NEMA (MG-1) section IV, Part 30.2.2.8, 200v or 208v motor must be single voltage, tri-voltage motor not acceptable on 200v or 208v service.
- L. All pumping components capable of pumping heavy chlorinated pool water.

## 2.4 STRAINERS

- A. Furnish and install hair and lint strainers where call for on drawings. Strainers to be of PVC or stainless steel construction with a clear acrylic lid as manufactured by Neptune Benson or Paddock Pool Equipment Co., Inc. Strainers shall be of the reducing type.
- B. Strainer baskets shall be stainless steel construction with 5/32 inch perforations. Provide each strainer with two strainer baskets.

## 2.5 VARIABLE FREQUENCY DRIVES

- A. The Variable Frequency Drives (VFD's) shall employ a Pulse Width Modulated (PWM) output waveform. Drive efficiency shall be 97% or better at full speed/load. The same manufacturer shall supply the Variable Frequency Drives for both Feature and Filter pumps. The Pump Supplier shall be responsible for providing as a system, the pumps, VFD's, flow meter and the set-point controller.
- B. The VFD shall be manufactured by Benshaw SG series, ABB, Model ACH 550, Square D Altivar Model 61 or approved equal. All items in this specification must be adhered to strictly. Any deviation must be submitted and approved in writing ten working days prior to bid date.
  - 1. This specification is to cover a complete Variable Frequency motor Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor.
  - 2. The drive manufacturer shall supply the drive and all necessary options as herein specified. VFD's that are manufactured by a third party and "brand labeled" shall not be acceptable. All VFDs installed on this project shall be from the same manufacturer.
  - 3. VFD's with Filter Packages will include: Non-fused main disconnect, chemical pump, Heater, inter lock relay, Backwash Timer, Filter Alarm light on door Auto/Off Backwash Selector Switch, and 115V Control Transformer.
  - 4. Drives to operate automatically with a 4 to 20 ma PID loop with the flow meter and show actual flow rate in GPM on the keypad.

5. With a certified start up you will receive a 2-year warranty on all parts and labor.

C. Reference Standards:

1. Standar 519-1992, IEEE Guide for harmonic content and control
2. UL508C
3. ICS 7.0, AC Adjustable Speed Drives
4. IEC 16800 Parts 1,2 and 3
5. NEC 430.120, Adjustable-Speed Drive Systems
6. IBC 2006 Seismic-referencing ACS 7-05 and ICC AC-156

D. Qualifications:

1. VFDs and options shall be UL listed as assembly. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.
2. CE Mark – The VFD shall meet product standard EN 61800-3 for the First Environment restricted level. (RFI / EMI Filter spec).
3. The entire VFD enclosure, including the bypass shall be seismically certified and labeled in accordance with the IBC 2006 International Building Code:
  - a. VFD manufacturer shall provide Seismic Certification and Installation requirements at time of submittal.
  - b. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake test data as defined by ICC AC-156.
  - c. Seismic ratings based upon calculations alone are not acceptable. Certification of Seismic rating must be based on testing done in all three axis of motion by a certified lab.

E. Submittals shall include the following information:

1. Outline dimensions, conduit entry locations and weight.
2. Customer connection and power wiring diagrams.
3. Complete technical product description including a complete list of options.
4. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).
  - a. The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5% impedance reactors, no exceptions.

- F. The VFD Package as specified herein shall be enclosed in a UL Listed Type enclosure, (enclosures with only NEMA ratings are not acceptable.)
1. Environmental operating conditions: 0 to 40<sup>0</sup> C (32 to 104<sup>0</sup> F) continuous. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.
  2. Enclosure shall be UL rated and shall be UL listed as a plenum rated VFD.
- G. All VFDs shall have the following standard features:
1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
  2. The keypad shall include Hand-Off-Auto selections and manual speed control. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
  3. The VFD shall have internal 5% impedance reactors to reduce the harmonics to the power line and to add protection from AC line transients.
  4. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120.
  5. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus.
- H. Serial Communications
1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, and BACnet MS/TP. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority (i.e. BTL Listing for BACnet).
  - I. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the entire VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted. No Exceptions.
  - J. OPTIONAL FEATURES – Optional features to be furnished and mounted by the drive manufacturer. All optional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.

## 2.6 POOL VALVES AND PIPING MATERIALS

A. Products:

1. Provide valves of same manufacturer throughout where possible and practical.
2. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

B. Valve Connections: Provide valves suitable to connect to adjoining piping as specified for pipe joint. Use pipe size valves.

C. Use of Valves:

1. Pipe sizes 3" – 12", Butterfly.
2. Miscellaneous valves ½" – 2", PVC True Union Ball Valves.
3. All chemical lines and equipment – PVC True Union Ball Valves.

D. Butterfly Valves:

1. Butterfly valves 3" – 12" shall be wafer or lug bodies and shall be suitable for use between ANSI 125 or 150 lb. Flanges.
2. Bodies of the flangeless design shall be provided with at least four (2) bolt guides to center the valve in the pipeline.
3. All butterfly valves shall have a cast iron body epoxy coated, ductile iron nylon 11 coated discs, stainless shaft with Buna-N or EPDM seat minimum 150 PSI rating.
4. All butterfly valves 4" – 6" shall have 10 position locking handle, butterfly valves 8" – 12" shall have gear operators and chain operators as required.
5. All valves shall be as manufactured by Bray Valve (713) 894 5454 or equal as approved by the Architect / Engineer.

E. Ball Valves:

4. PVC True Union Ball Valves, Dual Union, Eslon, Assahi, or equal.

F. Check Valves – (where required): Shall be cast iron body, stainless steel spring trim, bronze split disc, seal material Buna-N. (CHEXX) Model as manufactured by Metraflex, Chicago, Illinois, or Mueller Steam Specialties as indicated on Contract documents.

F. Modulating Float Valves: Shall be used in the surge tank as specified on Contract documents. The valves shall be constructed with stainless steel rods and PVC floats allowing 20% maximum flow when fully closed. As manufactured by Neptune Benson or equal as approved by the Architect / Engineer.

## PART 3 – EXECUTION

### 3.1 PIPING AND PIPE FITTINGS – HANGERS AND SUPPORTS

- A. Work Included: Pipe, fittings, connections, wall penetrations, hangers and supports, equipment bases and supports.
- B. Use the prescribed pipe type in the following areas. All plastic pipe flanges shall be scheduled 80 PVC with neoprene gaskets where required.
  - 1. All piping shall be schedule 80 or pressure rated PVC solvent weld.
  - 2. All chemical piping, schedule 80 PVC, solvent weld.
  - 3. Heater connections shall be Type “L” copper piping on the heater influent and effluent lines from the bypass to the heater, with cast brass or wrought copper fitting and 95/5 soldered joints.
- C. Hangers and Supports: Submit hanger locations and weights, hanger details on Shop Drawings.
  - 1. All mechanical room piping must be properly supported.
  - 2. It shall be the Contractor's responsibility to properly support piping at all valves, pumps, equipment, overhead areas, etc.
  - 3. Use of the proper hanger for the conditions is essential. All piping must be supported laterally as well as vertically hung.
  - 4. All piping 8” or larger must be properly supported from the floor only.
  - 5. All piping connections and support hardware shall be stainless steel inside balance tanks.
- D. Piping:
  - 1. Cut all pipe with mechanical cutter without damage to pipe.
  - 2. Placing and laying: Inspect pipe for defects before installation. Clean the interior of pipe thoroughly of foreign matter and keep clean during laying operation.
  - 3. Threaded joints: After cutting and before threading, the pipe shall be reamed and shall have burrs removed. Screw joints shall be made with graphite or inert filler and oil or with an approved graphite compound applied to make threads only. Threads shall be full-cut and not more than 3 threads on the pipe remained exposed. Use Teflon II tape on the make threads of all threaded pipe joints. Caulking of threaded joints to stop or prevent leaks will not be permitted. Unions shall be provided where required for disconnection of exposed piping. Unions will be permitted where access is provided
  - 4. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions and the following minimum standards:



- a. All fittings shall fit easily on the pipe before applying cement. The outer surface area of pipe and inner wall of fitting shall be dry and clean. Cleaner is to be applied to the outer surface of the pipe and to the inner surface of the fitting. Cement is to be applied to the outer surface of the pipe, or on the male section of fittings only. When the outside surface area of the pipe is satisfactorily covered with cement allow ten (10) seconds open time to lapse before inserting pipe end into fittings. After full insertion of pipe into fitting, turn fitting around the pipe end approximately 1/8 to 1/4 of a turn. Wipe off excess cement at the joint in a neat cove bead. Follow manufacturer's instructions on solvents.
  - b. All joints shall remain completely undisturbed for a minimum of 10 minutes from time of jointing the pipe and fitting. If necessary to apply pressure to a newly made joint, limit to 10% of rated pipe pressure, during the first 24 hours after the joint has been made.
  - c. Full working pressure shall not be applied until the joints have set for a period of 24 hours.
5. Make provisions for expansion and contraction by way of swing joints or snaking.
- E. Protect plastic pipe from exposure to aromatic hydrocarbons, halogenated hydrocarbons, and most of the esters and ketones that attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.
- F. No installation shall be made that will provide a cross connection or interconnection between distribution supply for drinking purposes and the swimming pool that will permit a backflow of water into the potable water supply. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly covered and protected against dirt, water and chemical or mechanical injury. At the completion of work the fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.
- G. Pipe Identification
- 1. Provide identification on all piping located in mechanical equipment, chlorine, acid rooms, heater courts, etc.
  - 2. Identify the pool that the line is serving (with multiple pools only), contents, direction of flow.
  - 3. Mark at least once on each line and at 20 ft. intervals on long pipe runs. Consult Health Department Code form minimum marking requirements.
  - 4. Color code per Health Department requirements. If code does not identify color coding requirements consult Architect/Engineer.
  - 5. Brady, B-946, custom legend, self-sticking markers and arrows or equal.

### 3.2 TESTING/FIELD QUALITY CONTROL

- A. This Section requires the following tests to be performed by the Contractor.

B. Testing and Flushing of Piping:

1. Contractor shall be responsible for discovering leaks and making necessary repairs.
2. After the piece is installed, the joints completed, test all pool piping per the Illinois Plumbing Code, Section 890.1930, Test Methods. Joints shall remain airtight under this pressure for a period of twelve hours. Provide test results to the Architect / Engineer.
3. Leaks shall be repaired and tested repeatedly until leakage or infiltration is approved.

C. Water Treatment:

1. Obtain a chemical analysis of the source/pool make-up water supply and submit to Architect / Engineer. Include the following:
  - a. Total alkalinity / PPM
  - b. Calcium hardness / PPM
  - c. Chlorine / PPM
  - d. PH
  - e. Iron
  - f. Copper
2. Treat and balance pool water prior to turnover of pool to the Owner (using chemicals provided by the Owner).
3. Pool water: balance to establish a total alkalinity level of 60-125 PPM and calcium hardness level of 180-375 PPM (3 times alkalinity level).
4. Stabilize pool water by shocking to 20 PPM of chlorine for initial sanitation.
5. Consult with Architect / Engineer for special waters to establish balanced levels.

3.3 INSTRUCTION OF OWNER'S PERSONNEL

- A. The Pool Sub-contractor shall supply the services of an experienced swimming pool operator instructor for a period of not less than four (4) hours after the pool has been filled and initially placed in operation. During this period the Owner's designated representatives shall be thoroughly instructed in all phases of the pool's operation.
- B. Prior to this instructor leaving the job, he shall obtain written certification from the Owner's designated representative acknowledging that the instruction period has been completed and all necessary operating information provided.
- C. Pool Sub-contractor shall deliver two complete sets of operating and maintenance instructions for the swimming pool equipment to the Architect / Engineer. Including, but not limited to the following:
  1. Bound together in a complete manual.

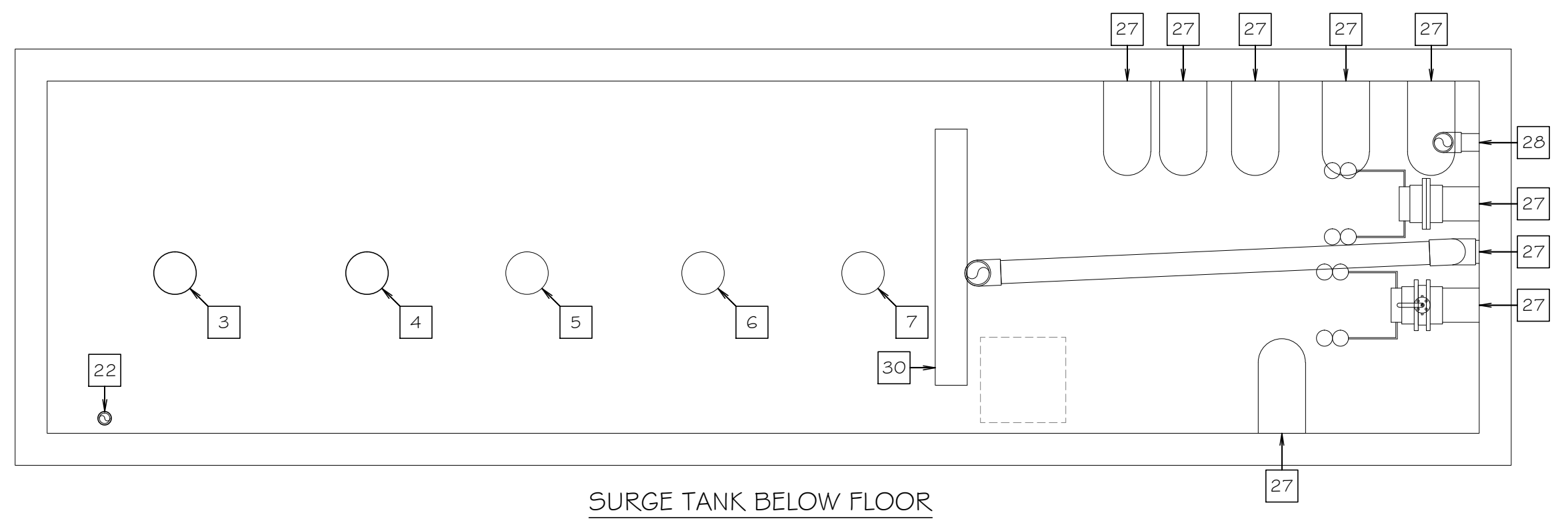
2. Accurate parts list.
3. Pool start-up instructions.
4. Narrative on the pool operation through all sequences.
5. All valves must be permanently tagged along with valve legend and explanation.
6. Trouble shooting information.
7. A schematic piping diagram as installed.
8. All piping in Mechanical Room to be labeled with description of line and arrows indicating direction of flow.

#### 3.4 CLEAN UP AND PROTECTION

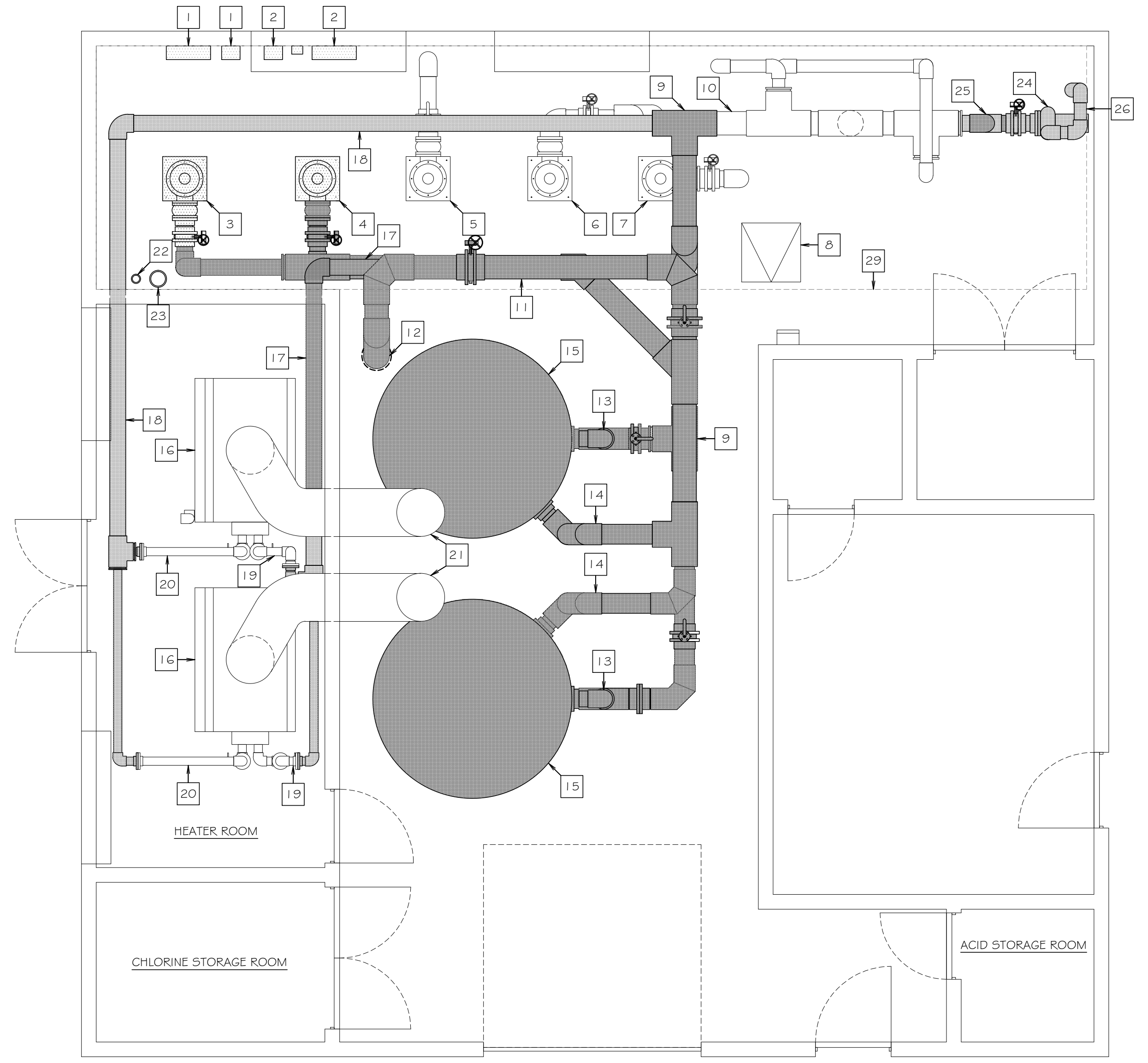
- A. After work of this Section has been complete, clean up work areas and remove all equipment excess materials and debris. Protect pool from damage until time of Final Acceptance. Remove and replace finishes that are chipped, cracked, abraded, improperly adhered, or otherwise damaged.

END OF SECTION

KEY NOTES	
ITEM	DESCRIPTION
1	REMOVE AND DISPOSE OF EXISTING FILTRATION PUMP #1 DISCONNECT, STARTER AND VFD.
2	REMOVE AND DISPOSE OF EXISTING FILTRATION PUMP #2 DISCONNECT, STARTER AND VFD.
3	REMOVE AND DISPOSE OF EXISTING FILTRATION PUMP #1
4	REMOVE AND DISPOSE OF EXISTING FILTRATION PUMP #2
5	EXISTING BODY SLIDE PUMP TO REMAIN
6	EXISTING TUBE SLIDE PUMP TO REMAIN
7	EXISTING PLAY FEATURE PUMP TO REMAIN
8	EXISTING SURGE TANK HATCH TO REMAIN
9	REMOVE AND DISPOSE OF EXISTING 12" FILTERED WATER SUPPLY PIPE
10	EXISTING 12" FILTERED WATER SUPPLY PIPE TO REMAIN
11	REMOVE AND DISPOSE OF EXISTING 12" FILTER BACKWASH PIPE
12	EXISTING BACKWASH HUB DRAIN TO REMAIN
13	REMOVE AND DISPOSE OF EXISTING 10" FILTER INFLUENT PIPING
14	REMOVE AND DISPOSE OF EXISTING 10" FILTER EFFLUENT PIPING
15	REMOVE AND DISPOSE OF EXISTING PADDOCK MODEL #6735-V-2C SAND FILTER (127.22 SQ. FT)
16	EXISTING LAARS 3,050,000 BTU POOL WATER HEATER TO REMAIN
17	REMOVE AND DISPOSE OF EXISTING 8" PVC HEATER INFLUENT PIPE
18	REMOVE AND DISPOSE OF EXISTING 8" PVC HEATER EFFLUENT PIPE
19	EXISTING 4" COPPER HEATER INFLUENT PIPE TO REMAIN
20	EXISTING 4" COPPER HEATER EFFLUENT PIPE TO REMAIN
21	EXISTING 26" VENT PIPE TO REMAIN
22	EXISTING 4" REFLECTION PIPE TO REMAIN
23	EXISTING 8" FILL PIPE TO REMAIN
24	REMOVE AND SAVE EXISTING DROP SLIDE PUMP
25	REMOVE AND DISPOSE OF EXISTING 8" DROP SLIDE PUMP SUCTION PIPE
26	REMOVE AND DISPOSE OF EXISTING 6" DROP SLIDE SUPPLY PIPE, ABOVE FILTER ROOM FLOOR ONLY
27	EXISTING PIPING TO REMAIN
28	EXISTING 6" DROP SLIDE SUPPLY PIPE TO REMAIN
29	EXISTING SURGE TANK BELOW FILTER ROOM FLOOR
30	EXISTING Baffle WALL



SURGE TANK BELOW FLOOR



1 EXISTING FILTER EQUIPMENT LAYOUT  
 SCALE: 1/4" = 1'-0"

DATE	REVISION

DESCRIPTION:  
 EXISTING FILTER  
 EQUIPMENT LAYOUT

DATE: 11.16.17  
 DRAWN BY: RRD / TJM  
 JOB NO. A17269

**DEEP HOPPER MAIN DRAIN NOTES:**

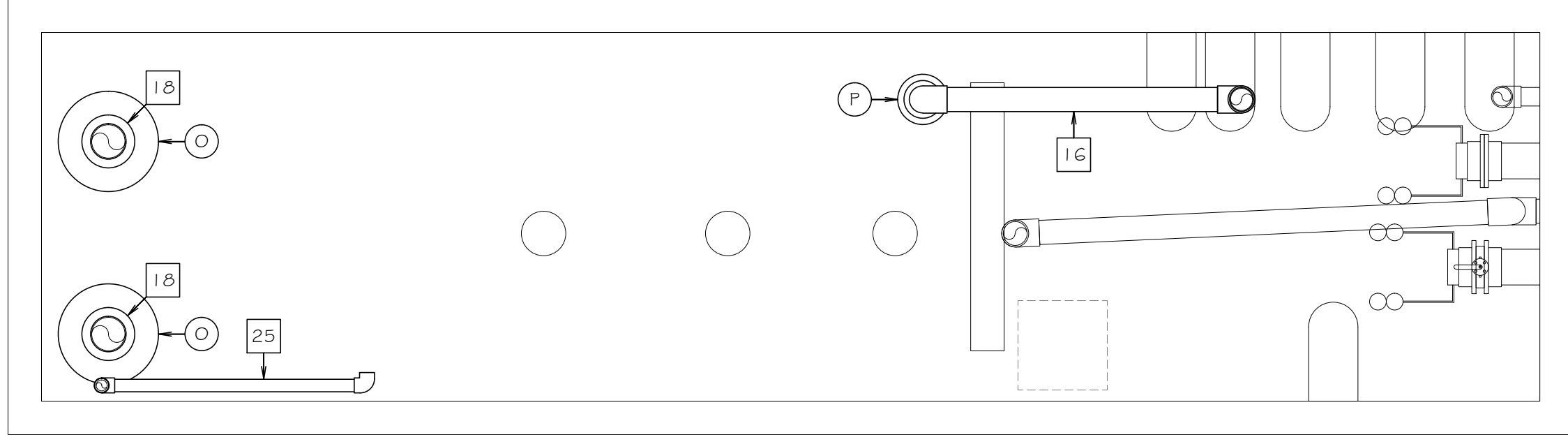
1. THE EXISTING DEEP HOPPER UNBLOCKABLE 1'-1 1/2" X 15'-1 1/2" MAIN DRAIN WITH (10) 18" X 18" GRATES IN A CUSTOM STAINLESS STEEL FRAME MEETS ANSI/APSP 16.
2. THE EXISTING DEEP HOPPER UNBLOCKABLE SUBMERGED SUCTION OUTLET HAS (2) 12" PIPES. THE TWO 12" PIPES EACH CONNECT TO THE EXISTING SURGE TANK.
3. THE EXISTING DEEP HOPPER MAIN DRAIN IS A FIELD FABRICATED OUTLET CONSISTING OF (10) LAWSON AQUATICS #MLD-FGD-1818 GRATES IN A CUSTOM STAINLESS STEEL FRAME. THE LAWSON AQUATICS #MLD-FGD-1818 GRATES INSTALLED HAVE BEEN CERTIFIED BY NSF (A NATIONALLY RECOGNIZED TESTING LAB) IN ACCORDANCE WITH ANSI/APSP 16. EACH GRATE IS SECURED TO THE STAINLESS STEEL FRAME WITH THE STAINLESS STEEL SCREWS SPECIFIED. THE MAIN DRAIN IS IN CONFORMANCE WITH ANSI/APSP 16. EACH OF THE #MLD-FGD-1818 GRATES ARE MARKED WITH ALL NECESSARY INFORMATION IN ACCORDANCE WITH ANSI/APSP 16.
4. THE MAXIMUM FLOW CAPABILITY OF EACH DEEP HOPPER 12" MAIN DRAIN PIPE IS 3,481 G.P.M. PER THE PIPE FLOW CALCULATIONS SUBMITTED IN 2010 (IDPH PERMIT #223-2010). THE TOTAL MAXIMUM FLOW CAPABILITY FOR THE TWO DEEP HOPPER MAIN DRAIN PIPES IS 6,962 G.P.M.
5. THE EXISTING DEEP HOPPER MAIN DRAIN IS A FIELD FABRICATED OUTLET AND CONFORMS TO ANSI/APSP 16. THE MAXIMUM APPROVED FLOW RATE FOR EACH 18" X 18" GRATE IS 816 G.P.M. THE TOTAL MAXIMUM APPROVED FLOW RATE FOR (10) 18" X 18" GRATES IS 8,160 G.P.M. THIS MAXIMUM FLOW RATE IS IN CONFORMANCE WITH ANSI/APSP 16 PER THE CALCULATIONS SUBMITTED IN 2010 (IDPH PERMIT #223-2010).
6. THE TOTAL MAXIMUM FLOW CAPABILITY OF THE TWO 12" MAIN DRAIN PIPES DOES NOT EXCEED THE MAXIMUM FLOW RATE OF THE NEW MAIN DRAIN GRATES.

**PLUNGE AREA MAIN DRAIN NOTES:**

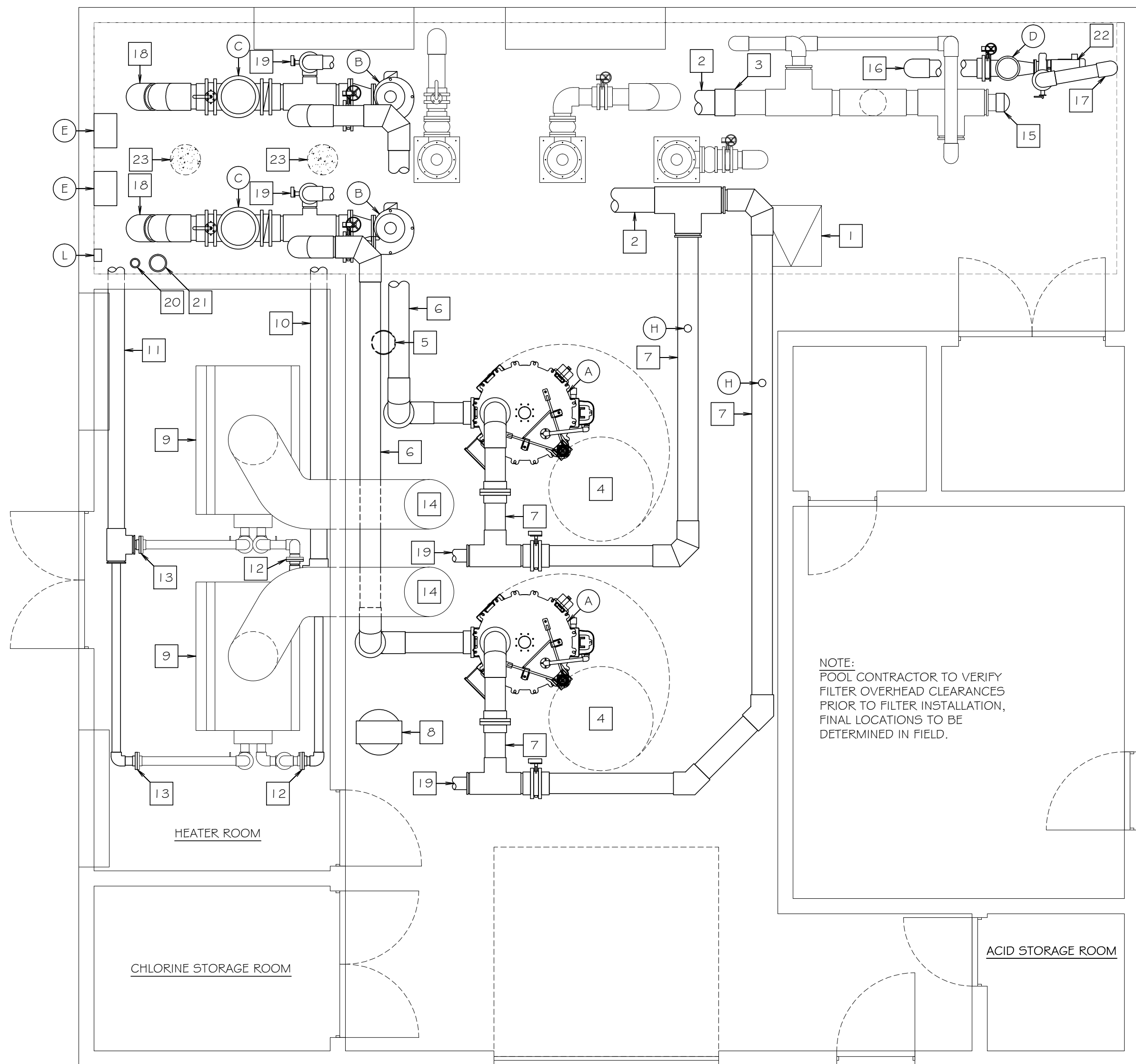
1. THE (2) EXISTING PLUNGE AREA (2) NEW UNBLOCKABLE 18" X 36" MAIN DRAINS MEETS ANSI/APSP 16.
2. THE (2) EXISTING PLUNGE AREA UNBLOCKABLE SUBMERGED MAIN DRAINS, EACH WITH A 12" PIPE. THE (2) 12" PIPES COMBINE TO A 12" PIPE THAT CONNECTS TO THE EXISTING SURGE TANK.
3. THE PLUNGE AREA (2) 18" X 36" LAWSON AQUATICS #FI-SG-1836 HAVE 28"-DEEP SUMPS, EACH WITH (2) 18" X 18" #MLD-GO-1818 GRATES INCLUDED. THE #MLD-GO-1818 GRATES WERE INCLUDED ON THE SUMP AND GRATE COMBINATION THAT WAS CERTIFIED BY NSF (A NATIONALLY RECOGNIZED TESTING LAB) IN ACCORDANCE WITH ANSI/APSP 16. EACH #FI-SG-1836 SUMP FROM LAWSON AQUATICS HAS (1) 10" COUPLING CONNECTION. EACH OF THE #MLD-GO-1818 GRATES IS SECURED WITH THE STAINLESS STEEL SCREWS PROVIDED BY THE MANUFACTURER IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. EACH OF THE #MLD-GO-1818 GRATES ARE MARKED WITH ALL NECESSARY INFORMATION IN ACCORDANCE WITH ANSI/APSP 16.
4. THE MAXIMUM FLOW CAPABILITY OF THE PLUNGE AREA 12" MAIN DRAIN PIPE IS 2,934 G.P.M. PER THE ATTACHED PIPE FLOW CALCULATIONS SUBMITTED IN 2010 (IDPH PERMIT #223-2010).
5. THE EXISTING 18" X 36" MAIN DRAINS ARE FIELD FABRICATED OUTLETS AND CONFORM TO ANSI/APSP 16. THE MAXIMUM FLOW RATE FOR EACH SUMP AND GRATES IS 1,600 G.P.M. THIS MAXIMUM FLOW RATE IS IN CONFORMANCE WITH ANSI/APSP 16. THE TOTAL MAXIMUM APPROVED FLOW RATE FOR (2) MAIN DRAINS IS 3,200 G.P.M.
6. THE TOTAL MAXIMUM FLOW CAPABILITY OF THE 12" MAIN DRAIN PIPE DOES NOT EXCEED THE MAXIMUM FLOW RATE OF THE (2) MAIN DRAINS.

KEY NOTES	
ITEM	DESCRIPTION
1	EXISTING SURGE TANK HATCH
2	NEW 12" FILTERED WATER SUPPLY PIPE
3	CONNECT TO EXISTING 12" FILTERED WATER SUPPLY PIPE
4	PROVIDE CLEARANCE FOR FILTER TOP REMOVAL
5	EXISTING BACKWASH HUB DRAIN, CUT FLUSH WITH FLOOR
6	NEW 10" FILTER INFLUENT PIPING
7	NEW 10" FILTER EFFLUENT PIPING
8	NEW FILTER AIR COMPRESSOR
9	EXISTING LAARS 3,050,000 BTU POOL WATER HEATER
10	NEW 8" CPVC HEATER INFLUENT PIPE
11	NEW 8" CPVC HEATER EFFLUENT PIPE
12	CONNECT TO EXISTING 4" COPPER HEATER INFLUENT PIPE
13	CONNECT TO EXISTING 4" COPPER HEATER EFFLUENT PIPE
14	EXISTING 26" VENT PIPE
15	CAP EXISTING 8" PIPE
16	NEW 8" DROP SLIDE PUMP SUCTION PIPE
17	NEW 6" DROP SLIDE SUPPLY PIPE, CONNECT TO EXISTING
18	NEW 12" FILTRATION PUMP SUCTION PIPE
19	NEW 6" FILTER PRECOAT PIPE
20	NEW 4" REFLECTION PIPE, EXTEND AWAY FROM PUMP SUCTION PIPES
21	EXISTING 8" FILL PIPE
22	REINSTALL EXISTING DROP SLIDE PUMP
23	FILL EXISTING PENETRATION WITH LIGHT-WEIGHT, NON-SHRINK CONCRETE

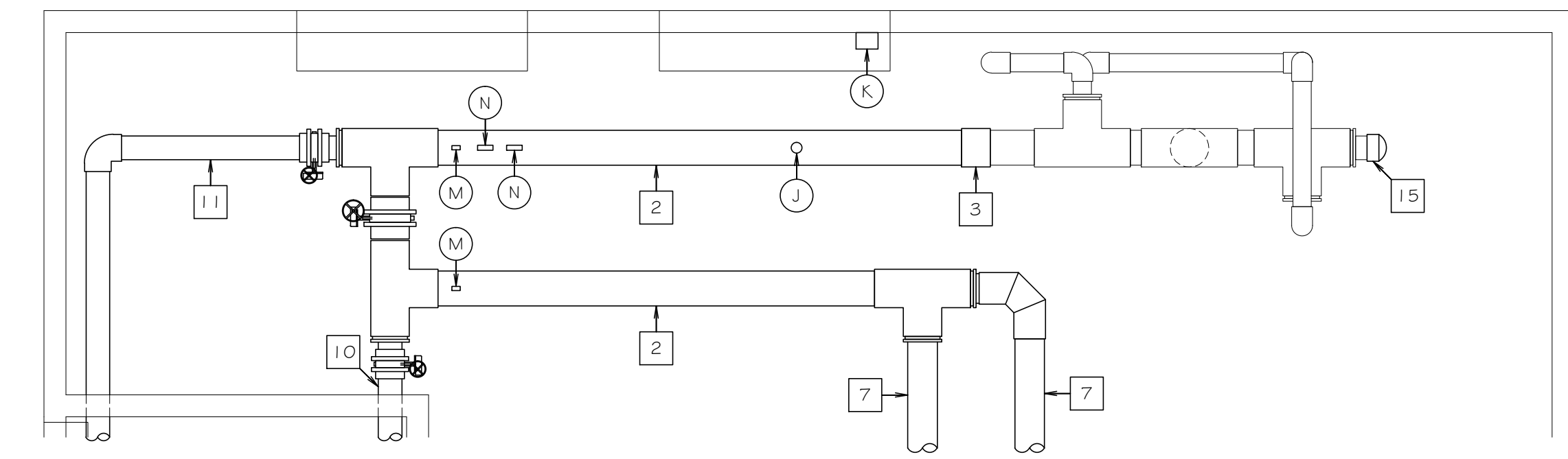
NEW FILTRATION EQUIPMENT LIST				
THE EQUIPMENT MANUFACTURERS AND CATALOG NUMBERS LISTED BELOW, AND NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS, ARE SHOWN TO PROVIDE A STANDARD. EQUIPMENT BY OTHER MANUFACTURERS WILL BE APPROVED IF SAID EQUIPMENT IS SHOWN TO BE EQUAL TO THAT SPECIFIED.				
ITEM	DESCRIPTION	MANUFACTURER	CATALOG NO.	QTY.
A	FILTER, REGENERATIVE "PERLITE" MEDIA, W/ 1,211 SQ. FT. OF FILTER AREA, 1.20 G.P.M. / SQ. FT. OF FILTER AREA FILTRATION RATE, STEEL TANK W/ CONTROL PANEL, AIR COMPRESSOR, MEDIA VACUUM TRANSFER SYSTEM AND PNEUMATIC VALVES.	NEPTUNE BENSON	SP-49-48-1548	2
B	FILTRATION PUMP AND MOTOR, FLOODED SUCTION, 1,460 G.P.M. @ 80 FT. TDH, 40 H.P., 208/230 VOLT, 3-PHASE, 1750 RPM, W/ EPOXY COATING ON ALL INTERIOR CAST IRON PARTS.	PACO	60123 LC	2
C	STRAINER, FIBERGLASS, 12" W/ TWO STAINLESS STEEL BASKETS.	NEPTUNE BENSON	1500NBF12R1	2
D	STRAINER, FIBERGLASS, 8" X 4" W/ TWO STAINLESS STEEL BASKETS.	NEPTUNE BENSON	1500NBF84R1	1
E	VARIABLE FREQUENCY DRIVE, 208/230 VOLT, 3-PH, 60 Hz, W/ NEMA 3 ENCLOSURE AND COOLING FAN, INTEGRAL DISCONNECT AND LINE REACTOR, VERIFY VOLTAGE AND HORSEPOWER FOR MOTOR BEFORE ORDERING.	ABB	ACS550 5SERIES	2
F	VACUUM GAUGE, 0 - 30", 2 1/2" DIAL, LIQUID FILLED, WITH STAINLESS STEEL TUBE AND SOCKET, SNUBBER NO. 872-2 AND GAUGE COCK NO. 865MFG.	TRERICE	700	3
G	PRESSURE GAUGE, 0 - 60 PSI, 2 1/2" DIAL, LIQUID FILLED, WITH STAINLESS STEEL TUBE AND SOCKET, SNUBBER NO. 872-2 AND GAUGE COCK NO. 865MFG.	TRERICE	700	3
H	MAGNETIC FLOW SENSOR, 10", FOR FILTRATION PUMP AND MOTOR VARIABLE FREQUENCY DRIVE CONTROL.	SIGNET	3-2551-P1-12	2
J	MAGNETIC FLOW SENSOR, W/ INTEGRAL DISPLAY, 12".	SIGNET	3-2551-P1-42	1
K	SWITCHING POWER SUPPLY, 110 VOLT, 1-PHASE, 4.2 AMP OUTPUT CAPACITY AT 24 VOLTS.	SIGNET	7300-1024	1
L	AUTOMATIC WATER LEVEL CONTROLLER, W/ ELEVEN POLE BASE MODEL #ZPD11, PROBES MODEL #A94-10 # MOISTURE PROOF ENCLOSURE MODEL #C1-C, 115 VOLT, 1-PHASE.	CARLOS GAVAZZI	5194-156-1115	1
M	THERMOMETER, 30° TO 130° FAHRENHEIT RANGE WITH SEPARABLE WELL NO. 138-0015.2.	TRERICE	A40543	2
N	AQUASTAT, SET TO 115° FAHRENHEIT.	HONEYWELL	L400GA1959	2
O	PVC ANTI-VORTEX PLATE, 12" CONNECTION, 36" DIAMETER PLATE.	NEPTUNE BENSON	AVPLATE12PVCKIT	2
P	PVC ANTI-VORTEX PLATE, 8" CONNECTION, 18" DIAMETER PLATE.	NEPTUNE BENSON	AVPLATE8PVCKIT	1



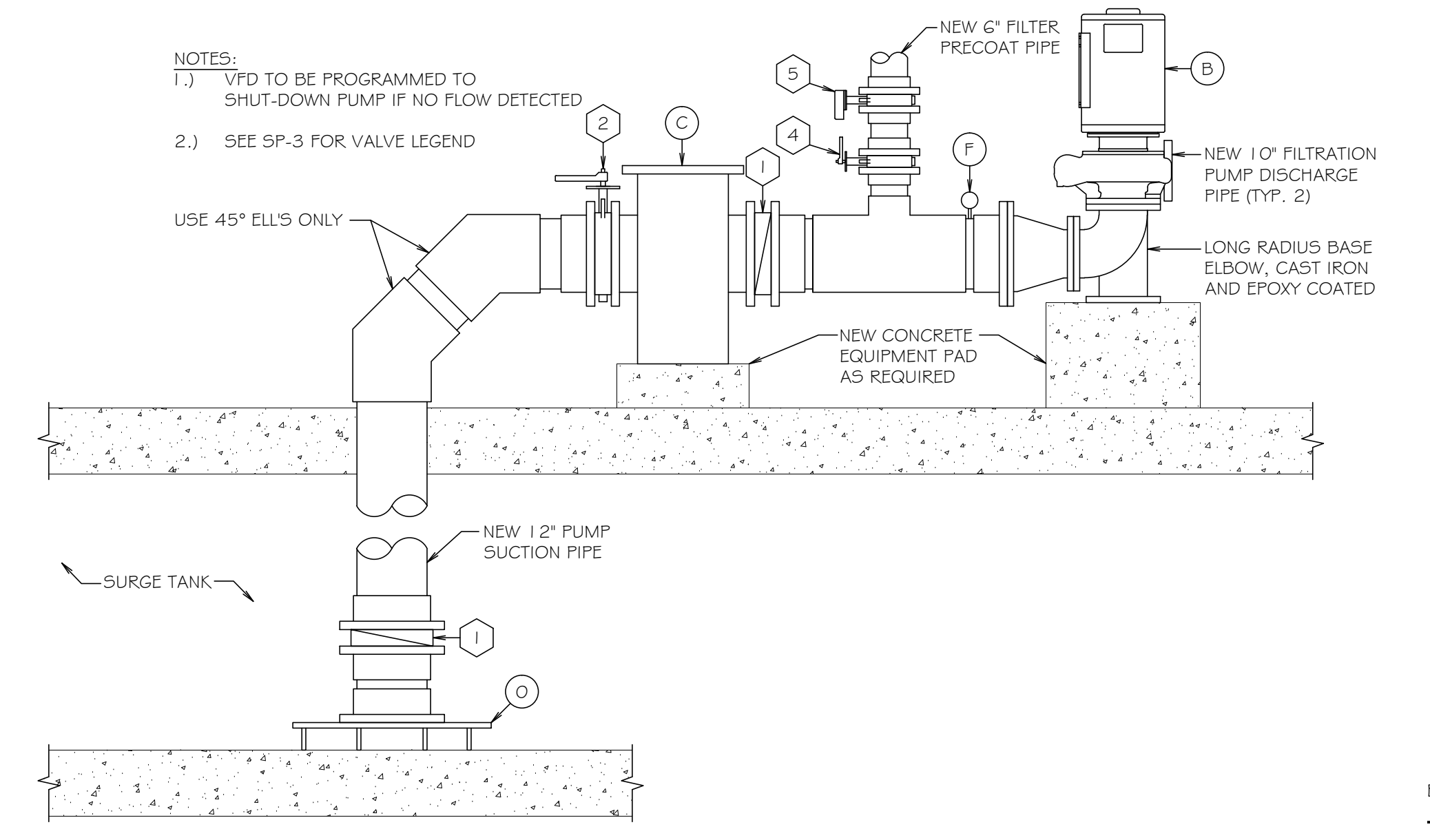
**SURGE TANK BELOW FLOOR**



**1 NEW FILTER EQUIPMENT LAYOUT**  
SCALE: 1/4" = 1'-0"

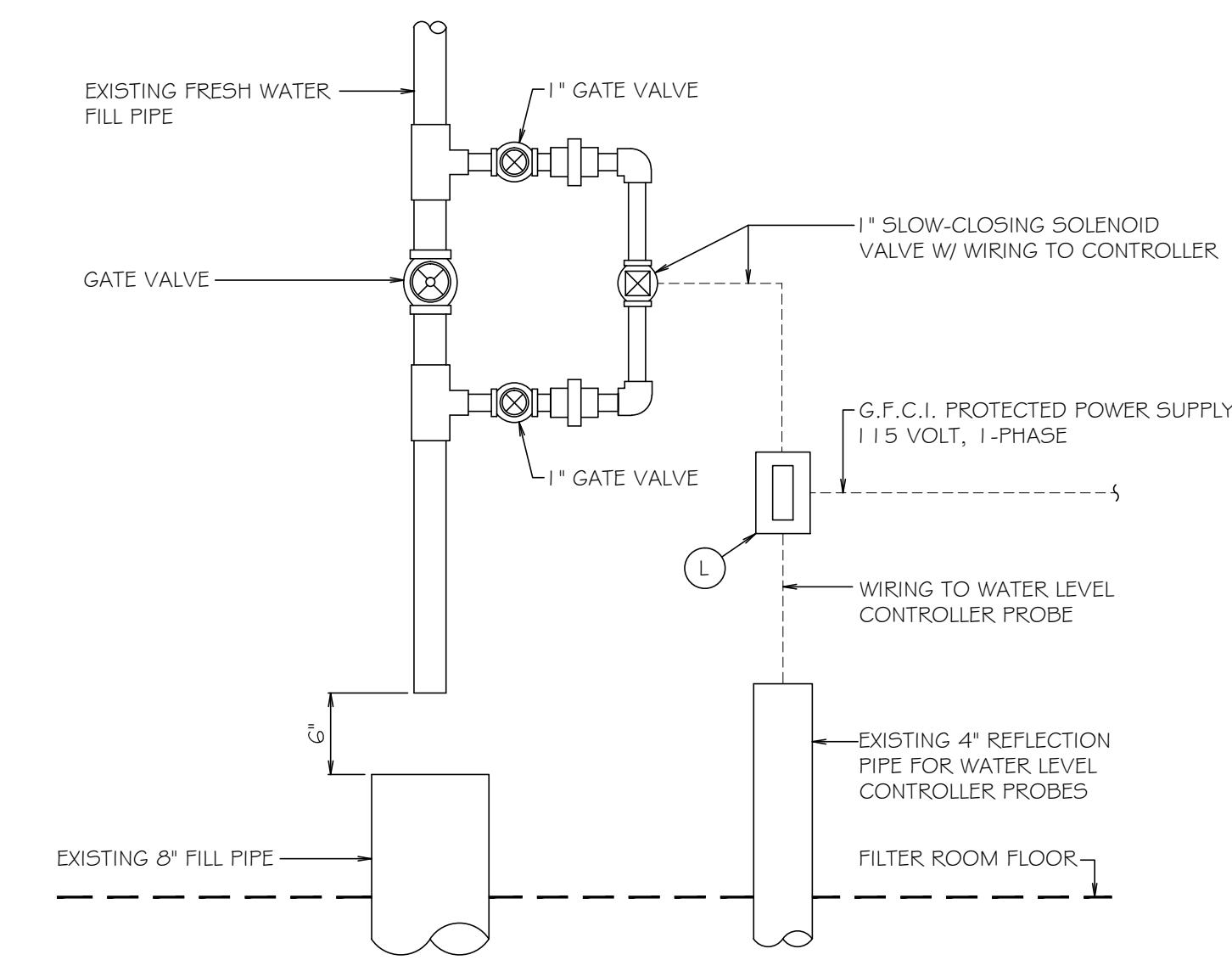


- NOTES:**
- 1.) VFD TO BE PROGRAMMED TO SHUT-DOWN PUMP IF NO FLOW DETECTED
  - 2.) SEE SP-3 FOR VALVE LEGEND



**2 NEW TYPICAL PUMP DETAIL**  
SCALE: 1/2" = 1'-0"

DATA	TOTAL
FILTER FLOWRATE:	2,920 G.P.M.



**3 TYPICAL WATER LEVEL CONTROLLER**  
SCALE: 1" = 1'-0"

**INNOVATIVE**  
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(847) 885-7500

**SEASCAPE AQUATIC**  
**1300 MOON LAKE BLVD.**  
**HOFFMAN ESTATES, IL 60169**

DATE	REVISION

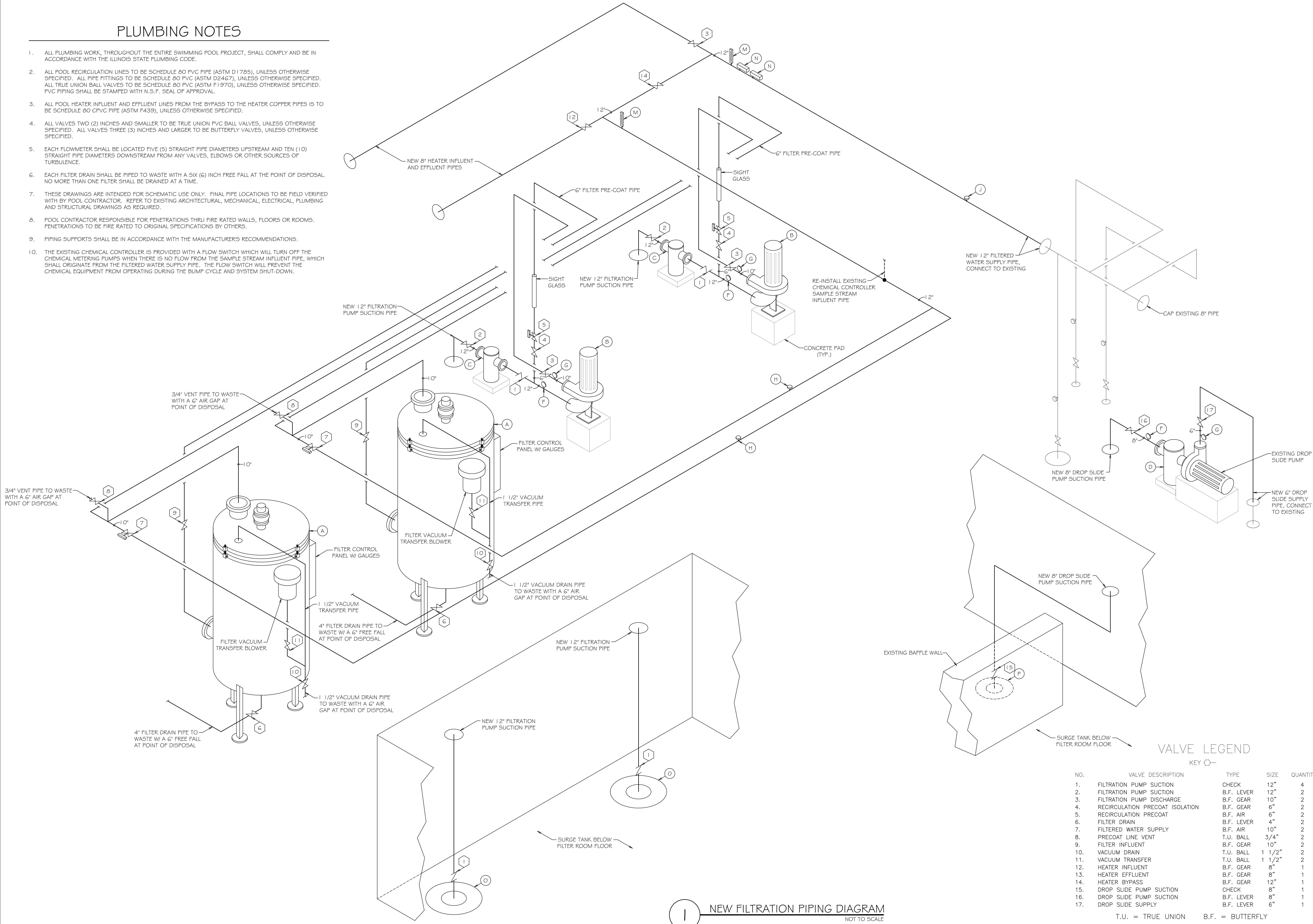
**DESCRIPTION:**  
NEW FILTER EQUIPMENT LAYOUT, EQUIPMENT LIST, DETAILS AND NOTES

**DATE:** 11.16.17  
**DRAWN BY:** RRD / TJM  
**JOB NO.** A17269

**SP-2**

# PLUMBING NOTES

1. ALL PLUMBING WORK, THROUGHOUT THE ENTIRE SWIMMING POOL PROJECT, SHALL COMPLY AND BE IN ACCORDANCE WITH THE ILLINOIS STATE PLUMBING CODE.
2. ALL POOL RECIRCULATION LINES TO BE SCHEDULE 80 PVC PIPE (ASTM D1785), UNLESS OTHERWISE SPECIFIED. ALL PIPE FITTINGS TO BE SCHEDULE 80 PVC (ASTM D2467), UNLESS OTHERWISE SPECIFIED. ALL TRUE UNION BALL VALVES TO BE SCHEDULE 80 PVC (ASTM F1970), UNLESS OTHERWISE SPECIFIED. PVC PIPING SHALL BE STAMPED WITH N.S.F. SEAL OF APPROVAL.
3. ALL POOL HEATER INFLUENT AND EFFLUENT LINES FROM THE BYPASS TO THE HEATER COPPER PIPES IS TO BE SCHEDULE 80 CPVC PIPE (ASTM F439), UNLESS OTHERWISE SPECIFIED.
4. ALL VALVES TWO (2) INCHES AND SMALLER TO BE TRUE UNION PVC BALL VALVES, UNLESS OTHERWISE SPECIFIED. ALL VALVES THREE (3) INCHES AND LARGER TO BE BUTTERFLY VALVES, UNLESS OTHERWISE SPECIFIED.
5. EACH FLOWMETER SHALL BE LOCATED FIVE (5) STRAIGHT PIPE DIAMETERS UPSTREAM AND TEN (10) STRAIGHT PIPE DIAMETERS DOWNSTREAM FROM ANY VALVES, ELBOWS OR OTHER SOURCES OF TURBULENCE.
6. EACH FILTER DRAIN SHALL BE PIPED TO WASTE WITH A SIX (6) INCH FREE FALL AT THE POINT OF DISPOSAL. NO MORE THAN ONE FILTER SHALL BE DRAINED AT A TIME.
7. THESE DRAWINGS ARE INTENDED FOR SCHEMATIC USE ONLY. FINAL PIPE LOCATIONS TO BE FIELD VERIFIED WITH BY POOL CONTRACTOR. REFER TO EXISTING ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND STRUCTURAL DRAWINGS AS REQUIRED.
8. POOL CONTRACTOR RESPONSIBLE FOR PENETRATIONS THRU FIRE RATED WALLS, FLOORS OR ROOMS. PENETRATIONS TO BE FIRE RATED TO ORIGINAL SPECIFICATIONS BY OTHERS.
9. PIPING SUPPORTS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
10. THE EXISTING CHEMICAL CONTROLLER IS PROVIDED WITH A FLOW SWITCH WHICH WILL TURN OFF THE CHEMICAL METERING PUMPS WHEN THERE IS NO FLOW FROM THE SAMPLE STREAM INFLUENT PIPE, WHICH SHALL ORIGINATE FROM THE FILTERED WATER SUPPLY PIPE. THE FLOW SWITCH WILL PREVENT THE CHEMICAL EQUIPMENT FROM OPERATING DURING THE BUMP CYCLE AND SYSTEM SHUT-DOWN.



1 NEW FILTRATION PIPING DIAGRAM  
NOT TO SCALE

### VALVE LEGEND

NO.	VALVE DESCRIPTION	TYPE	SIZE	QUANTITY
1.	FILTRATION PUMP SUCTION	CHECK	12"	4
2.	FILTRATION PUMP SUCTION	B.F. LEVER	12"	2
3.	FILTRATION PUMP DISCHARGE	B.F. GEAR	10"	2
4.	RECIRCULATION PRECOAT ISOLATION	B.F. GEAR	6"	2
5.	RECIRCULATION PRECOAT	B.F. AIR	6"	2
6.	FILTER DRAIN	B.F. LEVER	4"	2
7.	FILTERED WATER SUPPLY	B.F. AIR	10"	2
8.	PRECOAT LINE VENT	T.U. BALL	3/4"	2
9.	FILTER INFLUENT	B.F. GEAR	10"	2
10.	VACUUM DRAIN	T.U. BALL	1 1/2"	2
11.	VACUUM TRANSFER	T.U. BALL	1 1/2"	2
12.	HEATER INFLUENT	B.F. GEAR	8"	1
13.	HEATER EFFLUENT	B.F. GEAR	8"	1
14.	HEATER BYPASS	B.F. GEAR	12"	1
15.	DROP SLIDE PUMP SUCTION	CHECK	8"	1
16.	DROP SLIDE PUMP SUCTION	B.F. LEVER	8"	1
17.	DROP SLIDE SUPPLY	B.F. LEVER	6"	1

T.U. = TRUE UNION    B.F. = BUTTERFLY

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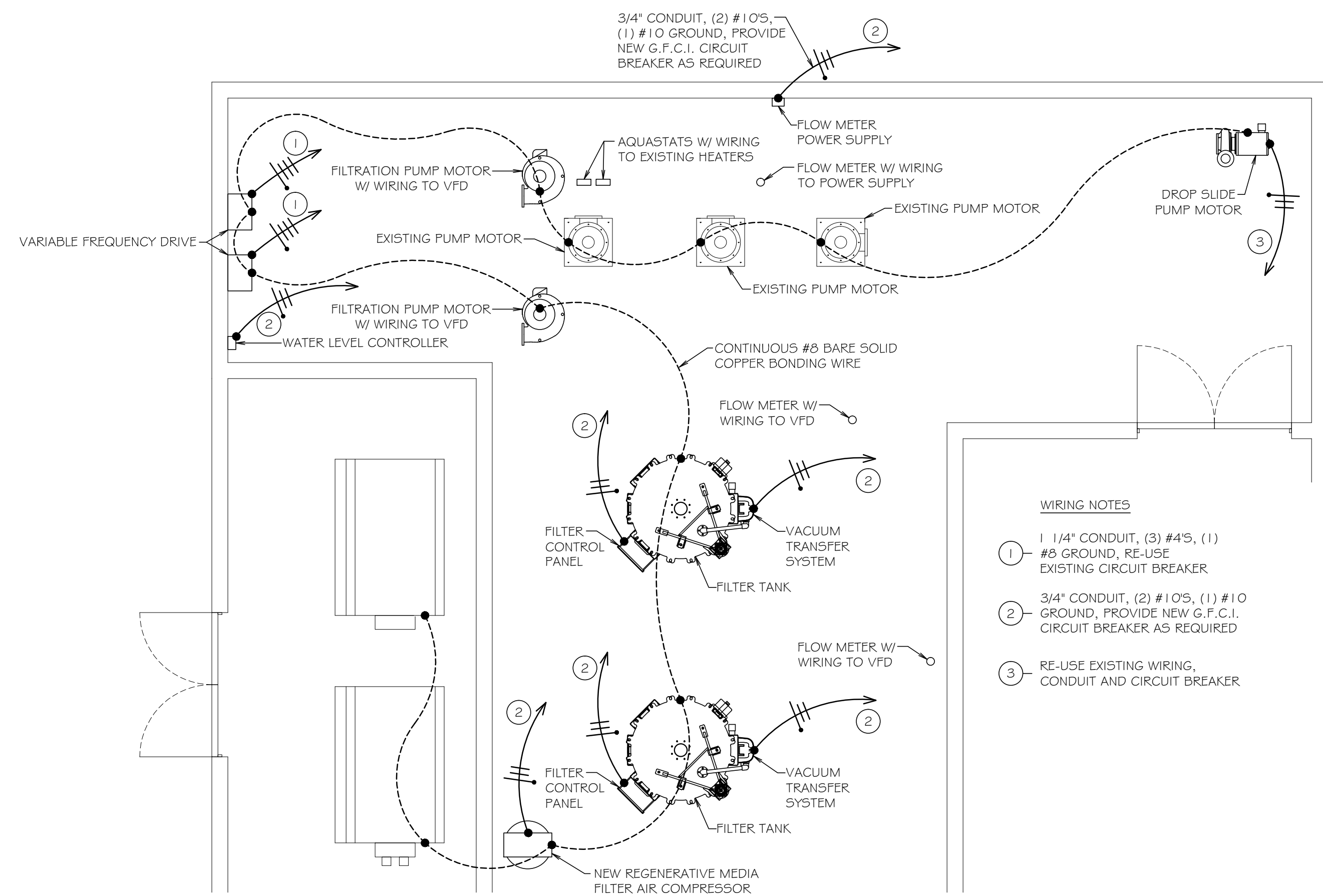
**SEASCAPE AQUATIC**  
**1300 MOON LAKE BLVD.**  
**HOFFMAN ESTATES, IL 60169**

DATE	REVISION

**DESCRIPTION:**  
FILTRATION PIPING  
DIAGRAM AND VALVE  
LEGEND

**DATE:** 11.16.17  
**DRAWN BY:** RRD / TJM  
**JOB NO.** A17269

**SP-3**



- WIRING NOTES**
- 1 1/4" CONDUIT, (3) #4S, (1) #8 GROUND, RE-USE EXISTING CIRCUIT BREAKER
  - 2 3/4" CONDUIT, (2) #10S, (1) #10 GROUND, PROVIDE NEW G.F.C.I. CIRCUIT BREAKER AS REQUIRED
  - 3 RE-USE EXISTING WIRING, CONDUIT AND CIRCUIT BREAKER

NOTE:  
 ALL ASPECTS OF THE ELECTRICAL INSTALLATION  
 TO BE IN COMPLIANCE WITH THE 2008 NEC

1 NEW FILTER EQUIPMENT ELECTRICAL PLAN  
 SCALE: 1/4" = 1'-0"

ELECTRICAL REQUIREMENTS					
ITEM OF EQUIPMENT	VOLTAGE	PHASE	H.P. / AMPS	QUANTITY	CONTROLS & INTERLOCKS
FILTER CONTROL PANEL	120	1	30 AMPS	TWO	WIRED TO VFD AND WIRED TO RUN CONFIRM CONTACT
FILTER VACUUM TRANSFER BLOWER	120	1	1 1/2 H.P.	TWO	PRE-WIRED TO FILTER CONTROL PANEL
FILTER AIR COMPRESSOR	120	1	15 AMPS	ONE	WIRED TO FILTER REGULATOR AND FILTER CONTROL PANEL
FILTRATION PUMP	480	3	40 H.P.	TWO	WIRED TO VFD
SWITCHING POWER SUPPLY	110	1	2.5 AMPS	ONE	WIRED TO MAGNETIC FLOW SENSOR
AUTOMATIC WATER LEVEL CONTROLLER	115	1	10 AMPS	ONE	SEE DETAIL

\* NOTE: VARIABLE FREQUENCY DRIVE TO BE PROVIDED BY PUMP AND MOTOR SUPPLIER - FIELD VERIFY VOLTAGE BEFORE ORDERING

DATE	REVISION

DESCRIPTION:  
 NEW FILTER EQUIPMENT  
 ELECTRICAL PLAN AND  
 ELECTRICAL REQUIREMENTS

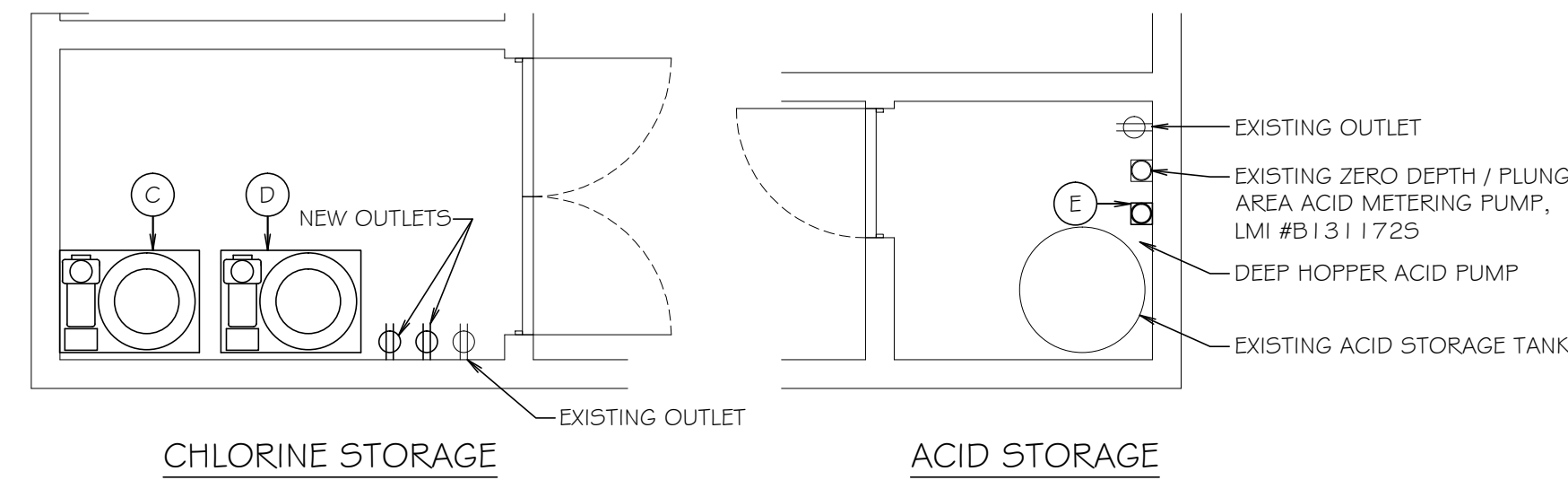
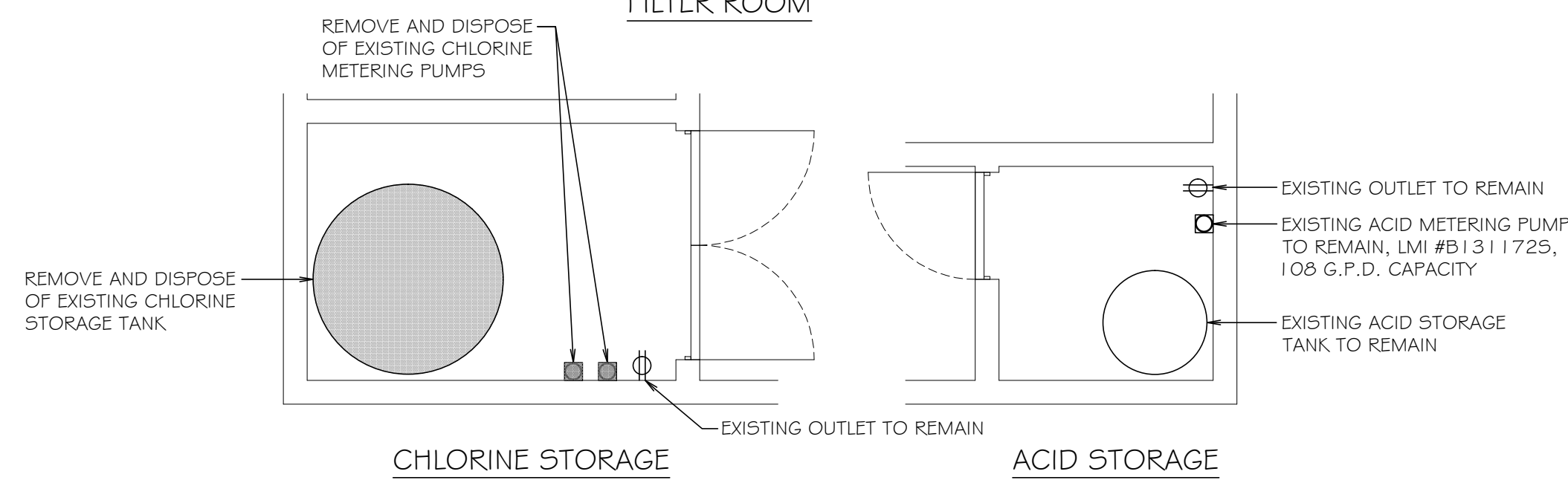
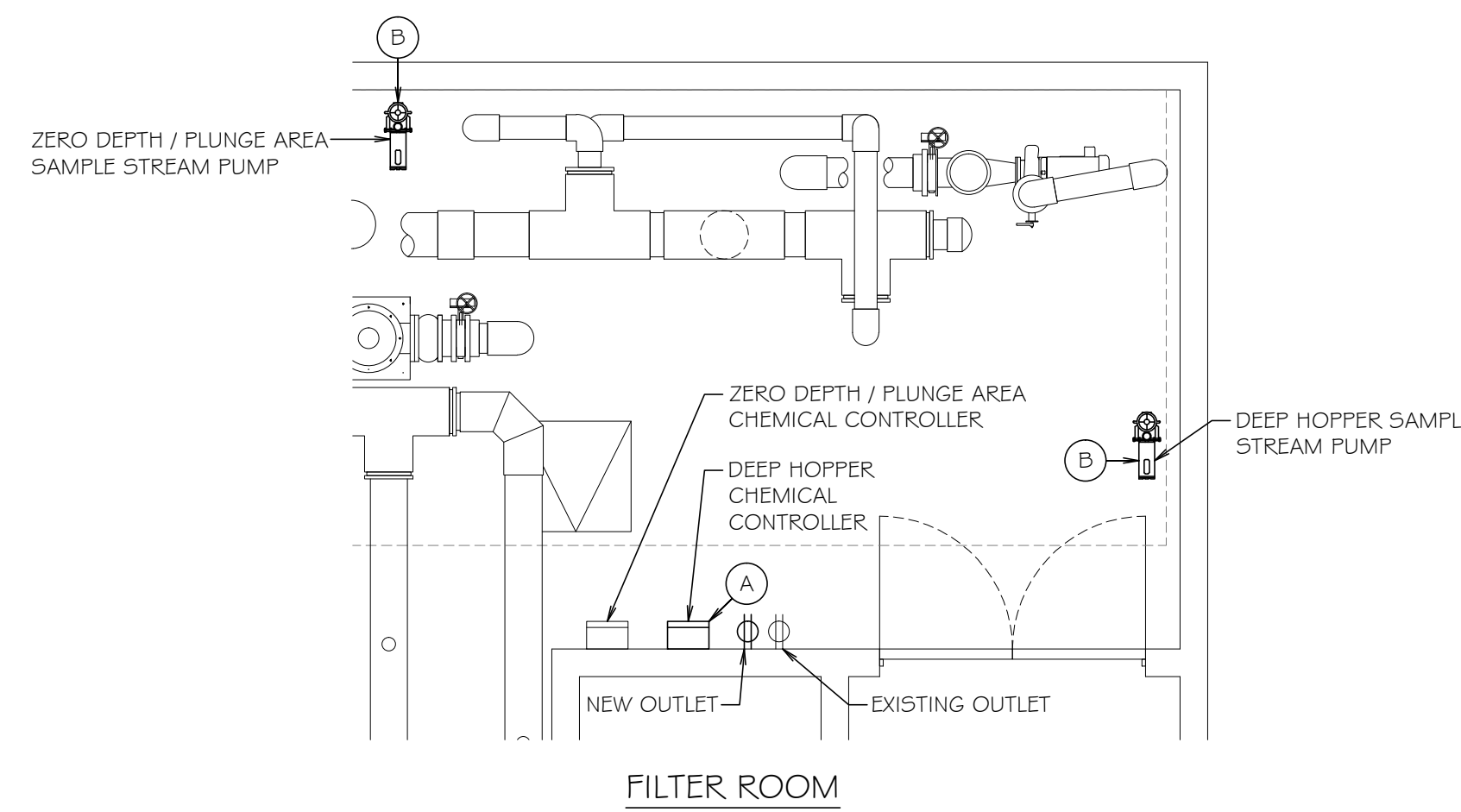
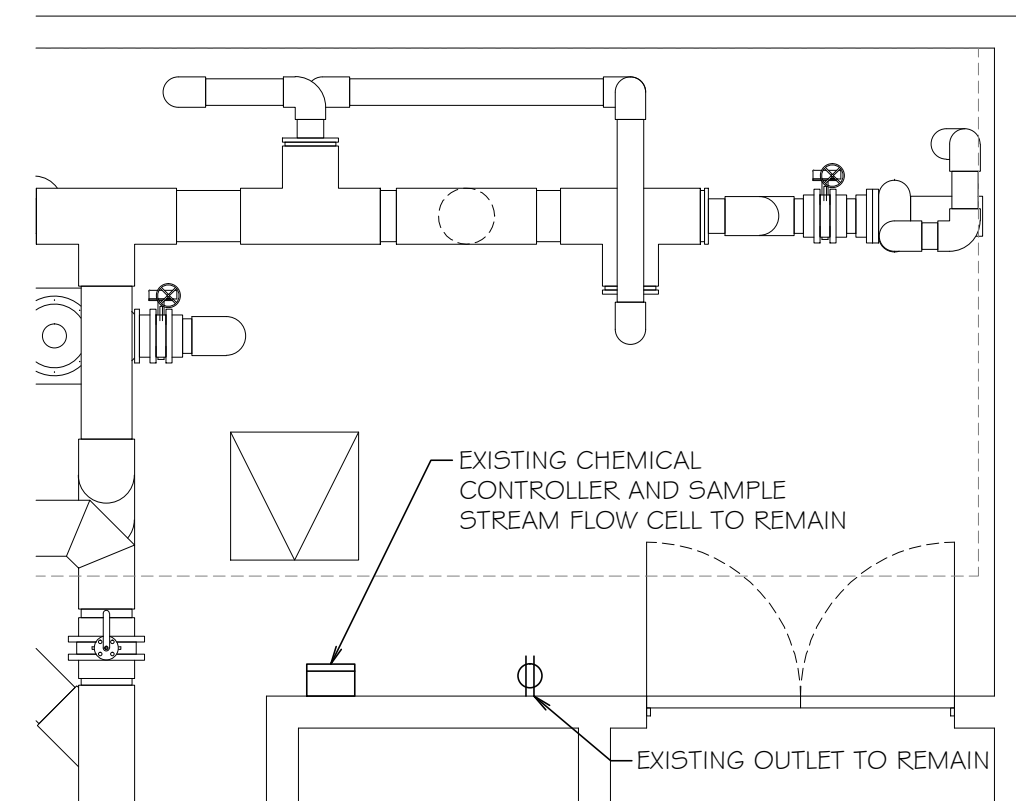
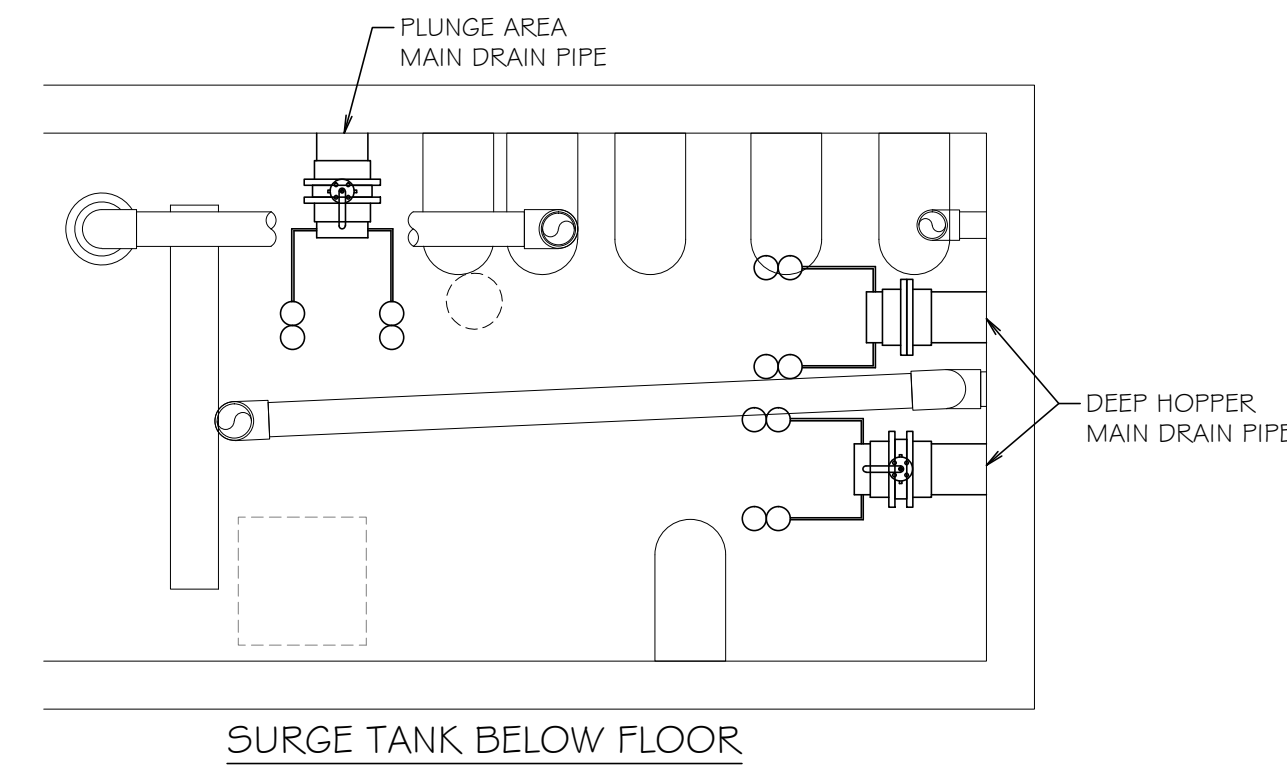
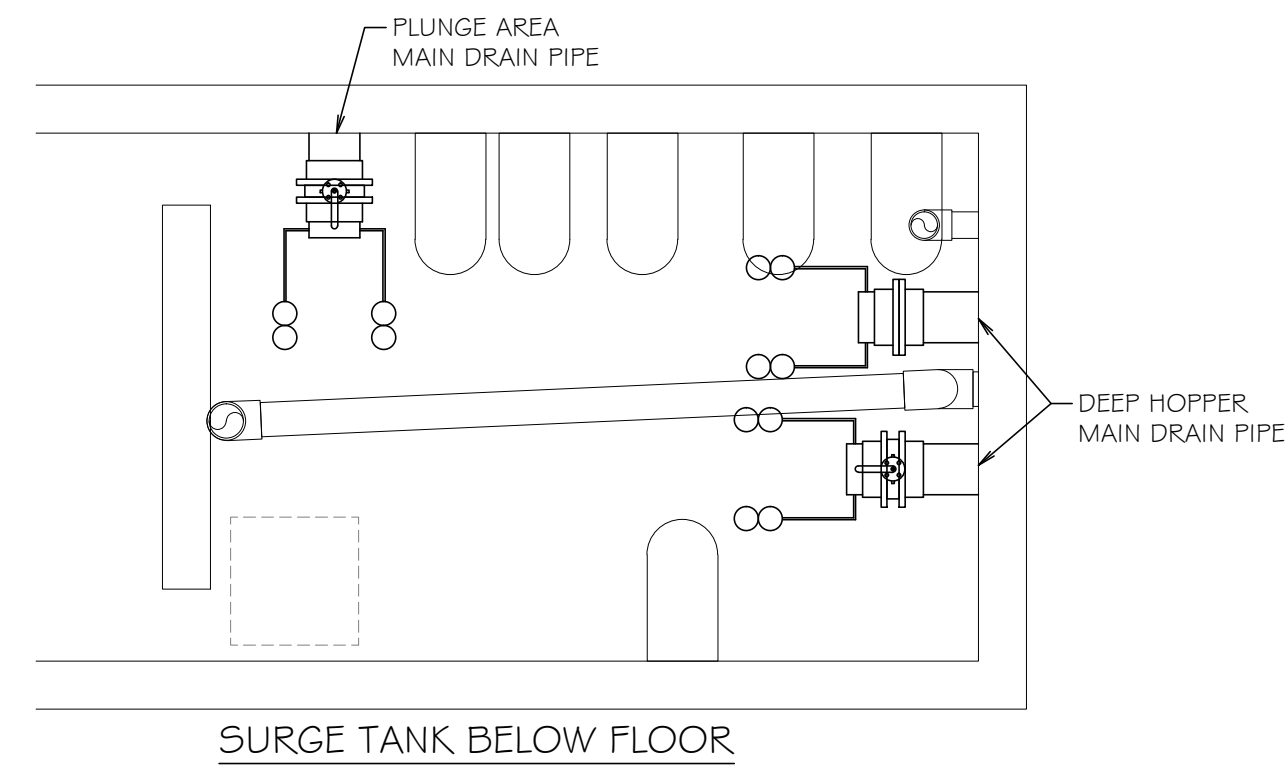
DATE: 11.16.17  
 DRAWN BY: RRD / TJM  
 JOB NO. A17269

SP-4

NEW EQUIPMENT LIST				
ITEM	DESCRIPTION	MANUFACTURER	CATALOG NO.	QTY.
A	AUTOMATIC CHEMICAL CONTROLLER, W/ PROBES, FLOW CELL AND PIG-TAIL CONNECTIONS FOR RELAYS, 115 VOLT, 1-PHASE.	ACUTROL	AK110	1
B	SAMPLE STREAM PUMP AND MOTOR, 1/2 H.P., 110 VOLT, 1-PHASE, 1725 RPM, TFC, FIBERGLASS BASE W/ STAINLESS STEEL HARDWARE AND PENTAIR PACKAGE 1G 1-G" PLASTIC STRAINER W/ EXTRA BASKET. CONTACT THOMAS PUMP COMPANY.	EBARA	JEU150G	2
C	CHLORINATOR, CALCIUM HYPOCHLORITE, 244.8 LBS./DAY CAPACITY WITH 1 1/2 H.P. CIRCULATION PUMP AND MOTOR, 110 VOLT, 1-PHASE.	AXIALL	3070AT	1
D	CHLORINATOR, CALCIUM HYPOCHLORITE, 244.8 LBS./DAY CAPACITY WITH 1 1/2 H.P. CIRCULATION PUMP AND MOTOR, 110 VOLT, 1-PHASE.	AXIALL	3070AT	1
E	ACID (MURIATIC ACID) METERING PUMP, 85 G.P.D., 110-VOLT, 1-PHASE.	STENNER	85M5	1

DATA	ZERO DEPTH	PLUNGE POOL	LAP POOL	TOTAL
SURFACE AREA:	9,972 SQ. FT.	951 SQ. FT.	3,744 SQ. FT.	14,670 SQ. FT.
VOLUME:	142,896 GALLONS	25,535 GALLONS	217,449 GALLONS	385,880 GALLONS
FLOW RATE:	1,588 G.P.M.	426 G.P.M.	906 G.P.M.	2,920 G.P.M.
VOLUME TURN OVER RATE:	1 HOUR 30 MINUTES	1 HOURS	4 HOURS	-

ELECTRICAL REQUIREMENTS					
ITEM OF EQUIPMENT	VOLTAGE	PHASE	H.P. / AMPS	QUANTITY	CONTROLS & INTERLOCKS
AUTOMATIC CHEMICAL CONTROLLER	115	1	10 AMPS	ONE	PLUG INTO G.F.C.I. OUTLET
CHEMICAL METERING PUMP	120	1	1.7 AMPS	ONE	PLUG INTO CHEMICAL CONTROLLER
CHLORINATOR CONTROL SYSTEM	110	1	1 1/2 H.P.	TWO	PLUG INTO CHEMICAL CONTROLLER AND G.F.C.I. OUTLET
SAMPLE STREAM PUMP MOTOR	110	1	1/2 H.P.	TWO	WIRED TO CHEMICAL CONTROLLER AND PLUG INTO G.F.C.I. OUTLET



**PLUMBING NOTES**

- ALL PLUMBING WORK, THROUGHOUT THE ENTIRE SWIMMING POOL PROJECT, SHALL COMPLY AND BE IN ACCORDANCE WITH THE ILLINOIS STATE PLUMBING CODE.
- PIPE MATERIALS FOR ALL POOL RECIRCULATION LINES TO BE, AS PER PLAN, SCHEDULE 80 PVC(ASTM D1785), UNLESS OTHERWISE SPECIFIED. PVC PIPING SHALL BE STAMPED WITH N.S.F. SEAL OF APPROVAL.
- POOL WATER HEATER INFLUENT PIPE FROM THE BYPASS TO EXISTING HEATER INFLUENT PIPE TO BE SCH. 80 C.P.V.C.
- EACH FLOWMETER SHALL BE LOCATED FIVE (5) STRAIGHT PIPE DIAMETERS UPSTREAM AND TEN (10) STRAIGHT PIPE DIAMETERS DOWNSTREAM FROM ANY VALVES, ELBOWS OR OTHER SOURCES OF TURBULENCE.
- FILTER DRAIN SHALL BE PIPED TO WASTE WITH A SIX (6) INCH AIR GAP AT THE POINT OF DISPOSAL.
- THESE DRAWINGS ARE INTENDED FOR SCHEMATIC USE ONLY. FINAL PIPE LOCATIONS TO BE FIELD VERIFIED BY POOL CONTRACTOR.
- ALL VALVES THREE (3) INCHES AND SMALLER TO BE TRUE UNION PVC BALL VALVES. ALL VALVES FOUR (4) INCHES AND LARGER TO BE BUTTERFLY VALVES.
- POOL CONTRACTOR TO MINIMIZE THE USE OF FITTINGS WHEREVER POSSIBLE.
- THE CHEMICAL CONTROLLERS AND CHEMICAL EQUIPMENT SHALL BE INTERLOCKED W/ THE FILTRATION PUMPS. DURING SYSTEM SHUT-DOWN OR BUMP CYCLES THE CHEMICAL SYSTEMS ARE TO BE DISABLED.
- SAMPLE STREAM INFLUENT PIPING SHALL ORIGINATE FROM THE MAIN DRAIN PIPES. SAMPLE STREAM EFFLUENT PIPING SHALL DISCHARGE INTO THE SURGE TANK.

**1** EXISTING CHEMICAL SYSTEM LAYOUT (ALTERNATE) SCALE: 1/4" = 1'-0"

**2** NEW CHEMICAL SYSTEM LAYOUT (ALTERNATE) SCALE: 1/4" = 1'-0"

DATE	REVISION

**DESCRIPTION:**  
 ALTERNATE CHEMICAL SYSTEM LAYOUTS, EQUIPMENT LIST, DATA, PLUMBING NOTES, AND ELECTRICAL REQUIREMENTS

**DATE:** 11.16.17  
**DRAWN BY:** RRD / TJM  
**JOB NO.** A17269

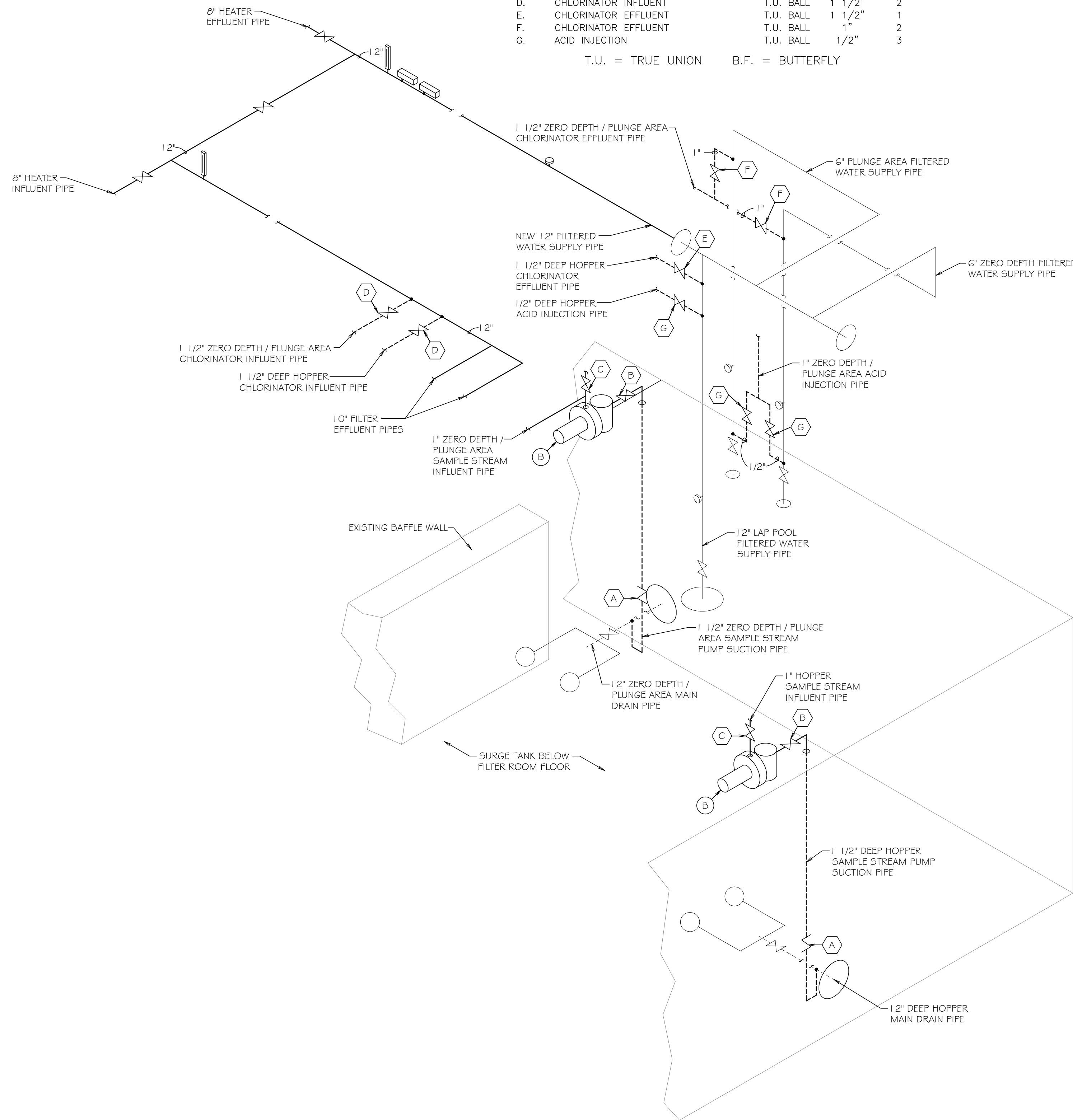


VALVE LEGEND  
(ALTERNATE)

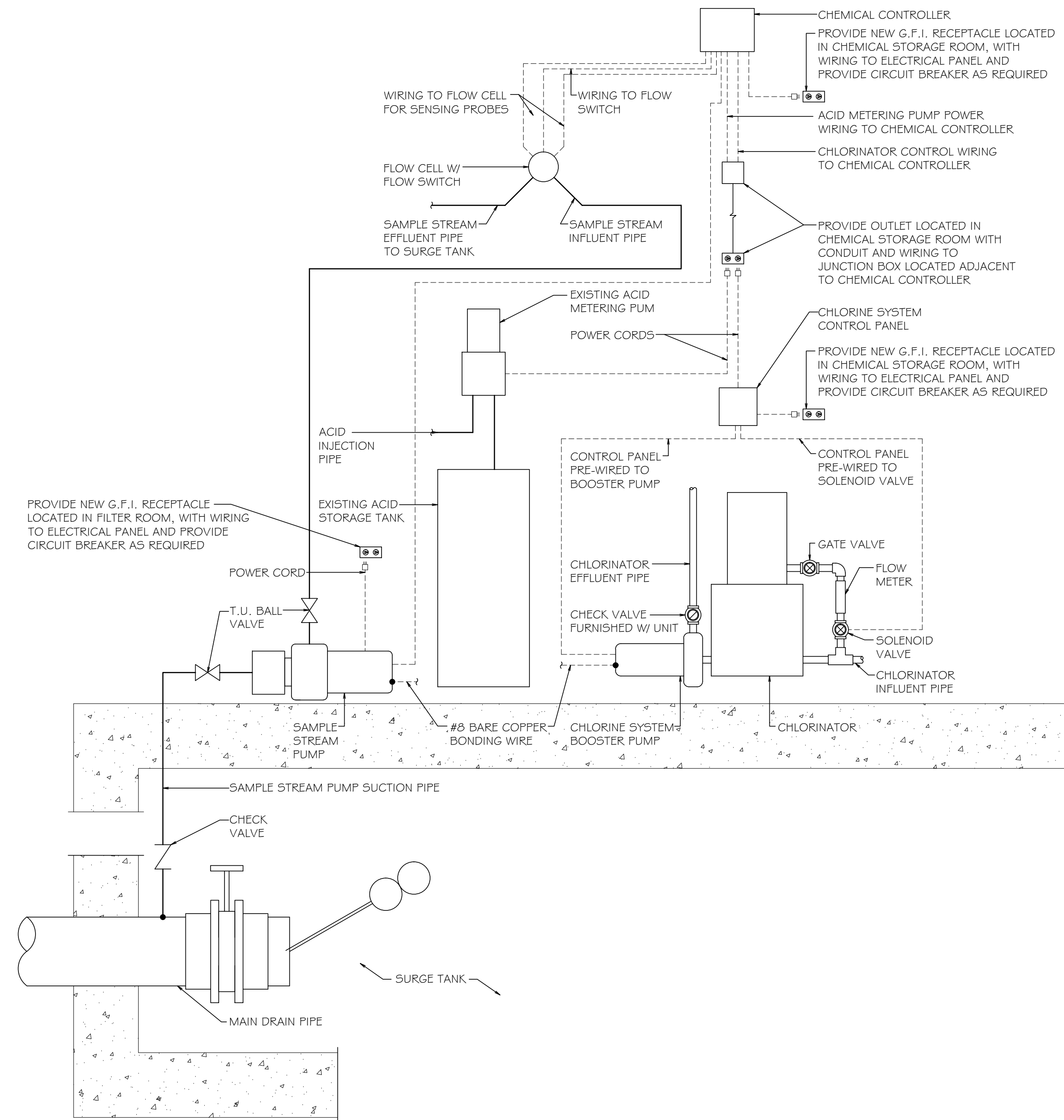
KEY —

NO.	VALVE DESCRIPTION	TYPE	SIZE	QUANTITY
A.	SAMPLE STREAM PUMP SUCTION	CHECK	1 1/2"	2
B.	SAMPLE STREAM PUMP SUCTION	T.U. BALL	1 1/2"	2
C.	SAMPLE STREAM INFLUENT	T.U. BALL	1"	2
D.	CHLORINATOR INFLUENT	T.U. BALL	1 1/2"	2
E.	CHLORINATOR EFFLUENT	T.U. BALL	1 1/2"	1
F.	CHLORINATOR EFFLUENT	T.U. BALL	1"	2
G.	ACID INJECTION	T.U. BALL	1/2"	3

T.U. = TRUE UNION B.F. = BUTTERFLY



1 NEW CHEMICAL SYSTEM PIPING DIAGRAM  
(ALTERNATE) NOT TO SCALE



2 TYPICAL CHEMICAL CONTROLLER DETAIL  
NOT TO SCALE

DATE	REVISION

DESCRIPTION:  
ALTERNATE  
CHEMICAL SYSTEM  
PIPING DIAGRAM AND  
VALVE LEGEND

DATE: 11.16.17  
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