

RFP Addendum No. 01

DATE ISSUED: January 25, 2026
TO: Invited Bidders
FROM OWNER'S REPRESENTATIVE: Collin Frink
Plante Moran Realpoint
3000 Town Center, Suite 100
Southfield, MI 48075
ON BEHALF OF CLIENT: Livonia Public Schools (LPS)
SUBJECT: Addendum for LPS Pool Filtration – Franklin & Churchill High
Schools

DESCRIPTION OF CHANGES

- Item 1: Prebid Meeting Minutes (2 pages)
- Item 2: Prebid Meeting Sign-in Sheet (1 page)
- Item 2: French Addendum 1 (43 pages)

Meeting Minutes

CLIENT: Livonia Public Schools
PROJECT: CHS & FHS Pool Filtration Equipment Renovations
SUBJECT: Pre-Bid Meeting
DATE & TIME: January 16, 2026 at 9:30am
LOCATION: Benjamin Franklin High School, 31000 Joy Rd, Livonia, MI, 48150, US
ATTENDEES: See Sign In Sheet

1. Bid Requirements

- a. Due Date – January 29 2026 at 12:00 pm
- b. Sealed Bids delivered to 15125 Farmington Road, Livonia, MI 48154 to the attention of Bill Green.
- c. Bid Opening – January 29, 2026 at 12:00pm
- d. Affidavits
 - i. Familial Disclosure
 - ii. Iran Economic Sanctions Act
 - iii. Equal Opportunity
 - iv. Bid Bond
- e. Bids must be held for 90 days
- f. 2 signed copies
- g. Performance Bond

2. Bid questions

- a. Sent to Harry Lau (hlau@livoniapublicschools.org) and Aimee Neikart (aimeen@frenchia.com)
- b. Substitutions approved prior to receipt of Bids will be identified via an Addendum.

3. Base Bid

- a. Franklin and Churchill High School

- i. Replacement and upgrading of the existing pool filtration and related electrical systems, including mechanical and chemical treatment equipment. The project involves demolition of outdated sand filters, recirculation pumps, piping, valves, and associated controls, followed by installation of new high-rate pressure filtration units, recirculation pumps, UV treatment systems, and chemical feed equipment. All work must comply with current Michigan codes and standards, maintain existing pool structure integrity, and ensure proper bonding and safety per NEC 680. The contractor is responsible for protecting existing finishes, coordinating with other trades, and implementing dust and containment controls, with all demolition debris.

4. Bid Alternates

- a. A1-FHS – Franklin High School - RegROUT existing pool including full cleaning prior to pool filling.
- b. A1-CHS – Churchill High School – RegROUT existing pool including full cleaning prior to pool filling.

5. Schedule

- a. Both pools should be completed by 8/1/26. Final schedule will be determined through conversations with the successful contractor to ensure the district has adequate pool space to accommodate their needs. Franklin High School will be available April 1st, 2026. Churchill will be available in late May.

6. Logistics

- a. Churchill High School
 - i. Pool Equipment room entrance near tennis courts. Laydown area will be available during the summer in the parking lot near the receiving area.
- b. Franklin High School
 - i. Pool Equipment room entrance from parking lot on North side of school. Laydown area will be available starting April 1, 2026.

7. Questions

- a. Main Drains in both pools will need to be replaced and should be included in the base bid pricing. This will be noted in addendum 1 drawings for both schools.

CHS & FHS Pool Filtration Project Sign In Sheet

Name	Company	Email
Collin Frank	PMR	COLLIN.FRANK@PLANTE-MORAN.COM
DAN MORLEY	midwest	DMORLEY@midwestpools.com
Bill Babcock	Aquatic Source	bbabcock@aquaticsource.com
Beard Colden	ADVANCED	
John Spencer	Advanced Pool	Advancepool@comcast.net
JASON CAVALIERO	BARVIZZI	jason@barvizzini.com
FRANK JAEHNIG	HARRINGTON	FJjaehning@hysco.com
Harry Jan	LPS	

ADDENDUM

Addendum No:	001
Project:	Livonia Public Schools FHS & CHS Filtration Projects Livonia, MI
Project No:	2025-042
Owner:	Livonia Public Schools
Documents Issued:	January 6, 2026
Addendum Issued:	January 23, 2026

This Addendum is issued before the receiving of bids to clarify or to include certain revisions to the plans or specifications. All work required by this Addendum shall be in accordance with the original plans and apply to this project.

It is requested to include the work hereinafter described, in the proposal by the contractor for the complete work.

ARCHITECTURAL

Specification Changes:

- 1. Refer to Section 131100 – Swimming Pool:**
 - a. Inserted Section 2.3 Recirculation Fittings and renumbered subsequent paragraphs.
- 2. Refer to Section 131105 – Selective Demolition:**
 - a. Inserted item 3.3.A.11 Remove existing VGB covers at main drain sumps.

Drawing Changes:

Please note the following changes apply to the drawings for both CHS and FHS.

- 1. Refer to Sheet AQ0.0 – Pool Reference Plan (issued):**
 - a. Main Drain Schedule added to sheet.
 - b. Main Drain M1 tagged on plan.
- 2. Refer to Sheet AQ0.1 – Pool Demolition Plan (issued):**
 - a. Demolition note D10 added to plan and note block indicating removal of VGB covers.
- 3. Refer to Sheet AQ1.0 – Pool Renovation Plan (issued):**
 - b. Note added to plan indicating new main drain covers.

SECTION 13 1100 - SWIMMING POOL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, be included in, and made a part of this Section.

1.2 SUMMARY OF WORK (*for general guidance-not inclusive*)

A. Introduction

- 1. Provide labor, materials, equipment, and services necessary for pool mechanical and pool area renovation. This work must include the installation of pool refinishes as well as products listed in Part 2 of Section 13 1100.

B. Work included in this section:

- 1. It is the intent of this section to place the entire responsibility for the construction of the pool under one vested Contractor. Under this section the Contractor will provide but is not necessarily limited to the following:
 - a. Contractor to complete and assess add remove from the Owner prior to start of work.
 - b. Provide electrical conduit, wiring, etc. to low voltage pool equipment within pool mechanical room. (Low voltage is considered less than 110V).
 - c. Coordinate for required bonding and grounding of the pool equipment.
 - d. Provide necessary piping and valving as shown on the drawings and specified herein.
 - e. Provide housekeeping pads for pool equipment as required in the drawings.
 - f. Obtain final acceptance by jurisdictional health department.
 - g. Start, test, calibrate and adjust mechanical equipment, electrical equipment, recirculation, chemical, and other supplied systems. Instruct the Owner's representative in the systems operation and maintenance as described herein.

C. Related work specified in other sections:

- 1. Section 13 1105 – Selective Demolition

D. Related work specified in Electrical sections. Reference Division 26 – Electrical. Work that must be completed by others.

- 1. Provide power to Variable Frequency Drive pool pump starter and power from VFD to the pool pump motor.
- 2. Ground and bond pool structures, fittings, and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.
- 3. Obtain permits, inspections, and approvals of wiring including grounding and bonding of metal components associated with the pool in accordance with Local, State and National Electrical Codes.

4. Confirm electrical conduits that penetrate the pool shell are watertight and installed per N.E.C. Article 680.

1.3 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

- A. The system must comply with necessary pre-construction approvals.
- B. Give necessary notices, obtain permits, pay government fees, and other costs in connection with this work, including the filing of necessary as-built drawings, prepare documents (including any amendments to the approved construction documents) and obtain necessary approvals of governmental departments having jurisdiction over their work. Obtain required certificates of inspection for his work and deliver copies to the Owner and Architect before requesting acceptance and final payment for the work.
- C. Include in the work, without extra cost to the Owner, labor, materials, services, apparatus, or drawings in order to comply with applicable laws, ordinances, rules, and regulations, whether or not shown on drawings and/or specified.

1.4 COORDINATION AND CLARIFICATION

- A. Coordinate with other trades' work relating to this section.
- B. Must establish with other trades, having related work in this section, that work necessary to complete the work as shown on the drawings and in the specifications is included in the base bid and alternates to the Owner.
- C. If in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, notify the Architect through channels established by the specifications and request a clarification ten (10) days prior to the bid date.

1.5 ALTERNATES

- A. Alternate #1: Provide an acid washing of the pool interior tile finish. Re-grout with material compatible with existing tile and setting bed finishes for swimming pool applications.

1.6 CONTRACTOR'S ALTERNATE PROPOSAL

- A. Submit bid to the owner based on materials, equipment and methods as specified in this Section. No substitution of material will be allowed.
- B. It is the intent of the contract documents to encourage competition. The base proposal must include the construction methods and equipment as specified and detailed. Proposed system substitutions must have prior written approval by the Architect.
- C. If there is a deviation from the basis of design equipment, confirm that engineering criteria are appropriate for the substituted equipment.

- D. Substitutions of specified construction methods and equipment must include a complete submittal as required by these specifications and drawings of appropriate scale incorporating required changes. Provide a list of at least ten (10) satisfactory installations comparable to this project that have been manufactured and installed under the manufacturer's current legal name. Submit a list of such projects with the name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect on the bid date.
- E. Changes or modifications to the Contract Documents that are not authorized by the architect are the sole responsibility of the Contractor.

1.7 SUBMITTALS

- A. Submittals must be made in accordance with the requirements of Division 1 - General Requirements and in strict compliance with the following procedures and guidelines.
- B. One (1) set of shop drawings and engineering data must be tabbed, indexed, and referenced to the specifications, compiled into an electronic submittal, and submitted in two stages. Each section of items must be prefaced by a cover sheet listing the items submitted within the section. Electronic submittals must be organized, numbered, and submitted in the same format and order as the project specifications. Only complete sets will be reviewed.
 - 1. Engineering data covering systems, equipment, structures, and fabricated materials, which will become a permanent part of the work under this contract, must be submitted for review. This data must include drawings and descriptive information in sufficient detail and scale to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorage and supports required; performance characteristics; fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification, in writing, must be provided indicating that equipment will fit in the space allotted and as shown on the drawings.
 - 2. Submittals regardless of origin must be stamped with the approval of the Contractor and identified with the name and number of this contract, Contractor's name, and references to applicable specification paragraphs and contract drawings. Each submittal must indicate the intended use of the item in the work. When catalog pages are submitted, applicable items must be clearly identified. The current revision, issue number, and date must be indicated on drawings and other descriptive data.
 - 3. The submittals will not be accepted from anyone but the Contractor. Submittals must be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
 - 4. The Contractor's stamp of approval is a representation that the Contractor accepts full responsibility for determining and verifying quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, and that he has reviewed or coordinated each submittal with the requirements of the work and the contract documents.
 - 5. Each submittal must include a statement prepared by the originator of the drawings and data, certifying compliance with the contract documents except for deviations, which are specifically identified.
 - 6. Deviations from the contract documents must be identified on each submittal and must be tabulated in the Contractor's letter of transmittal. Such submittals must, as pertinent to the deviation, indicate essential details of changes by the Contractor (including modifications to other facilities that may be a result of the deviation) and required piping and wiring diagrams.
 - 7. The Contractor must accept full responsibility for the completeness of each submission, and, in the case of a resubmission, must verify that exceptions previously noted have been considered.

8. The need for more than one resubmission, or a delay in obtaining review of submittals, will not entitle the Contractor to an extension of the contract time unless the delay of the work is directly caused by a change in the work authorized by a change order.
9. Review of drawings and data submitted by Contractor will cover only general conformity to the drawings and specifications, external connections and dimensions that affect the layout. Review does not indicate a thorough review of dimensions, quantities, and details of the material, equipment, device, or item shown. Review of submittals does not relieve Contractor from responsibility for errors, omissions, or deviations, or responsibility for compliance with the contract documents.
10. When the drawings and data are returned marked REJECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, the corrections must be made as noted thereon and as instructed and six corrected copies (or one copy and one corrected reproducible copy) resubmitted.
11. Resubmittals must bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal. Resubmittals must be indexed, tabbed, referenced to the specifications, and bound in a three-ring binder and submitted at one time.
12. When corrected copies are resubmitted, the Contractor must, in writing, direct specific attention to revisions and must list separately revisions made other than those called for on previous submissions.
13. When the drawings and data are returned marked NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED, no additional copies are to be provided unless specifically requested to do so for record.

C. Permits, Receipts and Test Reports

1. Provide the Architect with copies of permits and receipts for fee payments.
2. Submit a sample format for each test report intended for use. Submit test reports required herein only on approved forms.

D. Include complete product data indexed, tabbed, and referenced to specifications with 8 1/2" x 11" cover sheet covering:

1. Paragraph 2.1 - Pumping Equipment
2. Paragraph 2.2 - Filtration Equipment
3. Paragraph 2.3 - Piping Systems
4. Paragraph 2.4 - Chemical Treatment Systems
5. Paragraph 2.5 - Chemistry Monitoring and Control System
6. Paragraph 2.6 - Flow Meters
7. Paragraph 2.7 - Water Level Controller
8. Paragraph 2.8 - Swimming Pool Finishes

E. Include engineering construction drawings for pool piping.

F. Reference Section 13 1105 - Selective Demolition

1.8 OPERATION AND MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

- A. Detailed operation and maintenance information must be supplied for equipment requiring maintenance or other attention. The equipment supplier and/or the Contractor must prepare an operation and maintenance manual for equipment. Parts lists and operating, and maintenance instructions must be provided.

B. Each operation and maintenance manual must include the following:

1. Equipment function and calibration, normal operating characteristics, and limiting conditions.
2. Assembly, installation, alignment, adjustment and checking instructions.
3. Operating instructions for startup, routine and normal operation, regulation, and control, shut down and emergency conditions.
4. One (1) copy of instructional videos.
5. One (1) copy of Safety Data Sheet forms for all pool chemicals provided.
6. Operating cycles must be specifically described in outline format and in referenced detail. A wall-mounted color-coded piping flow diagram must be provided in the pool equipment room. The diagram must be engraved on laminated plastic with color-coded piping to match the color of coding on piping, and including valves identified with number on tags. The minimum size is 11-inch x 17 inch.
7. Include manufacturer recommended maintenance schedule, parts lists, piping diagram (to agree with wall mounted diagram) and trouble-shooting information for pool mechanical equipment.
8. Using reference to keyed valves and wall diagram, include specific written instructions for procedures that must be followed for the following:
 - a. Emptying and refilling the pool including de-watering during the period that the pool will be empty.
 - b. Water level control adjustment and chemical control operation.
 - c. Normal surge tank operation and balancing, and
 - d. Filter operation, media changes, and maintenance.
9. Lubrication and maintenance instructions.
10. Guide to "troubleshooting."
11. Parts list and predicted life of parts subject to wear.
12. Outline, cross section, and assembly drawings; engineering data and wiring diagrams.
13. Test data and performance curves, where applicable.
14. Specific written instructions for procedure for emptying and refilling the pool including de-watering during the period that the pool will be empty. Provide a yellow warning sign 8-1/2 in. x 11 in., that must be mounted in the filter room, that reads:

WARNING
Prior to emptying Pool
Consult O & M Manuals for Procedures

Add another sign that reads:

Keep Caps, Plugs and Tops Tight Fitting to Prevent Escape of Fumes.

15. Additionally, provide the following signs mounted on the chemical room doors:
 - a. NFPA Hazard Diamond for each chemical stored in room.
 - b. Warning: Authorized Personnel Only Beyond This Point
 - c. Signage indicating location of associated Safety Data Sheet forms for all chemicals stored in room.
 16. One set of applicable submittals must be included in each manual.
- C. The operation and maintenance manuals must be in addition to instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by the Contractor.

- D. Manuals and other data must be printed on heavy, first quality paper, 8-1/2 x 11-inch size with standard 3-hole punching and inserted in plastic covers. Drawings and diagrams must be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practical, larger drawings must be folded separately and placed in envelopes that are bound into the manuals. Each envelope must bear suitable identification on the outside.
- E. Six (6) bound volumes of each manual must be submitted. Parts lists and information must be assembled in substantial manuals and permanent, three-ring or three-post binders. Material must be assembled and bound in the same order as specified, and each volume must have a table of contents and suitable index tabs.
- F. Material must be marked with project identification. Non-applicable information must be marked out or deleted.
- G. Shipment of equipment will not be considered complete until the required manuals and data have been received.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers and crates with labels intact and legible.
- B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- C. Handle materials in a manner to prevent damage.
- D. Store materials on clean raised platforms with weather protective coverings. Provide continuous protection of materials against damage or deterioration.
- E. Remove damaged materials from site.

1.10 WARRANTIES

- A. The Contractor warrants to the Owner and Architect that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted, and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements, including substitutions not properly approved and authorized will be considered defective. The Contractor's warranty will exclude remedies for damage or defect caused by abuse, improper or insufficient maintenance, improper operations, modifications not executed by the Contractor or improper wear and tear under normal use. If required by the Architect, provide satisfactory evidence as to the kind and quality of materials and equipment.
- B. The Contractor must agree to repair or replace defective or non-complying work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

- C. Warranties must be for a period of one year from the date of substantial completion or the owner begins using the pool unless otherwise specified. Submit warranties covering, but not limited to the following:
1. Defects in material, workmanship, and installation of the pool pumps for a period of one (1) year.
 2. Manufacturer's minimum eighteen (18) month warranty against defective materials, components, and workmanship in the variable frequency drive system.
 3. Manufacturer's minimum fifteen (15) year warranty on the filter tank and lining against defective materials or workmanship of the tank and components. (Additional warranty time may be purchased from the manufacturer.) Prorated warranties are not acceptable. Flexsol 3000 lined vessels must carry a fifteen (15) year limited non-prorated warranty. The filter manufacturer must bear the responsibility for suitability of lining and must be the sole source for the specified warranty. Internal tube elements must carry a fully rated ten (10) year warranty. Valve bodies and the regenerative media filter controller must carry a three (3) year fully rated warranty. Valve operators and system accessories including the bump tire, quick exhaust valve and solenoid valve must carry a one (1) year warranty as provided by the product manufacturer. Unless otherwise specified, workmanship must be guaranteed first class and carry a one (1) year warranty.
 4. Defects in material, workmanship, and installation of the pool piping system for a period of three (3) years.
 5. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the pH buffer feed system.
 6. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the ultraviolet sanitizing system (excluding the UV lamps, quartz, and seals). Medium pressure ultraviolet bulbs must be warranted for a period of 8,000 hours. Intermittently operated lamps (≥ 1 on/off cycle per day) will be replaced free of charge should failure occur prior to 4,000 hours and replacement will be prorated between 4,000 and 8,000 hours.
 7. Manufacturer's minimum five (5) year warranty against defective materials, components, and workmanship in the pool chemical controller. ORP, pH, flow and temperature sensors must be covered by a standard two (2) year warranty. Other sensors and flow cell components must be covered by a standard one (1) year warranty.
 8. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the pool water level control system.

1.11 SYSTEM TRAINING

- A. A qualified representative of the Contractor performing work under this section must put the equipment into operation and instruct the Owner's representatives in the operation of this equipment to the Owner's satisfaction immediately after project's substantial completion.
- B. The Contractor's training representative must have completed the equipment/system's manufacturer's training requirements and be certified, by the manufacturer, to provide and teach system training.
- C. The representative from the Contractor must be either a CPO (Certified Pool Operator) or have an AFO (Aquatic Facility Operator) certification.
- D. Training periods to consist of 16 hours of on-site training and scheduled as follows:
1. 8 hours of initial training on the complete swimming pool system. The 8 hours of initial training must be comprised of at least 3 hours of training on water chemistry analysis and adjustment.

The water chemistry training will include in-depth review of the use of the Langlier index and its computation.

2. The initial 8 hours of training must include information on the care, operation, adjustment, and maintenance of items provided by the Contractor under the "Part 2 – Products" section of this specification.
3. 8 hours of training after the Owner's staff has experience operating the system. This time may be requested after the pool has been placed in operation within a period of one (1) year from the time the pool was accepted by the Owner. The additional training must contain at least 2 hours of review of water chemistry.
4. Provide a project specific video recording instruction manual in addition to the training sessions. The video instructions must be project specific and must include information on the care, operation, adjustment, and maintenance of items provided by the Contractor under the "Part 2 – Products" section of this specification. This video recording must be done separate from the Owner training.
5. The Contractor must include one (1) copy of video recording instructions in each Operations and Maintenance Manual.

1.12 POOL FILL WATER QUALITY

- A. The Owner is to bear the cost of the water required for one (1) complete filling of the pool. Removal of iron or copper (if in excess of .3 ppm) will be required for the final fill to avoid staining of the pool finish. Subsequent fillings or partial fillings (more than 25%) of the pool is by the Contractor, at its own expense.
- B. Provide the necessary plant equipment so that the temperature of fill water will be within plus or minus 10 degrees of the ambient air and/or the pool structure at the time of filling. Extreme caution is urged if the temperature variance is greater than 10-degree F.
- C. Provide the necessary chemicals and to adjust and balance the water chemistry in the pool to the following levels:

pH	7.4 - 7.6
Calcium Hardness	200 - 400 PPM
Total Alkalinity	60 - 80 PPM
Langelier saturation index	-0.3 - +0.3
Total Dissolved Solids (TDS)	not to exceed 1,500 PPM

1.13 START-UP CHEMICALS

- A. The Contractor must maintain the chemical balance of the pool water (including the cost of chemicals required) until the pool and mechanical system(s) are fully operational and accepted by the Architect and the Owner.
- B. Provide the Owner with sufficient quantities of the necessary chemicals to maintain the pool operation after the owner begins using the pool.
 1. The Contractor is required to provide chemical quantities as shown on the drawings for the following chemicals:
 - a. CO₂

- C. Chemicals must be provided to the Owner must include those required by the chemical feed systems provided.

1.14 RECORD DRAWINGS

- A. Provide a complete set of record drawings of the entire pool systems including sub-systems. Record drawings must be prepared in accordance with the requirements and must be a complete, stand-alone set. The Contractor is permitted to obtain original documents and copy them for this purpose only. Provide a digital record set (latest version of AutoCAD or compatible software).

PART 2 - PRODUCTS

2.1 PUMPING EQUIPMENT

- A. Proposed substitutions must include a mechanical drawing incorporating required changes in layout, piping, and valves. The cost of such changes must be included in the price of the substitute. Confirm correct pump motor voltage prior to ordering pump. Motors must be capable of continuously running without overloading at points on the characteristic curve of the pump without overload or damage. Confirm by 1/4-inch scale shop drawing that the pumps provided will fit within the available space and can be reasonably removed for servicing.
 - 1. Pumps must be certified by the National Sanitation Foundation (NSF) and bear the certification mark.
 - 2. Since the recirculation pumps are powered by a VFD, the impellers must be trimmed to the maximum diameter based on the most limiting condition of either the diameter of the maximum non-overloading rated motor horsepower at the design point or a diameter resulting in 10% greater head than the specified head.
 - 3. The pump motor must be totally enclosed, fan cooled (TEFC) and premium efficiency of the horsepower and speed specified. A pump requiring larger horsepower is not acceptable unless submitted as a substitute and approved by the engineer, in which case necessary electrical revisions must be coordinated and provided.
 - 4. The entire pumping unit must be mounted on a base using cap screws to preserve the back-pull-out feature of the pump. Pumps must not be secured with floor studs or "all-thread." The pump base must be coated with the same epoxy coating as the pump.
 - 5. Recirculation Pumps
 - a. Provide horizontally mounted centrifugal pumps as shown on the drawings and described in these specifications. Each pump must be of a straight centrifugal, end suction, bronze fitted, close coupled type.
 - b. Pumps manufactured by Paco, Griswold, Aurora or Herborner are considered equal, provided they meet the requirements.
 - c. Pump casing must be cast iron fitted with a replaceable bronze case wear ring. Mechanical seals must be provided specific for a chlorinated water application. Pump impeller must be enclosed type of cast bronze or 316L stainless-steel, statically, and dynamically balanced, and trimmed for the specified design conditions. If a VFD is used in conjunction with a pump, the impeller must be trimmed to the maximum diameter based on the rated motor horsepower. Bronze materials must be suitable for use in a chlorinated environment. Suction and discharge flanges must be provided and tapped for gauge connections. Provide steel or cast-iron bases with equivalent epoxy coating for corrosion protection.

- d. Provide a fusion-bonded epoxy coating on wetted parts to protect pump internals from corrosion, including pump volute interior and complete pump impeller (bronze impellers only). Sandblast to bare, white metal. The thickness must be 8 to 12 mils (heavy film). Verify thickness by non-destructive testing. Coat parts as recommended by the manufacturer, including preheating parts to 400 degrees and electrostatic deposition or fluidized bed technique. Provide primers if required to resist chlorinated water <10 ppm. The coating must be Scotchkote 134 manufactured by Fusecote or approved equal.
 - e. Provide a hair and lint strainer, for each pump, of fiberglass or epoxy coated stainless-steel construction with a clear observation top in the sizes (or pipe sizes) indicated on the drawings. Verify and coordinate pipe and pump suction sizes in the field. Strainer must be a straight non-reducing type with an approved tapered eccentric reducer at the front of the recirculation pumps. Provide a stainless-steel basket with at least 4 times the free open area as the inlet pipe, and one spare basket with each strainer.
 - 1) Basis of Design: As manufactured by MerMade Filter Inc., or Neptune/Benson Inc., or Fluidtrol Process Technologies, Inc.
 - f. Recirculation pumps must be provided by the same manufacturer. Confirm voltages prior to ordering pumps.
6. Additional Chemical Feed Booster Pump for Owner's Attic Stock
- a. Provide one (1) horizontally mounted, single horsepower, self-priming, centrifugal pump as noted on the drawings and described herein. The pump must be of a straight centrifugal, end suction, non-corrosive PPO Resin material construction, closed coupled type, with integral hair and lint strainer.
 - 1) Basis of Design: WFK-4 Whisperflo as manufactured by Pentair.
 - b. The pump body, seal plate, and attached hair and lint strainer must be constructed of non-corrosive PPO Resin materials, and close-coupled to an electric motor by means of an adaptor of the same material.
 - c. The pump must have a PPO Resin diffuser to aid in priming and it must contain a replaceable bronze wear ring for the impeller. The impeller must be of the closed type and PPO Resin, non-overloading at points on the performance curve. The mechanical shaft seal must be constructed of ceramic and carbon seal faces, with stainless-steel, brass, and Buna N materials in the spring bellows portion. The impeller must be secured to the motor shaft by means of a stainless-steel key and locking screw into the end of the motor shaft. The pump must be capable of operating at up to 50 psi, 104° F continuous water temperature.
 - d. The electric motor coupled to the pump must be of the NEMA Rated series JM construction with stainless-steel shaft inside a removable shaft sleeve of 300 series stainless-steel. Motors must be continuous duty rated at 40° C (or realign better) ambient and be suitable for outdoor installation.
 - e. Pumps must meet Department of Energy (DOE) minimum efficiency standards for dedicated-purpose pool pump (DPPP) motors.
 - f. The pump strainer must consist of a PPO Resin body, Polycarbonate Resin Thermoplastic cover with O-ring seal, and Cam and Ramp Lid, and a strainer basket of mineral reinforced polypropylene material.
 - g. The strainer basket must be securely positioned below the suction inlet of the trap, with access for inspection and cleaning through a removable trap body lid. The trap body lid must be secured by means of a locking ring. Provide one spare basket for each strainer.

B. Variable Frequency Drive Starters

1. Provide variable frequency drive starters (VFD) for the pool pumps as indicated on the drawings. VFDs must be Eco-Flow-C by H2Flow Controls, AcuDrive by Pentair, GreenDrive by Neptune Benson, or approved equal.
 - a. Basis of Design: Eco-Flow-C by H2Flow Controls
2. Ensure that equipment is provided with the correct operating voltage and that interconnected electrical and electronic equipment must adequately communicate and operate the specified pumping equipment. Equipment installations must meet or exceed the requirements of the National Electric Code and other local and state regulations.
3. Variable Frequency Drive Base Requirements
 - a. Provide complete VFD as specified herein or in the equipment schedule for loads designated that must be variable speed or variable flow.
 - b. The VFD must convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD must be a six or twelve pulse input design, and the input voltage rectifier must employ a full wave diode bridge. The output waveform must closely approximate a sine wave. The VFD must be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.
 - c. Indoor Applications: VFD must be fully enclosed in a corrosion resistant NEMA 12/IP54 UL listed enclosure.
 - d. VFD and required options will be incorporated by the VFD manufacturer into an integrated package, with a single input feed and main disconnect.
 - e. VFD must have a fused disconnect and battery back-up, for the purpose of maintaining programming in the event of a power outage, or properly rated circuit breaker.
 - f. The VFD must produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.
 - g. The VFD selected must be able to source the motor's full load nameplate amperage (fundamental RMS) on a continuous basis and be capable of running the motor at its nameplate RPM, voltage, current, and slip.
 - h. The VFD will be capable of running variable torque loads. The VFD must be able to provide its full-rate output current continuously and 110% of rated current for 60 seconds.
 - i. VFD must offer a motor spinning test that will allow the user to determine if the motor is running in the correct direction.
 - j. Switching of the input power to the VFD must be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.
 - k. Switching of power on the output side between the VFD and the motor must be possible with no limitation or damage to the VFD and must require no additional interlocks.
 - l. Cooling must be via an aluminum heat sink and must prevent the introduction of ambient air to the electronics for cooling. With the exception of the water-resistant heat sink fan, electronics must be fully sealed within the enclosure.
 - m. The VFD must have temperature-controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.
 - n. VFD must provide full torque to the motor, given input voltage fluctuations of up to +10% to -10% of the rated input voltage.
4. Harmonics:
 - a. The VFD must provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor.
 - b. The VFD must be provided with line-side harmonic reduction, as required, to ensure that the current distortion limits, as defined in table 10.3 of IEEE 519-1992, are met.

- c. Harmonic solutions must be capable of withstanding up to 2% ambient voltage distortion with the maximum Current Distortion not to exceed 12% at 100% load.

5. Protective Features:

- a. VFD must have input surge protection.
- b. VFD must include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
- c. Printed Circuit boards must be conformal coated to reduce the corrosion effect from environmental gases and other conditions. The conformal coating must meet IEC 61721-3-3, Class 3C2 as standard.
- d. Dry-pump detection must be available to detect if the pump has run dry. If this condition occurs, the drive will be safely stopped. A timer must be included to prevent nuisance tripping.
- e. VFD must include two current sensors on output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.

6. Interface Features:

- a. VFD must provide an alphanumeric backlit display keypad (LCP) which may be remotely mounted using a standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
- b. VFD Display must have the ability to display parameters pertaining to the VFD or the load including the following: current, speed, DC bus voltage, output voltage, input signal in mA, or other values from a list of user-selectable parameters.
- c. LED lights must be provided. These indications must be visible both on the keypad and on the VFD when the keypad is removed.
- d. Two-level password protection must be provided to prevent unauthorized changes to the programming of the VFD.
- e. VFD must offer as standard an internal clock. The internal clock can be used for: Timed Actions, Energy Meter, Trend Analysis, date/time stamps on alarms, Logged data, Preventive maintenance, or other uses.
- f. A battery back-up must be provided to maintain internal clock operation during power interruptions.
- g. Inputs and outputs must be optically isolated.
- h. The VFD must have at least two analog signal inputs. Inputs must be programmable for either 0 -10V or 0/4-20 mA.
- i. At least one programmable analog output must be provided for indication of the drive status. This output must be programmable for output speed, voltage, frequency, motor current and output power. The analog output signal must be 0/4-20 mA.
- j. The VFD must be capable of sending an output signal as a start command to actuate external equipment before allowing the VFD to start.
- k. The VFD must be equipped with a standard RS-485 serial communications network connection.

7. Adjustments:

- a. The VFD must have selectable output switching frequencies to mitigate motor noise.
- b. Multiple complete programming parameter setups must be provided, which can be locally selected through the keypad or remotely selected via digital input(s), allowing the VFD to program for up to four alternate control scenarios without requiring parameter changes.

- c. In each programming setup, independent acceleration and deceleration ramps must be provided. Acceleration and deceleration time must be adjustable over the range from 0 to 3,600 seconds to base speed.
 - d. The VFD must have four programmable "Bypass frequencies" with adjustable bandwidths to prevent the driven equipment from running at a mechanically resonant frequency. The feature must offer a Semi-Automatic program to simplify the set-up.
 - e. VFD must include an automatic acceleration and deceleration ramp-time function to prevent nuisance tripping and simplify start-up.
 - f. The VFD will include a user-selectable Reset function, which enables the selection of between zero and multiple restart attempts after a self-clearing fault condition (under-voltage, over-voltage, current limit, inverter overload, and motor overload). The time between restart attempts must be adjustable from 0 through 600 seconds.
 - g. The VFD will include a user-selectable Auto-Restart function that enables the VFD to power up in a running condition after a power loss, to prevent the need to manually reset and restart the VFD.
8. Bypass
- a. Provide a manual bypass in conjunction with the VFD for the recirculation pumps consisting of a door interlocked main pad lockable disconnect in the off position, a built-in motor starter and a facility for allowing DRIVE/OFF/BYPASS/TEST switching by three contactor control.
9. Contact Motor Selector
- a. Where required provide a motor selection contactor (CMS) consisting of a panel mounted contactor motor select switch with three positions. MOTOR 1 / AUTO / MOTOR 2. Contactor Switch is available for one VFD manually alternating by hand between two pump motors. The two pump motors must be of equal HP and current rating and match the drive rating (as in single pump motor operation). The MOTOR 1 switch position selects motor 1 and the MOTOR 2 switch position selects motor 2.
10. Individual VFD options such as bypass, motor selection contactors, etc. must be incorporated by the manufacturer onto a single panel with a single input feed and main disconnect function. Enclosures must be UL listed and fully assembled by the VFD manufacturer.
11. Service Conditions:
- a. The ambient operating temperature of the VFD must be -10°C to 40°C (14 to 104°F).
 - b. Elevation to 3,300 feet (1000 meters) without derating.
 - c. VFD's must be rated for line voltage of 525 to 690VAC, 380 to 480VAC, or 200 to 240VAC; with +10% to -10% variations. Line frequency variation of $\pm 2\%$ is acceptable.

C. Pump Gauges

- 1. Pressure gauges must be provided on the discharge of the pumps.
- 2. Compound gauges must be provided at the intake port of the pumps, after the hair and lint strainer.
- 3. Gauges must be liquid filled, 316L stainless-steel bourdon tube type with a minimum 2-1/2-inch diameter dial, high impact polypropylene or stainless-steel case, corrosion resistant white scale with black divisions and numerals, 300 Series stainless-steel heavy duty rotary bushed movement, black enameled balanced Micrometer pointer.

- a. Basis of Design: Gauges must be manufactured by Weksler Instrument Corporation or approved equal.
4. Scale ranges must be selected to indicate the normal system operating pressure of each system or location within the system. Pressure ranges must be calibrated in psig (0-60 psi) and compound gauge must be calibrated in inches of mercury (0-30 in Hg / 0-60 psi).
5. A stainless-steel filter type pressure snubber must be provided for each pressure gauge consisting of a 3/8-inch diameter by 1/8-inch-thick micro metallic stainless-steel filter and placed in the line just before the pressure gauge. Provide isolation brass valves or brass gauge cocks at each gauge for easy replacement and maintenance.

2.2 FILTRATION EQUIPMENT

- A. The filter system must consist of high rate filtration tanks as shown on the drawings. Every aspect and component of the filter system must be certified by the National Sanitation Foundation (NSF) and bear the certification mark. The filter must have an engraved metal data plate permanently affixed on the face of the system that describes operational data and instructions and indicates startup date.
- B. It is the intent of these specifications to describe a filtration system complete in every respect with accessory items and supplied and warranted by one manufacturer.
- C. Horizontally Oriented Fiberglass Tanks
 1. The filter tanks must be horizontally oriented single cell fiberglass tanks, minimum 42 inches in diameter. The filter system must be listed as approved by the National Sanitation Foundation prior to bid date.
 - a. Basis of Design: Fiberglass filters must be the product of Stark/Pentair, Waterco, or Neptune Benson provided they meet the specifications and layout. System design is based upon Stark/Pentair. Valves must be provided to backwash one filter at a time.
 2. Filter tanks must incorporate components and features as described in this section.
 3. Two (2) saddle style bases must be provided for tank support. Systems that incorporate stacked tanks must include similar bases and mounting saddles for the upper vessel. Tank supports and connections must be seismic rated to support the filter tanks for the appropriate seismic zone where the project is located. Access to the tank must be provided by a 14" x 18" manhole with two (2) curved yokes. Manhole seal must be complete with a one-piece 1/4" neoprene gasket and positioned so that internal pressure from the filter will augment the seal. No additional hardware or through bolts will be allowed.
 4. Each filter tank must be equipped with the necessary flanges and connections for the internal and external piping. Connections must be comprised of fiberglass flanges and schedule 80 PVC flanges.
 5. Tank connections 2 inches and smaller must be 150 lb. Type 316L stainless-steel threaded full couplings. Tank connections 3 inches and larger must be heavy steel bosses drilled and tapped on both sides to receive standard flanged fittings or Sch. 40 Type 316L stainless-steel nipples.
 6. The discharge from the automatic air release valve must be hard piped to waste. Each filter tank must have a means of releasing air. Each coupling or orifice must be provided with a slotted

PVC sand retainer or stainless-steel strainer. An automatic air release system must be provided for each tank.

7. The drain system must consist of a 3/4-inch 316L stainless-steel coupling mounted at the lowest point in the bottom head. This drain must be valved and piped to the nearest floor drain or backwash pit.
8. Filter Piping – Internal
 - a. The lower internal distribution system must be a horizontal header/lateral arrangement. The header must be Schedule 80 PVC construction, capped on one end and flanged or threaded at the other end for field connection. Lateral connections must be spaced no more than 6 inches on centers and must be 1-1/2-inch FPT connections. Attachments to header must be solvent welded and thermo-welded to ensure integrity of connection.
 - b. Under drain system must be factory installed and constructed of extra heavy Schedule 80 high impact PVC. Multiple PVC main headers must be tapped and threaded to receive laterals.
 - c. Laterals must consist of 1-1/2-inch Schedule 80 PVC pipe with openings as required. Each lateral must be fabricated complete with socket cap on one end and male adapter on the other end. Both fittings must be solvent welded to the slotted pipe. Laterals must be designed and sized at the factory, so they are installed in the field and over the entire cross sections area of the filter.
 - d. The upper distributor must consist of PVC piping Schedule 80 and/or deflector plate per manufacturer standard design.
 - e. Each filter must be supplied with a pressure equalizing upper internal distribution system consisting of a horizontal header/lateral arrangement. The header piping must be constructed of Schedule 80 PVC. The header/lateral piping and connections must be designed and sized to provide uniform distribution and unrestricted flow during the filtration and backwash cycles.
 - f. Upper laterals must be constructed of Schedule 80 PVC pipe with machine slotted openings or orifices. Machined slots or orifices must be clean, de-burred and free of obstructions that would not permit the free flow of water through the opening. Details of the lateral attachment to the header must be submitted for review and approval.
 - g. The lower and upper distribution systems must be properly supported and anchored. Hardware in wetted areas must be Type 316L stainless-steel or non-metallic. Tank interiors must be inspected prior to the media being placed in the filters.
9. Filter Piping – External
 - a. External face piping must be Schedule 80 PVC pipe and fittings. Flanges must be located so as to allow for easy dismantling of face piping. Fittings must be solvent cemented.
 - b. Piping must be drilled and tapped where necessary to accommodate gauge tubing connectors.
 - c. Valves 3" and larger must be constructed with cast aluminum S12A alloy (as defined by ASTM B275) housing and fully coated with Rilsan on interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and 316L stainless-steel shaft. Valves must be rated for 150 psi bubble tight shutoff. Unless otherwise specified, nuts and bolts must be stainless-steel with stainless-steel washers and used when secured to PVC flanges. Systems incorporating solenoid, pneumatic, pressure amplified, hydraulic or multi-directional valves are not acceptable.
 - d. Standard accessory items must include sight glass rated for 50 psi with polycarbonate glass, remote mounted gauge panel with two 4½" diameter pressure gauges, ¼" petcocks, ¼" poly vent tubing with PVC compression adapters.

10. Backwash Control

- a. The filter manifold face piping must be designed to allow for one (1) filter tank to backwash at a time while the recirculation system is operating. A manual backwashing system must be provided with the filter system.
- b. Manual Backwash System
 - 1) The manual backwash system must be equipped with a face piping configuration such that the operator must manually control and operate both the time and sequencing of the backwash cycle. Valving on the filter face piping must be a mechanical linkage device allowing the operator to simultaneously move two (2) valves at once. Mechanical linkage components must be PVC or Type 316L Stainless-steel.

11. Automatic Air Relief Valve

- a. A 1" valve must be provided to automatically and continuously release air in the filter. The valve must be fabricated of plastic with Buna-N seals. A plumbing kit must be provided with two (2) PVC ball valves to allow manual air relief and isolation of the automatic valve. Valves fabricated of cast iron, bronze or stainless-steel valves will not be accepted.

12. Filter Media

- a. Filter media must be recycled glass media as approved by the filter manufacturer. Glass media must have a uniformity coefficient of 1.69, bulk density of 80 lbs/ft³ and have an effective size from 0.45 to 0.6 mm.
- b. The bottom layer of support media must be placed by hand to avoid damage to the under-drain system and leveled before the addition of the upper layer of filter media.
- c. Media must be delivered after approval by the manufacturer of the filter and stored in 40-pound bags.
- d. Media must be supplied by the filter manufacturer and approved by the filter manufacturer prior to shipping.

2.3 RECIRCULATION FITTINGS

- A. Main drain covers must be PVC grating sized to fit existing main drain sump in field. Grate openings must not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.0 fps. The grate must be PVC and fit closely and flush with top surface of frame and secured to frame with vandal proof fasteners. The exposed edges of main outlets must be rounded and smooth, free of burrs and sharp edges. Main drain covers must comply with the Virginia Graeme Baker Act and ANSI/APSP-16 2017.

2.4 PIPING SYSTEMS

A. General

1. Provide recirculating piping between the pool and the filter room, fill receptor and interconnecting piping to and from the chemical feed systems and chemical controller.
2. Provide necessary pipe supports and support systems required to support associated piping and valves.
3. Provide other tubing, conduit, or piping associated with equipment specified herein. Coordinate with other trades.

B. Pipes

1. Pipe routing as shown and detailed on the contract drawings is diagrammatic only and is not intended to show minor details or exact locations of piping systems. Installation is required and must be adjusted to accommodate interference and adjustments anticipated and encountered. Pipe sizes on plans refer to the nominal inside diameter of the pipe.
2. PVC swimming pool piping must be NSF approved and conform to the requirements of ASTM D-1785.
3. PVC pipes must be the product of one manufacturer. Approved manufacturers of PVC piping are Eslon, Harvel, and Chemtrol or approved equal.
4. Swimming pool piping above the floor or deck in the filter room must be Schedule 80 PVC.
5. The influent and effluent lines to the heat exchanger unit must be CPVC. Connections between metallic piping and/or equipment and PVC must be flanged.
6. PVC and CPVC fittings must be the product of one manufacturer. Molded fittings must be manufactured by Asahi, Eslon, Chemtrol, Harvel, Spear, Lasco or acceptable substitutes. Fabricated fittings must be manufactured by Harrison Machine, Plastinetics, or acceptable substitute.
7. Chemical feed lines from chemical feeders to recirculation piping must be Schedule 80 PVC piping. Piping must be hard piped into the recirculation piping via tee or saddle per the drawings. Required valves must be of PVC construction.
8. Flanged plumbing connection hardware must be stainless-steel.
9. Materials must be installed by workmen thoroughly skilled in their trades and work must present a neat and mechanical appearance when complete. At no additional expense to the Owner, replace or correct work not judged acceptable by the Architect, Engineer, or Owner's representation.
10. No installation allowed that will provide a cross-connection or interconnection between a distributing supply for drinking purposes and the swimming pool, or between the pool and a sanitary or storm water sewer system that will permit a backflow of water into the pool water system.
11. Piping must be hydrostatically (water) pressure tested for leaks before start-up to guarantee water tightness. Pneumatic (air) pressure test not allowed.
12. Adhere to the applicable provisions in Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.
13. Mechanical equipment must be connected into the recirculation piping system must be connected utilizing flanged or union connections.
14. Provisions must be made to purge pipes in the system.
15. Concentric reducers must be fiberglass by MerMade Filter, Inc., or equivalent reducers of schedule 80 PVC construction.

C. Pipe Hangers and Supports

1. Manufacturer
 - a. Subject to compliance with these specifications, pipe hanger and support systems must be manufactured by Cooper B-line (basis of design), Inc, TOLCO, and Anvil International or approved equal.
2. Hangers
 - a. Pipes 2 inches and smaller
 - 1) Adjustable steel clevis hanger, B-Line models B3100 or B3104.
 - 2) Adjustable steel swivel ring (band type) hanger, B-Line model B3170.

- b. Pipes 2-1/2 inches and larger
 - 1) Adjustable steel clevis hanger, B-Line model B3100.
 - 2) Adjustable steel yoke pipe roll, B-Line model B3114.
- 3. Multiple or Trapeze Hangers
 - a. Trapeze hangers must be constructed from 12-gauge roll formed ASTM A1011 SS, Grade 33 structural steel channel, 1-5/8 by 1-5/8-inch minimum, B-Line B22 strut or stronger as required.
 - b. Mount pipes to trapeze with 2-piece pipe straps sized for outside diameter of pipe, B-Line B-2000 series.
- 4. Wall Supports
 - a. Pipes 2-1/2 inches and smaller
 - 1) Steel offset "J" hook hanger, B-Line model B3600.
 - b. Pipes 3 inches and larger
 - 1) Welded strut bracket and pipe straps, B-Line models B3064 and B2000 series.
 - 2) Welded steel bracket B-Line model B3066 or B3067 with roller chair or adjustable steel yoke pipe roll. B-Line model B3120 or B3110.
- 5. Floor Supports
 - a. Electroplated carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line model B3092 and B3088T or B3090 and B8088. Pipe saddle must be screwed or welded to an appropriate base stand.
- 6. Vertical Supports
 - a. Steel riser clamp sized to outside diameter of pipe, B-Line model B3373.
- 7. Plastic Pipe Supports
 - a. V-Bottom clevis hangers with galvanized 18-gauge continuous support channel, B-Line models B3106 and B3106V, to form a continuous support system for plastic pipes smaller than 1 inch or flexible tubing.
 - b. A vented and sloped continuous PVC Schedule 40 pipe no smaller than 1-1/2 inch outside diameter will be used to route flexible tubing with the appropriate pipe supports.
- 8. Supplementary Structural Supports - Design and fabricate supports using structural quality steel bolted framing materials. Channels must be roll formed, 12-gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch or greater as required by loading conditions. Submit design for pipe tunnels, pipe galleries etc. for approval. Use clamps and fittings designed for use with the strut system.

D. Hanger Attachments

- 1. Upper Attachments
 - a. Beam Clamps

- 1) Beam clamps must be used where piping must be suspended from building steel. Clamp type must be selected on the basis of load supported and load configuration.
- 2) C-Clamps must be locknuts and cup point set screws similar to B-Line model B351L or B3036L. Top flange c-clamps must be used when attaching a hanger rod to the flange of structural steel, B-Line model B3034 or B3033 or approved equal. Refer to manufacturer's recommendations for set screw torque. Retaining straps must be used to maintain the clamp position on the beam where required.
- 3) Center load beam clamps must be used where specified. The steel clamps must be B-Line models B3050 or B3055. Forged steel beam clamps with cross bolt must be B-Line B3291-B3297 series or approved equal as required to fit beams.

b. Concrete Inserts

- 1) Cast in place spot concrete inserts must be used applicable, either steel or malleable iron body, B-line B2500 or B3014 or approved equal. Spot inserts must allow for lateral adjustment and have means for attachment to forms. Select inserts to suit threaded hanger rods sizes, B-line models N2500 or B3014N series.
- 2) Continuous concrete inserts must be used where applicable. Channels must be 12 gauge, ASTM A1011 Grade 33 structural quality carbon steel, complete with Styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert must have a load rating of 2,000 lbs/ft. in concrete, B-Line models B22I, 32I, or 52I or approved equal. Select channel nuts suitable for strut and rod sizes.

E. Hanger Accessories

1. Hanger rods must be threaded on both ends or continuously threaded rods of circular cross section. Use adjustable lock nuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

F. Hanger Finish

1. Indoor Finishes
 - a. Hangers must be zinc plated in accordance with ASTM B633 or must have an electro-deposited green epoxy finish.
 - b. Strut channels must be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 or must have an electro-deposited green epoxy finish.
 - c. Zinc Plated hardware is not acceptable for use in chemical rooms.

G. Valves

1. Valves 3 inches and larger must be butterfly type valves, with PVC body, 150# SWP with stainless-steel shaft, PVC or polypropylene disc and replaceable resilient seat bonded to a rigid shaft and guaranteed for bubble tight shutoff from 27-inch vacuum to 150 PSI. Extended neck 2 inches beyond flanges for insulated piping must be provided with handle for manual operation. Valve components must be suitable for swimming pool chlorinated water service. Butterfly valves must be Georg Fischer Type 563, Asahi/America Type SP Pool-Pro, Chemtrol Model-B, Simtech VP series, Colonial Valve 411 Series, or approved equal.
2. Valves smaller than 3 inches must be PVC true union ball valves, full port, three-piece construction, blowout-proof stem, Viton seal with socket end connectors.
3. Check valves must be a quick closing non-slam type, either self-aligning wafer or flanged type, of corrosion resistant materials suitable for use in a swimming pool environment. Provide check

valves in accordance with the manufacturer's recommendations. Locate check valves at least 5 pipe diameters from pumps and fittings. Check valves must be Technocheck Corp., model 5050, with epoxy coated cast iron body and bronze swing plates on a stainless-steel spring, Colonial Valve model 601N or 601NP PVC valve with EPDM O-ring and stainless-steel spring or approved equal, for installation between 150 lb. flanges.

4. Modulating float valve in the surge tank must have PVC body and stainless-steel wafer disc. Hardware must be non-corrodible. The float-operated valves must be provided horizontally on the main drain lines in the surge tank. A valve must consist of non-corrosion components including shaft, float arm, pins, and floats. Valve must be suitable for mounting on a 125E class standard PVC flange. The float arm leverage weight and pivot lengths must be adjustable to obtain desired ratio of surge tank level change to pool gutter overflow level change. Two floats and a stabilizer required. Valve must be model FV-D XWB (Extra Weight Ball) as manufactured by MerMade Filter, Inc. or approved equal manufactured by Neptune-Benson, EPD, or Fluidtrol Process Technologies, Inc.
5. Butterfly type valves 8 inches and larger must be fitted with a watertight gear operator.
6. Valves located 7 feet or greater off the floor must be fitted with a chain operator.
7. Electrically actuated butterfly valves (2 required) shall be provided as replacements to the existing Fisher diaphragm valves within the pool mechanical room to prevent flooding the basement in the event of a power and valve failure. Valves shall be interlocked with the pool recirculation pump and close whenever the pump is off or has lost power. Valve shall have battery backup in the event of a power failure.

a. Basis of design: Series 92 electric actuator by Asahi/America or equal.

8. Valve hardware must be 316L stainless-steel and meet ANSI hardware installation guidelines.

H. Pipe and Valve Identification

1. Exposed pool piping must be equipped with color coded flow directional arrows at thirty (30) inch intervals per local and state swimming pool health code. Verify that pool piping identification is in accordance with local and state health regulations.
2. Valves must be identified with minimum 1-1/2-inch diameter plastic laminate engraved tags with minimum 1/2-inch-high numbers. Tags must be fastened to valves with a nylon attachment (zip tie). Valves must be described as to their function and referenced in the operating instruction manual and wall mounted piping diagram that must be prepared.

2.5 CHEMICAL TREATMENT SYSTEMS

A. pH Buffering System (CO₂) – Owner to rent from local supplier

1. Shop drawings complete with a piping diagram depicting the location in which the CO₂ feeder is connected to the system must be provided and approved prior to installation. Installation of the system must be as specified in the manufacturer's directions with no exceptions taken.
2. Bulk Storage
 - a. Provide a system for storing, regulating, and feeding carbon dioxide for pH control. The system must consist of CO₂ storage tank, a pressure reducing/regulating system, a feed and rate of flow adjustment control system, injection system/mass transfer system, and valves, tubing, fittings, and appurtenances required for a complete and operable system.
 - b. The system is to include the following components:
 - 1) CO₂ Storage Tank – **Owner Provided**

- a) Provide one (1) 750 lb. mass storage tank meeting ASME requirements, specifically designed and configured for use with CO₂. The tank must be of an insulated, vacuum-jacketed double wall construction with a rated service pressure of at least 292 psig. The outer shell must be stainless-steel and given a 10-mil dry film thickness epoxy coating, the inner shell must be of stainless-steel.
- b) The tank must include shut off and pressure regulating valves, gauges for accurate output pressure control, a 300-psig pressure relief valve, and must be provided with a dual pressure building/economizer regulator that includes a 7.5-amp, 120 VAC heater extending into the tank and the liquid CO₂. Tank must be equipped with a quick fill venturi feed system to expedite tank filling and prevent excessive product waste.
- c) Peak usage flow rate must be 40 pounds per hour and a continuous flow rate of 15 pounds per hour. Secure tank to building wall with a coped saddle and a 16 GA x 3" stainless-steel strap bolted to wall.
- d) Fill tank with CO₂ for initial testing and operation and provide full tank at the time of substantial completion.

2) Remote Fill Box

- a) Provide a remote fill station for the bulk storage tank capable of filling at the rate of approximately 30 to 50 pounds per minute in a manner that does not require entry to the storage room containing the CO₂ tank. The length of tubing between remote fill box and bulk storage tank must not be more than 40', unless otherwise noted. Each fill station must consist of a flush mounted (recessed) lockable fill box located at the exterior of the building, as indicated, connected to the CO₂ system. It must include a quick disconnect and automatic closure coupling. Box must be 6" x 6" x 4" deep and constructed of painted 16 gauge galvanized or stainless-steel or sized to module with exterior masonry.
- b) Each tank must be connected to an outside fill station, as indicated, with two lengths of 1/2 inch outside diameter copper tubing for the purpose: one to transfer liquid to the tanks from a bulk delivery vehicle, and the other from the relief valves to the outside of the building. Copper tubing from remote fill box to storage tank must be fitted with either double ferrule swage fittings, or silver soldered fittings.
- c) Following the remote fill installation, pressurize the system to 150 PSI with gaseous CO₂ through the fill connection to test for leaks. Pressure test must be Snoop Liquid Leak Detector from Nupro Co. or approved equal.

3) Adjustable Rate of Flow Feed Unit

- a) Provide an adjustable rate of flow feed unit to control the flow of CO₂ from the storage tank to the pool recirculation piping. The feed unit must be connected to the storage system with thick wall 3/8-inch OD reinforced braided polyethylene tubing enclosed in schedule 40 PVC. The feed system must include 120-volt AC solenoid operated valve for remote on/off control of CO₂. Feed system must be provided by BECS, Prominent, EKO3, or approved equal and as shown on the drawings.
- b) Injection System: Provide one (1) wet stone diffuser designed for use with CO₂, sized to the pipe in which it must be inserted and for the maximum anticipated rate of CO₂ flow. Provide with pipe saddle connector and fittings and connectors required for a complete and operable installation.

B. Ultraviolet Dechloramination and Disinfection System

1. Medium Pressure UV

- a. Ultraviolet Disinfection Equipment: Must operate within the UVC electromagnetic spectrum emitting wavelengths in the range of 200nm to 400nm. This required wavelength will provide constant disinfection/inactivation of bacteria, algae, molds, viruses, and destruction of Monochloramines, Trichloramines, and Dichloramines. Ultraviolet Lamp/Chamber and Spectra Touch Control Panel by Evoqua Technologies Ltd. or approved equal. Deviations/exceptions must be provided in writing to and approved by the designer prior to the bid date.
- b. The UV System must have a MET or equivalent (ETL, CSA, or UL) listing, be NSF-50 2016 certified including Section 14.18 (crypto inactivation) and 3rd party validated to the USEPA UVDGM 2006 Guidelines.
 - 1) Equipment General Description: The Ultraviolet System must be provided in a complete package to include a stainless-steel chamber, Spectra Control System located in NEMA 12 (IP52) rated panel, Medium Pressure Bulb(s) designed to emit wavelengths within the UVC electromagnetic spectrum, automatic wiper system, and Project Commissioning by a Certified Ultraviolet Technician.
- c. Ultraviolet manufacturer to offer unit capability of a horizontal OR vertical installation application using state of art design and direct flow through characteristics. Unit must be a medium pressure system with 94% UVT at the indicated design flow rate. Systems validated or designed for flows based on 98% UVT are not acceptable. Chamber and Control Cabinet must be as indicated on the drawings.
- d. Ultraviolet Lamp
 - 1) Ultraviolet lamp must be medium pressure high intensity. Lamp must be designed to emit continuous Ultraviolet wavelengths in the range of 200nm to 400nm. This will provide optimal disinfection benefits and destruction of Monochloramine, Dichloramine, and Trichloramine compounds. The lamp(s) must remain unaffected by temperature variance of 0 degrees F (-17 C) to 200 degrees Fahrenheit (93 degrees Celsius).
 - 2) The lamp system must provide a constant dose of not less than 60 mJ/cm² until the end of the lamp life for indoor applications and not less than 40 mJ/cm² for outdoor disinfection and this must be based on constantly monitoring the full recirculating flow rate, not on a side stream treatment. The system must be equipped with infinitely variable power control of the lamp intensity & dose. Power stepping not acceptable. The lamps must be capable of turndown to 30% of the nominal rated power.
 - 3) The lamp must be connected via means of a plug connector and must have a mechanical interlock to prevent lamp removal when lit for safety reasons.
- e. Ultraviolet Reactor
 - 1) The unit must be constructed of 316L stainless-steel electropolished and passivated to prevent corrosion within the harsh pool environment.
 - 2) The Ultraviolet chamber must come complete with the following equipment: Ultraviolet intensity monitor factory calibrated to provide intensity in mW/cm², monitors providing percentage of lamp output not acceptable. It must include a built-in alarm system to notify the operator when the output level drops below the required level of 60 mJ/cm² (or operator set dosing levels).

- 3) UV Reactor will be a validated system with third party testing to a recognized international standard such as the USEPA DGM.
 - 4) Ultraviolet temperature monitoring system must be provided to maintain system integrity in the event of flow interruptions to the chamber.
 - 5) Ultraviolet chamber must come complete with annealed quartz sleeve with "O" ring seals for water tightness. The system must be complete with advanced seal arrangement to reduce the risk of quartz over-compression on the seal face.
- f. Automatic Wiper System
- 1) An automatic cleaning system must be provided for cleaning of quartz sleeve and Ultraviolet monitor probe. The system must travel the entire length of the quartz sleeve twice per desired cleaning cycle. Precision molded wiper rings must be provided to ensure thorough quartz tube cleaning and quartz tube protection. The wiper cycle must be user selectable and adjustable within a range of 5 minutes to 24 hours depending on anticipated application and deposit build-up.
 - 2) The wiper system must have the following characteristics:
 - a) The system must utilize direct drive with square faced coupling and acme threaded shaft to prevent slippage and pin shearing. Systems utilizing shear pins or complicated gear boxes will be unacceptable.
 - b) The wiper power supply must be 24-volt DC for improved safety. Higher voltage not acceptable.
 - c) System must incorporate Direct Shaft Encoding for positional location. Systems relying on external limit switches or internally located magnets will be unacceptable.
 - d) The wiper interval must be operator selectable with optional override switch.
 - e) Wiper faults must be indicated on the control system display.
 - f) Wiper System to utilize "Intelligent Operation" for automatic start-up commissioning.
 - 3) Records wiper position at chamber ends. Position must be fixed and not dependent on a timed interval or component striking end of chamber.
 - 4) Establish a travel run without using limit switches to ensure system integrity and longevity.
- g. UV Strainer
- 1) The UV system must be provided with a downstream strainer to protect against the possibility of lamp/quartz breakage traveling downstream.
- h. Ultraviolet Control System
- 1) The control cabinet must be a SPECTRA control unit and or pre-approved equal.
 - 2) The power must be controllable to provide full power, half power and infinite variable power based on real time interface with changes in UVT, Flow Rate or Combined Chloramines. The power panel must house the electronic ballasts required to ignite and power the lamps.
 - 3) Three levels of operation must be provided to meet the needs of the operator and pool environment: Simple Control (start, stop and reset), Full Parameter Display, and Customized Operator Configuration.
 - 4) Modes of operation must be password protected to secure system critical setup functions. Touch Control system must have clearly identifiable start, stop, and reset icons (suitable for gloved operation) with Running and Fault LCD indicators.

- 5) The display must include the following:
 - a) Ultraviolet calculated dose
 - b) Ultraviolet intensity (as a percentage and mW/cm^2)
 - c) Lamp Current
 - d) Flow rate (as gallons per minute or m^3/hour)
 - e) Chamber Temperature
 - f) Operation hour meter
 - g) Fault indicators to include Lamp fault, low UV & temperature alarm, ground fault trip, wiper fault.
 - h) Alarm functions must have a simple text message display to assist in fault finding.
- i. Ultraviolet Control System Interface
 - 1) The Control system must have a minimum of the following system interface control:
 - a) Remote operation
 - b) Process interrupt features (from valves & flow meters)
 - c) Low UV dose
 - d) Flow meter input.
 - e) Auto-Restrike.
 - f) Half to full power UV setting with 24 hour/7-day settable timer.
 - g) Variable power/Dose pacing interface
 - 2) Control system must have built in data-logging capabilities to record the following information:
 - a) UV intensity required.
 - b) UV intensity measured.
 - c) Lamp current
 - d) Chamber Temperature
 - e) Flow Rate
 - f) Time and date stamp, every alarm generated.
- j. Manufacturers must maintain spare or replacement parts in the USA for the same day or not longer than next day delivery in North America.

2.6 WATER CHEMISTRY MONITORING AND CONTROL SYSTEM

- A. A programmable pool chemical automation system must be provided for continuous monitoring and control of the pool water chemistry and related disinfection equipment. The installation of the system must be per the manufacturer's specification. A factory trained/authorized representative must provide training to the Owner and the training must be video recorded. Water chemistry controllers must be provided by ProMinent Fluid Controls, BECS Technology, SB Control Systems, or a technically equal system capable of providing equal performance for operating functions.
 1. The water chemistry control systems for the pool must feature and be capable of the following. Water chemistry controllers without these capabilities and features are not considered equal. Water chemistry control system requirements are based upon BECSys7.
 - a. Continuous, real-time monitoring and control of pH and ORP.
 - b. The controller must be capable of interfacing with an alkalinity meter, which provides a reading of the total alkalinity of the body of water being controlled.

- 1) The alkalinity meter must provide monitoring of pool water total alkalinity by performing a flowing water titration, utilizing a single reagent. The alkalinity meter must report the total alkalinity reading to the water chemistry controller for display, data logging, remote access, alarm notifications and alkalinity control. Installation of the system must be per the manufacturer's specification and with no exceptions allowed. A factory trained/authorized representative must provide training to the owner. The specified meter is a BECSys Alkalinity Meter manufactured by BECS Technology, Inc.
 - 2) The water chemistry controller must interface to the alkalinity meter via low-voltage, digital RS485 connection. Parameter changes made via the water chemistry controller user interface must be transmitted by the water chemistry controller to the alkalinity meter. The controller must provide user-programmable settings for low alkalinity and high alkalinity, which will activate a corresponding alarm when the total alkalinity reading exceeds these settings. The controller must monitor, display, and data log total alkalinity to 1 ppm resolution.
 - 3) The alkalinity reagent must be specifically formulated to include no more than 3% hydrochloric acid. Alkalinity reagent must be available from the alkalinity meter manufacturer via the same distribution channel as the alkalinity meter.
 - 4) The alkalinity meter must utilize a dedicated pH sensor with the following characteristics:
 - a) 0-14 sensing range.
 - b) ABS body with 1/2" NPT process connection.
 - c) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, are not considered equal.
 - d) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction.
 - e) A silver/silver chloride (Ag/AgCl) reference element.
 - f) A general-purpose glass membrane pH sensing element.
 - g) Operating temperature range of 0 - 80 degrees C.
 - h) Operating pressure range of 0 - 100 psig.
- c. Free chlorine in PPM, system flow rate, water chemistry balance calculations, water temperature, and other readings and control as deemed necessary for the project per this section.
 - d. The controller must have the ability to monitor and control the UV treatment system.
 - e. The controller must have the ability to call for pH from both CO₂ and Muriatic acid systems on a user programmable time-of-day schedule to alternate between feeding CO₂ or acid.
 - f. The controller must manage the recirculation pump with a programmable Fireman Cycle feature, which automatically turns off the Heater, UV, and Auxiliary systems prior to shutting off the recirculation pump.
 - g. The utilization of simultaneous ORP and PPM (bracketing) control for managing both the quantity and quality of the sanitizer/oxidizer. Controllers that do not have the ability to control simultaneously to ORP and PPM control points or that utilize an alternate chlorine set point or boost function will not be considered equal.
 - h. Actuating outputs in the following operator selectable modes: off, manual, automatic, proportional and must have a manual on fail-safe timer to ensure that if the controller is left in manual mode, the controller will revert back to automatic mode to prevent an over-feed event.
 - i. Programmable events can be time set to occur daily, weekly, or monthly.
 - j. Remote monitoring of the recirculation flow rate of the system when installed with compatible magmeters.

- k. Provide use of flow signal as a supplemental chemical feed interlock to prevent the dosing of chemicals during a system low flow/no flow condition.
- l. The controller must continuously monitor data-log while being monitored and control via two-way remote communication.
- m. The controller must continuously calculate and display the Langelier Saturation Index and Ryznar Index using either sensor data and/or manual input for pH, temperature, total alkalinity, and calcium hardness.
- n. Programmable high and low alarm levels for control functions with operator-selectable feed lockout and alarm buzzer options.
- o. Performance and Certifications
 - 1) The controller system must be NSF/ANSI 50 listed for automatic controller equipment for swimming pools, spas, and other recreational water facilities.
 - 2) The controller system must be certified to UL61010/IEC61010 standards.
 - 3) The controller must automatically activate the appropriate chemical feeders in order to maintain the sanitizer/oxidizer level:
 - a) Within +/- 0.1 parts per million (PPM) or +/- 10 mV (millivolts) of oxidation reduction potential (ORP)
 - b) The pH within +/- 0.1 pH unit of the set points selected by the operator.
 - c) Set point and calibration levels must be adjustable with a keypad mounted on the front panel of the unit as well as the remote interface.
 - d) The controller must use pH sensor with +/- 0.04 accuracy in the operational range of 6.8 – 8.2 as certified by NSF.
 - e) An ORP sensor with an accuracy of +/- 3% mV as certified by NSF.
 - f) A free chlorine sensor that operates in a range of 0.1 parts per million (PPM) up to 10.0 parts per million (PPM) within a 9% accuracy as tested by NSF or another third-party certifying agency.
- p. System Supply
 - 1) The controller must be factory supplied with:
 - a) ORP, pH, temperature, and free chlorine sensors.
 - b) A flowrate sensor to measure system flowrate.
- q. Hardware
 - 1) The controller must have:
 - a) A minimum of seven (7) fully configurable digital inputs.
 - b) A minimum of four (4) fully assignable digital outputs.
 - c) A minimum of nine (9) configurable analog inputs.
 - d) A minimum of five (5), 115 VAC fully assignable relays.
 - e) The controller must be capable of expanded capabilities with an optional input/output expansion card kit.
 - f) High voltage field wiring must be through a separate NEMA 4X factory engineered and supplied enclosure that precludes direct access to controller electronics. High voltage connections must be clearly identified, and a field wiring diagram must be provided with the controller for the Contractor's reference. Controller high-voltage relay assignment parameters must be programmed at the factory prior to delivery to installation location.
 - g) The controller must include a sensing flow cell that is hydraulically designed to allow verified correct flow and consistent pressure across sensors. Flow cell

will be clear PVC that is modular in concept and have the flexibility to add supplementary water chemistry sensors as desired. The sensing flow cell must include a safety flow switch sensor, water spigot, and isolation valves.

r. Communications

- 1) The controller must have as a standard feature:
 - a) The controller must include the capability of ethernet connection and secondary wireless communication.
 - b) The controller must allow full two-way remote communication and full control of parameters.
 - c) Accessibility with a standard internet browser using a fully interactive Ethernet TCP/IP graphical interface that includes security access codes.
 - d) Real-time monitor/control with real-time auto polling, data logging, email and text alarms and providing both graphical and report formats via a personal computer, smartphone, or tablet device.
 - e) The controller must have the ability to facilitate email or text alarm notifications, historical graphing, and real-time control via a personal computer, smartphone, or tablet device.
 - f) The controller must have the ability to export a .csv file once per day with reading type, time, and reading. The export must be done via email and must include the controller serial number. Export data must include ORP, Free Available Chlorine, pH, and Temperature.
 - g) The controller must have the ability to allow software upgrades and programming as needed in the field.

s. Commissioning and Manuals

- 1) The control system must be provided with on-site start-up operator training performed by a representative trained and authorized by the controller manufacturer.
- 2) The manufacturer must supply an operation and maintenance manual describing features, operating instructions, maintenance procedures and replacement parts.
- 3) Installation of the system must be per the manufacturer's specification and no exceptions must be allowed. A factory trained/authorized representative must provide training to the owner and the training must be video recorded.

2.7 FLOW METERS

- A. Recirculation flow meter (1 required) must be provided according to the manufacturer in the filtered water return lines to the pool. The flow sensor must be the GF Signet 2551 insertion magmeter. Provide the coaxial cable from the sensor to the display/transmitter. Flow meter accuracy must be +/- 2% of reading.
- B. Backwash piping flow meters (2 required) must be a pilot, impact ball, variable area type with one piece, impact resistant machined acrylic plastic body. GPM scale must be permanently etched or imprinted on the meter. Flow rate indicator must be of stainless-steel material. The scale range must be appropriate for a specific flow rate. Pipe size to accommodate backwash rate. The backwash piping flow meter must be BLUE-WHITE series F-300 or approved equal.

2.8 WATER LEVEL CONTROLLER

A. Sight Glass Surge Tank Water Level Controller

1. Provide a water level sensing and control system for the pool that will monitor the water level in the surge tank and automatically activate the auto water make-up control valve. For sensing water level and activating make-up water control valve, use Series ELC-810 Controller housed in a watertight NEMA 4X UL94 5V UL flammability rated polycarbonate enclosure to meet IP66 and NEMA 4, 4X, 12 and 13 ratings. The Controller must utilize two sensors to control water level. ELC-810 series must have a menu-driven LCD display screen and utilize a five-switch user interface for navigation through the menu. The menu must allow changing the following settings: delay to shutoff, alternate sensor option, maximum time on, manual override, delay to normal, type of sensor, high level option, flow sensor active, and sounder with alarm. Menu settings must be capable of password protection. The Controller must be capable of displaying the following data: last fill time, last drain time, last alarm. The Controller must be capable of determining the following: maximum time on exceeded, over current to solenoid valve, no valve/valve wiring problem, and sensor not working properly. The Controller must have a low voltage interlock with auto water make-up solenoid valve, must provide adjustable time delay for increasing level and manual override; and requires 115 VAC, 1 phase, 60 Hz power. Manufactured by AquatiControl Technology, model ELC-810-DS-SG-XXX (Coordinate the specific length(s) of cable required for each controller prior to ordering). Refer to drawings for additional information.
2. Provide a solenoid valve for the high-level sensor, normally opened, stainless-steel fitted, bronze body, 24 VAC slow closing type. Refer to Plumbing drawings for pipe size. Interlock with automatic water level control system. Refer to the drawings for additional information. Solenoid must be the 8221 Series by ASCO or approved equal. Maximum size of 2 1/2".
3. Provide a proximity switch sensor that must be sensitive to within +/- 1/8" (4mm) of nominal water level. Supply voltage to sensor must be 12V to 24V DC from Controller. Current consumption must be < or = 15mA. Response frequency must be 100Hz. Maximum control output must be 200mA. Sensor operating temperature must be -25 Deg. C to 70 Deg. C. Operating humidity must range from 35% RH to 95% RH. Sensor must be mounted on the existing sight glass. Sight glass must be mounted to surge tank wall with composite/non-metallic hangers and stainless-steel hardware. Refer to drawings for additional information.
4. Wiring from the sensor to the Controller must be provided and must be connected to the terminal points mounted within a corrosion-resistant, nonmetallic NEMA 4X enclosure. Wiring connections must be made through the bottom of the enclosure. The enclosure size must be no less than 8" wide x 5" high x 4" deep. The access door must be the entire front face panel of the enclosure. Confirm location in field.
5. Major components must be plugged in using WAGO terminal blocks for ease of installation and replacement. Unit must be designed to activate a 24-volt AC solenoid valve.
6. Provide a make-up water solenoid valve, normally closed, stainless-steel fitted, bronze body, 24 VAC slow-closing type. Interlock with automatic water level control system. Refer to the drawings for additional information including size of pipe. Solenoid must be by ASCO 8221 or approved equal.
7. Discharge of make-up water must be into the surge tank. Refer to the drawings for additional information.

2.9 SWIMMING POOL FINISHES – Alternate #1

A. Tile Acid Wash & Cleaning

1. Power wash the interior of the swimming pool and surrounding perimeter deck with a light power wash to knock down any heavy dirt, mold, and/or algae. Contractor must not get the power washing nozzle too close to the surface to avoid damaging the finish. Start with a 60/40 mix of acid to water. Douse a small area with the mix and briefly scrub with a medium bristle brush. Rinse the area and assess. If clean, proceed for the remainder of the tile surface. If

needed, increase the mix ratio for more severe stains, though the mix should never be 100% acid. If a spill occurs, rinse the area immediately. Contractor to wear PPE during acid wash process including eye protection, mask/respirator, knee-high rubber boots, rubber gloves and protection for arms.

B. Tile Grout

1. Use either LATICRETE PERMACOLOR Grout or MAPEI Ultracolor Plus FA Grout in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal.
2. Mix grout to a thick creamy consistency and force into joints for entire thick depth, flush with surface. Clean off excess and fill skips and gaps before grout sets. Color selection by Architect or Interior Designer. Provide dampness for minimum 3-day curing and polish with clean dry cloths (not required when epoxy grouts are used).
3. Maintain a temperature range of 50 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average a temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.
4. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile must be cleaned with pH neutral solutions, free of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.
5. Conform to the following reference standard:
 - a. A108.10 – Installation of Grout in Tile Work.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS, INSPECTION AND PREPARATION

- A. Carefully examine the contract documents for requirements that affect the work of this section. Prior to starting work, notify the Architect of defects requiring correction. Do not start work until conditions are satisfactory.
- B. Verify that work by others, related to this section, has been completed. This includes earthwork, concrete work, and mechanical, electrical, and plumbing connections.
- C. Protect materials and work completed by others from damage while completing the work in this section.

3.2 PIPING INSTALLATION

A. General

1. Provide and erect, according to the best practices of the trade, piping shown on the drawings and required for the complete installation of these systems. The piping shown on the drawings must be considered as diagrammatic in indicating the general run and connections and may or may not in parts be shown in its true position. The piping may have to be offset, lowered, or raised as required or as directed at the site. This does not relieve responsibility for the proper erection of the systems or piping in every respect suitable for the work intended as described in the specifications and approved by the Architect. In the erection of piping, it must

be properly supported, and proper provisions must be made for expansion, contraction and anchoring of piping. Piping must be cut accurately for fabrication to measurements established at the construction site. Pipe must be worked into place without springing and/or forcing, properly clearing windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted. Pipes must have burrs and/or cutting slag removed by reaming or other cleaning methods in strict accordance with the manufacturer's instructions. Changes in direction must be made with fittings. Open ends of pipes and equipment must be properly capped or plugged to keep dirt and other foreign materials out of the systems. Plugs of rags, wool, cotton waste or similar materials will not be used in plugging. Piping must be arranged so as not to interfere with removal and maintenance of equipment, filters, or devices, and so as not to block access to manholes, access openings, etc. Flanges or unions applicable for the type of piping specified must be provided in the piping at connections to items of equipment. Piping must be installed to ensure noiseless circulation. Valves and specialties must be so placed to permit easy operation and access.

B. Pipe Hangers and Supports

1. Pipes must be adequately supported by pipe hangers and supports as specified.
2. Horizontal PVC Schedule 80 piping must be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 120-degree F and as listed below:

Nominal Pipe Size	Hanger Support Spacing	Minimum Rod Size for Single Rod Hanger
1-1/4" and less	5'-0"	3/8"
1-1/2" to 3"	6'-0"	1/2"
4" to 6"	8'-0"	5/8"
8" to 12"	10'-0"	7/8"

3. Horizontal CPVC Schedule 80 piping must be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 140-degree F and as listed below:

Nominal Pipe Size	Hanger Support Spacing	Minimum Rod Size for Single Rod Hanger
1/2" and less *	4'-0"	3/8"
3/4" to 2"	6'-0"	3/8"
2-1/2" to 3"	7'-0"	1/2"
4" to 8"	8'-0"	7/8"

4. Round rods supporting the pipe hangers must be of the following dimensions:

Nominal Pipe Size	Rod Diameter
1/2" to 2" pipe	-3/8" rod
2-1/2" to 3" pipe	-1/2" rod
4" to 5" pipe	-5/8" rod
6" pipe	-3/4" rod

5. Hanger rods must be galvanized steel. Provide for controlling level and slope by turn buckles or other approved means of adjustment and incorporate lock nuts.
6. Provide means of preventing dissimilar metal contact such as plastic-coated hangers, copper colored epoxy paint, or non-adhesive isolation tape.
7. Provide hangers to provide a minimum of 1-inch space between finished covering and adjacent work.

8. Place a hanger within 12 inches of each horizontal elbow.
9. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
10. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified. Trapeze hangers must be spaced according to the smallest pipe size or provide intermediate supports according to the support spacing schedules. Provide heavier members as required for the load supported for the entire span distance. Hanger rods must be as specified above and properly sized for the load supported, but not less than 5/8 inches diameter.
11. Piping must be rigidly supported from the building structure by means of hanger assemblies properly selected and sized for the application in accordance with the manufacturer's recommendations and specifications. Do not support piping from other pipes, ductwork or other equipment that is not building structure. Do not modify the building structure for hanger installation.
12. Attachment of piping hangers to the building structure must be provided in a manner approved by the Architect. Provide concrete inserts installed by others in the building construction at the time the concrete is poured, and hangers must be attached to these inserts.
13. The use of pipe hooks, chains, or perforated iron for pipe hanger supports will not be permitted.

C. Concrete Inserts

1. Provide inserts for placement in form work before concrete is poured.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Where concrete slabs form finished ceilings, inserts must be flush with the slab surface.
4. Provide hook rods to concrete reinforcement section for inserts carrying pipe over 4 inches.

D. Flushing, Draining and Cleaning Pipe Systems

1. Flush out water systems with water before placing them in operation. Other systems must be cleaned by using compressed air or nitrogen. After systems are in operation and during the test period, strainer screens must be removed and thoroughly cleaned.

E. Expansion and Contraction

1. Make necessary provisions for expansion and contraction of piping with offsets, loops, flexible connections, and anchors as required to prevent undue strain. Provide shop drawings for method and arrangement for control of expansion and contraction of piping.

F. Testing

1. Piping installation and pressure testing must be performed by the Contractor and reviewed by the Owner or a designated representative of the Owner prior to putting the pool systems in operation. A minimum notice of one (1) week is required prior to review. Results must be submitted to the Architect. Pictures with time stamps for each section of piping must be included with testing report(s) and be submitted within one (1) week of the pressure test(s).
2. Pool related piping must be capped and hydraulically pressure tested (with water, not air) to a pressure of not less than 50 PSI for a period of no less than two (2) hours. Pressure testing must be conducted in accordance with ASTM D2774. The temperature of the water used for the test must be between 40°F and 90 °F.
3. Adhere to the applicable provisions of Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.

3.3 START-UP AND INSTRUCTION

- A. Supply the services of an experienced swimming pool operator/instructor for a period of not less than one day (total 8 hours) after the pool has been filled and initially placed in operation. During this period, the Owner's representatives who will be operating the pool must be thoroughly instructed in phases of the pool's operation. Deliver six (6) complete sets of operating and maintenance instructions for the swimming pool, structures, finishes and component equipment. Prior to leaving the job, obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and necessary operating information provided.
- B. Written reports of each of these visits outlining the pool's operation, competence and performance of the pool's operation personnel, and other pertinent comments must be submitted to the Owner and Architect/Engineer within one (1) week after each visit.
- C. Provide specific written procedures that must be followed for emptying and refilling the pool as mentioned previously in this section. The procedures must be included in the bound volume of operating instructions and references in the front index with a note headed by the words: "CAUTION -
- VERY IMPORTANT".

END OF SECTION 13 1100

SECTION 13 1105 - SELECTIVE DEMOLITION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected pool materials and equipment.
 - 2. Salvage of existing items to be reused or recycled.
 - 3. Protection of surrounding areas.

- B. Related Requirements:

- 1. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.

- C. Related work specified in other sections:

- 1. Section 13 1100 - Swimming Pool

1.3 DEFINITIONS

- A. Remove: Detach and remove items from the pool and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of the Contractor.

1.5 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owners Representative.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with OSHA Standards 29 CFR Part 1926 & 1910.
- C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that all piping to remain has been plugged before starting selective demolition operations. All piping and pool equipment to remain fully drained immediately following the draining of the pool until the pool is ready to be refilled and started up for final system commissioning.
- B. Review record documents of existing construction provided by Owners Representative. Owners Representative does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
- F. Notify owner on completion of selective demolition and obtain documentation verifying that existing surfaces have been inspected and accepted.

3.2 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Contractor to provide a dust control plan for review by the Owner's Representative.
 - 2. Primary removal of pool tile and mortar must be performed by hydro-blast process. Sand blasting will not be permitted.
 - 3. Double containment with dedicated exhaust of work area and pathway of removal is required.
 - 4. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 5. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 6. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 7. Comply with requirements for temporary enclosures and dust control.

3.3 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing pool finishes as described and/or indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Remove existing sand filters and face piping.
 - 2. Remove existing recirculation pumps housekeeping pad, valves and strainer.
 - 3. Remove existing flow meter sensor.
 - 4. Remove existing UV chamber, cabinet and housekeeping pad.
 - 5. Remove existing chemical controller.
 - 6. Remove two (2) existing fisher valves.
 - 7. Remove existing float valve in surge tank.
 - 8. Remove recirculation piping, valves, hangers, and supports within the pool mechanical area to the extent shown on the drawings.
 - 9. Remove abandoned muriatic acid bulk tank and dispose of remaining acid.
 - 10. Remove existing variable frequency drive panel.
 - 11. Remove existing VGB covers at main drain sumps.
 - 12. Dispose of demolished items and materials promptly.

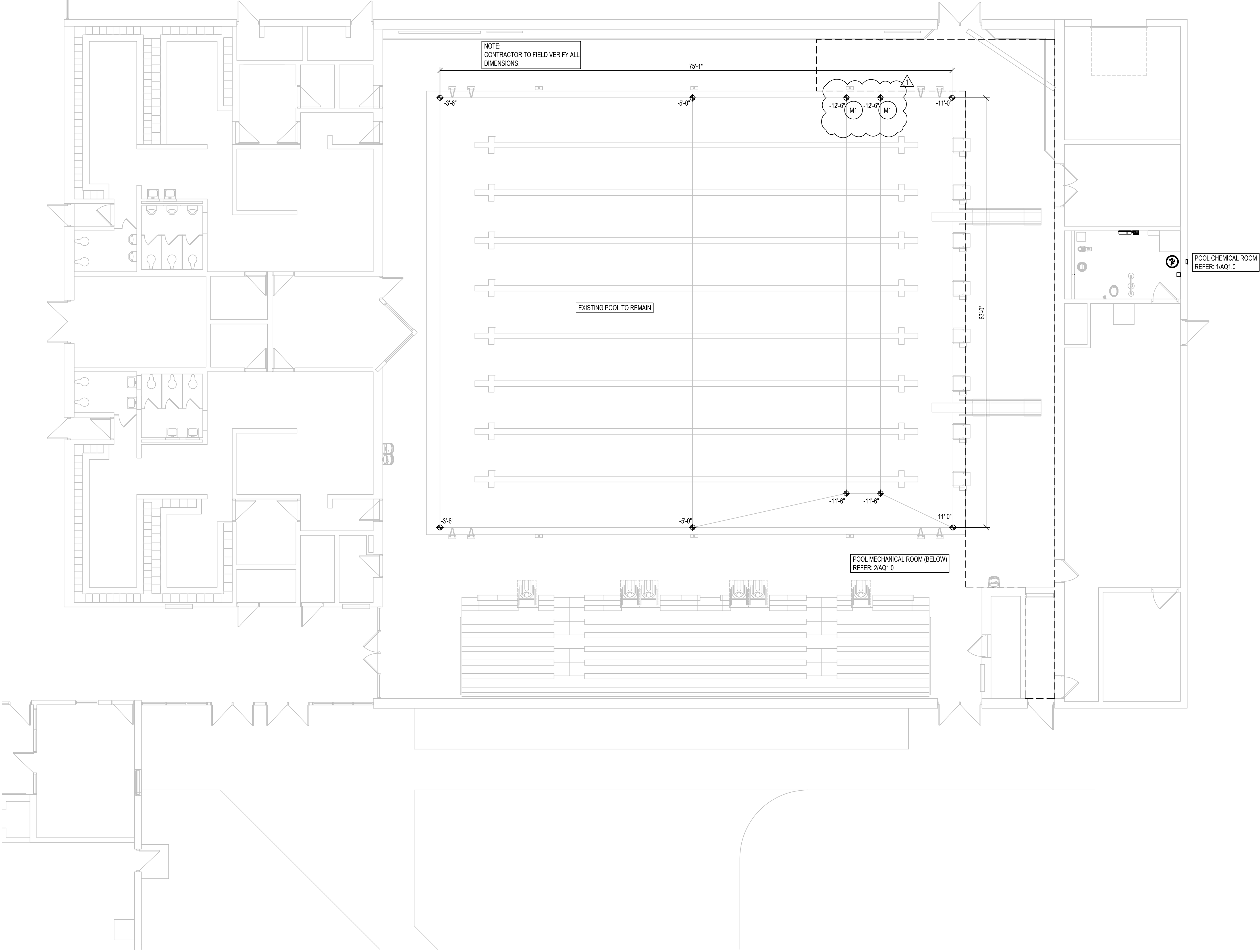
3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Protect all finished surfaces during the demolition process.
 - 2. Do not allow demolished materials to accumulate on-site.
 - 3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.5 CLEANING

- A. Clean adjacent structures and improvements including but not limited to structural spaces of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 13 1105



1
AQ0.0
POOL REFERENCE PLAN
1/8" = 1'-0"

DESIGN DATA		
	UNITS	COMPETITION POOL
LENGTH	FT.	75'-1"
WIDTH	FT.	63'-0"
WATER SURFACE AREA	SQ. FT.	4,736
PERIMETER	FT.	276'-2"
VOLUME	GALLONS	265,320
RECIRCULATION SYSTEM		
POOL TURNOVER RATE	HOURS	6.0
RECIRCULATION RATE	GPM	737
SURGE CAPACITY	GALLONS	EXISTING TO REMAIN
SEWER CAPACITY	GPM	REFER TO PLUMBING
BATHER LOAD	PERSONS	320

MAIN DRAIN SCHEDULE							
ID	DESCRIPTION	SIZE	QTY	DESIGN FLOW (GPM)	DESIGN VELOCITY (FPS)	MFG ALLOWABLE FLOW @ COVER (GPM)	MODEL
M1	LAP POOL	18"X18"	2	737	.65	712	MLD-FGD-1818
NEPTUNE BENSON							

NOTE:
1. EXISTING MAIN DRAIN SUMPS TO REMAIN. NEW GRATES MUST BE MANUFACTURED BY NEPTUNE BENSON. DALDORADO, AQUASTAR, PADDOCK OR APPROVED EQUAL. THE MANUFACTURER INDICATED IS THE BASIS OF DESIGN. CONTRACTOR TO VERIFY MANUFACTURER OF EXISTING GRATE.
2. MAXIMUM FACE VELOCITY MUST NOT EXCEED 1.0 FOOT PER SECOND.
3. OPEN AREA IS BASED ON MANUFACTURER'S DATA.
4. THE INSTALLED LIFE OF THE MAIN DRAIN COVER MUST BE A MINIMUM OF 10 YEARS.
5. FASTEN MAIN DRAIN COVER TO SUMP WITH SIS TAMPER PROOF FASTENERS AT A SPACING NO GREATER THAN 24" O.C. REFER TO SUMP AND GRATE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

GENERAL POOL NOTES

- ◆ DENOTES WATER DEPTH FROM WATER LEVEL.
- (ALTERNATE #1) POOL FINISH TO RECEIVE ACID WASHING AND REGROUT. REFER TO SPECIFICATION 131100.
- ALL PROPRIETARY NAMES MENTIONED ARE TO DESIGNATE PERFORMANCE STANDARDS. EQUIVALENT PRODUCTS MUST BE SUBMITTED FOR APPROVAL.
- ALL POOL REINFORCING STEEL, METAL FITTINGS, EQUIPMENT WITHIN 5'-0" OF POOL EDGE, AND ANY METAL PARTS OF POOL MECHANICAL EQUIPMENT IN CONTACT WITH THE POOL RECIRCULATION SYSTEM MUST BE BONDED PER NEC 680. REFER: 1/AQ1.2

CONTRACTOR SUPPLIED POOL CHEMICALS

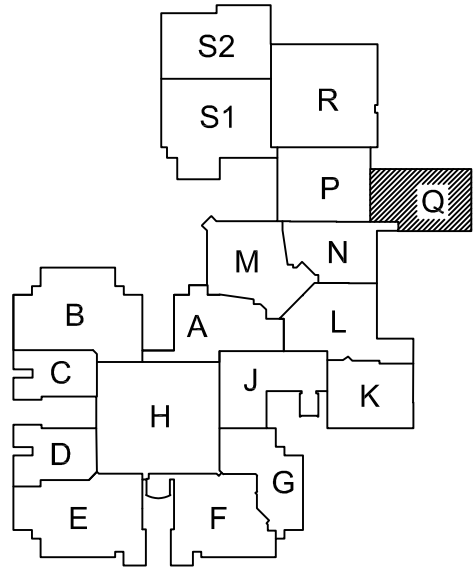
DESCRIPTION	AMOUNT
CO2	FULL BULK TANK(S): 750 LBS

DRAWING INDEX

SHEET	DESCRIPTION
AQ0.0	POOL REFERENCE PLAN
AQ0.1	POOL MECHANICAL & CHEMICAL ROOMS DEMOLITION PLANS
AQ0.2	POOL MECHANICAL ROOM EXISTING CONDITIONS
AQ0.3	POOL CHEMICAL ROOM EXISTING CONDITIONS
AQ1.0	POOL MECHANICAL & CHEMICAL ROOM PLANS & SECTION
AQ1.1	POOL MECHANICAL DETAILS
AQ1.2	POOL MECHANICAL DETAILS
AQ1.3	POOL MECHANICAL DETAILS
AQ2.0	POOL SYSTEMS SCHEMATIC

POOL ALTERNATES

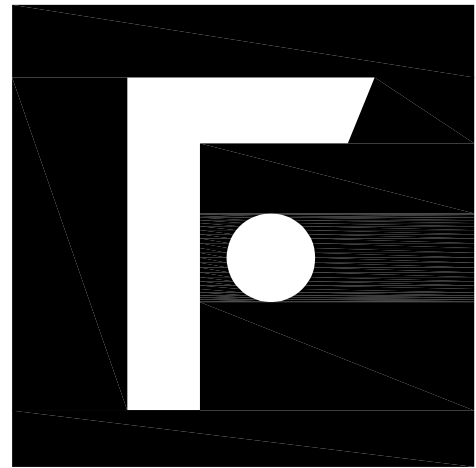
ALTERNATE #1 - ACID WASH THE INTERIOR POOL TILE AND RE-GROUT WITH MATERIAL COMPATIBLE WITH EXISTING FINISHES.



ISSUE DATE	ISSUED FOR
1/8/2026	BIDS
1/23/2026	ADDENDUM 1



DRAWN	ZRW
CHECKED	MJM
APPROVED	CPN



FRENCH

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PROJECT

Livonia Public Schools
Churchill High School
Pool Filtration Project

Livonia,
Michigan

SHEET

Unit Q
POOL REFERENCE
PLAN

PROJECT NUMBER

2025-042.1

SHEET NUMBER

AQ0.0





1. COORDINATE ALL DEMOLITION PLANS AND WORK WITH ARCHITECT AND CONSTRUCTION DOCUMENTS PRIOR TO THE START OF DEMOLITION.
2. REVIEW RECORD DOCUMENTS OF EXISTING CONSTRUCTION PROVIDED BY THE OWNER. NEITHER THE OWNER NOR ENGINEER MAKES ANY GUARANTEE THAT THE EXISTING CONDITIONS REFLECT THOSE INDICATED IN THE RECORD DOCUMENTS. CONTRACTOR TO PROVIDE NOTIFICATION OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH DEMOLITION.
3. CONTRACTOR TO SURVEY EXISTING CONDITIONS AND CORRELATE WITH REQUIREMENTS INDICATED IN THE CONTRACT DOCUMENTS TO DETERMINE THE EXTENT OF DEMOLITION REQUIRED. CONTRACTOR TO RECORD EXISTING CONDITIONS WITH DETAILED PRECONSTRUCTION PHOTOGRAPHS.
4. UNLESS OTHERWISE INDICATED, DEMOLITION WASTE BECOMES PROPERTY OF THE CONTRACTOR.
5. EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE RECYCLED, REUSED, SAVED, OR REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM. OWNER HAS THE FIRST RIGHT OF REFUSAL ON ALL DEMOLITION MATERIALS.
6. IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB. IMMEDIATELY NOTIFY THE OWNER AND ENGINEER.
7. INDICATE RECEIPT AND ACCEPTANCE OF ANY HAZARDOUS WASTES BY A LANDFILL FACILITY LICENSED TO ACCEPT SUCH HAZARDOUS WASTES.
8. MAINTAIN EXISTING UTILITIES TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING DEMOLITION OPERATIONS. REFER TO OTHER TRADES FOR COORDINATION.
9. ELECTRICIAN MUST VERIFY EXISTING BOND GRID. ALL NEW EMBEDS AND MECHANICAL EMBOS MUST BE BONDED AND TIED TO EXISTING GRID PER NEC ARTICLE 680.
10. PROTECT ALL EXISTING POOL FINISHES, GUTTERS, MAIN DRAINS, AND ANY OTHER POOL RELATED APPURTENANCES DURING CONSTRUCTION.
11. THE CONTRACTOR MUST BE RESPONSIBLE FOR CONTINUOUSLY MONITORING GROUNDWATER LEVELS ON THE SITE DURING ANY AND ALL PERIODS WHEN THE SWIMMING POOL IS NOT FULL OF WATER. PROTECTION OF THE EXISTING POOL STRUCTURE FROM DAMAGE DUE TO HYDROSTATIC PRESSURE IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
12. CONTRACTOR TO PROVIDE AND EXERCISE APPROVED DUST CONTROL PLAN.
13. ALL AREAS OF WORK MUST HAVE DOUBLE CONTAINMENT AND DEDICATED EXHAUST INDEPENDENT OF HVAC.
14. CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST, DIRT, AND DEBRIS FOLLOWING DEMOLITION OPERATIONS. CONTRACTOR TO RETURN ADJACENT AREAS TO CONDITION EXISTING BEFORE THE START OF DEMOLITION OPERATIONS.

COORDINATE ALL DEMOLITION PLANS WITH ARCHITECT AND CONSTRUCTION DOCUMENTS PRIOR TO DEMOLITION	
D1	REMOVE EXISTING SAND FILTERS AND FACE PIPING. REFER: 3/AQO.2
D2	REMOVE EXISTING RECIRCULATION PUMPS, HOUSEKEEPING PADS, VALVES AND STRAINER. REFER: 2/AQO.2
D3	REMOVE EXISTING FLOW METER SENSOR
D4	REMOVE EXISTING UV CHAMBER, CABINET AND HOUSEKEEPING PAD. REFER: 7/AQO.2
D5	REMOVE EXISTING CHEMICAL CONTROLLER. REFER: 2/AQO.3
D6	REMOVE TWO EXISTING FISHER VALVES. REFER: 8 & 9/AQO.2
D7	REMOVE EXISTING FLOAT VALVE IN SURGE TANK.
D8	REMOVE MECHANICAL ROOM POOL RECIRCULATION PIPING, VALVES, HANGERS AND SUPPORTS. REFER: 1/AQO.2
D9	REMOVE ABANDONED MURIATIC ACID BULK TANK AND DISPOSE REMAINING ACID. REFER: 1/AQO.3
D10	REMOVE EXISTING VGB COVERS AT THE TWO (2) MAIN DRAIN WALL SUMPS.



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PROJECT

Livonia Public Schools
Churchill High School
Pool Filtration Project

Livonia,
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1 SHEET

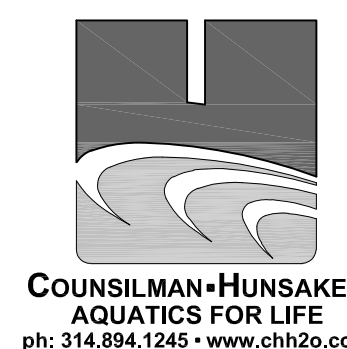
Unit Q
POOL MECHANICAL
ROOMS DEMOLITION
PLANS

PROJECT NUMBER

2025-042.1

SHEET NUMBER

AQ0.1





UV TREATMENT SYSTEMS SCHEDULE						
ID	POOL	MODEL NUMBER	CALCULATED 60 MJCM2 (GPM)	LAMPS	POWER (KW)	VOLTAGE (V) WITH BREAKER SIZE (50 OR 60 HZ)
U1	COMPETITION	WF-215-8-N	1,012	2 @ 1.5KW	3.0	240 V (1Ø)-3ØA

NOTE:

1. THE BASIS OF DESIGN MANUFACTURER IS EVOQUA TECHNOLOGIES LTD. ALTERNATE MANUFACTURER: PROMINENT, AQUIONICS OR APPROVED EQUAL.
2. INTERLOCK UV SYSTEM WITH CHEMICAL CONTROLLER OR RECIRCULATION PUMP.
3. REFER: 6/AQ1.1

ID	ITEM	ID	ITEM
1	CHEMICAL CONTROLLER REFER: 2/AQ1.1	7	ELECTRICALLY ACTUATED VALVE REFER: 8/AQ1.2
2	FLOW METER SENSOR REFER: 8/AQ1.1	8	CO2 FILLBOX REFER: 5/AQ1.1
3	IMPACT FLOW METER REFER: 9/AQ1.1	9	HEATER TEES REFER: 9/AQ1.2
4	HARD PIPE TO DRAIN	10	WATER LEVEL CONTROLLER REFER: 11/AQ1.1
5	CO2 TANK REFER: 3/AQ1.1	11	TOTAL ALKALINITY PANEL REFER: 10/AQ1.2
6	10" FLOAT VALVE REFER: 12/AQ1.2	12	CHEMICAL INJECTION REFER: 7/AQ1.1

GENERAL POOL MECHANICAL ROOM NOTES

THE FOLLOWING INFORMATION SHALL BE LAMINATED AND POSTED IN THE POOL MECHANICAL ROOM: BACKWASH PROCEDURE, POOL FILLING & DRAINING, VALVE REFERENCE CHART, POOL MECHANICAL ROOM PLAN, POOL PIPING SCHEMATICS & POOL SYSTEMS SCHEMATICS.

MINIMUM 7'-0" CLEARANCE BENEATH ALL OVERHEAD PIPING.

PROVIDE AND SUPPORT OVERHEAD AND VERTICAL PIPING PER SPECIFICATION REQUIREMENTS.

LABEL AND IDENTIFY ALL PIPING IN COMPLIANCE WITH THE SPECIFICATIONS.

ALL FLOW METERS SHALL BE SIZED TO MATCH THE PIPE ON WHICH IT IS INSTALLED. PROVIDE PRESSURE GAUGES ON INFLUENT AND EFFLUENT SIDE OF EACH FILTRATION SYSTEM AND A FULL LINE SIZE FLOW METER ON FILTER RETURN.

HYDROSTATICALLY TEST ALL PIPING AT 50 PSI FOR TWO HOURS AND MAINTAIN A PRESSURE OF 20 PSI IN ALL PIPING THROUGHOUT CONSTRUCTION. SECURE ALL FIXTURES PER SPECIFICATION REQUIREMENTS BEFORE HYDROSTATIC TEST.

REFER TO DETAILS 2-7/AQ1.2 FOR INSTALLATION OF PIPE SUPPORTS.

ALL VALVE HARDWARE MUST BE 316L STAINLESS STEEL AND MEET ANSI HARDWARE INSTALLATION GUIDELINES. REFER: 10/AQ1.1

CAL TREATMENT

CHEMICAL FEED REQUIREMENTS - REFER TO THE POOL SYSTEMS SCHEMATIC(S) ON AQ2.0.

INTERLOCK POOL RECIRCULATION PUMP(S) WITH ITS CORRESPONDING WATER CHEMISTRY CONTROLLER, CHEMICAL FEED PUMP(S), AND HEATER(S).

PROVIDE SIGNAGE ON CHEMICAL ROOM DOORS IN COMPLIANCE WITH THE STATE FIRE CODE. REFER: 11/AQ1.2

SECURE CHEMICAL METERING PUMP FEED LINES TO WALL AND/OR OVERHEAD WITH CLIPS OR DEVICES THAT DO NOT CRIMP, DISTORT OR ALLOW HIGH AND LOW AREAS IN TUBING RUNS. PROVIDE CHECK VALVE AND SHUT-OFF VALVE BEFORE LINES ENTER POOL RETURN PIPING.

WATER CHEMISTRY CONTROLLERS SHALL CONTROL THE SANITIZING SYSTEM AND PH CONTROL SYSTEM AND SHUT THEM DOWN UPON LOSS OF SAMPLE STREAM FLOW.

THE CHEMICAL CONTROL SYSTEM BYPASS LINE SHALL SAMPLE WATER AFTER THE FILTERS AND BEFORE THE HEATER BYPASS LINE.

VERIFY REMOTE ACCESS CAPABILITY TO ALL CHEMICAL CONTROLLERS. REFER TO ELECTRICAL.

INSTALL SANITIZER INJECTION POINT DOWNSTREAM OF PH BUFFER INJECTION POINT ON FILTERED WATER RETURN PIPE. CHEMICAL INJECTION POINTS SHALL BE LOCATED DOWNSTREAM OF ALL OTHER EQUIPMENT/SYSTEMS IN THE POOL MECHANICAL ROOM AT A MAXIMUM HEIGHT OF 7'-0" ABOVE FINISHED FLOOR. REFER: 7/AQ1.1

RICAL

SCF/CS PROVIDED AT OUTLETS. REFER TO ELECTRICAL.

POOL EQUIPMENT ROOM AND CHEMICAL STORAGE AREAS SHALL BE PROVIDED WITH ARTIFICIAL LIGHTING SUFFICIENT TO ILLUMINATE ALL EQUIPMENT AND SUPPLIES. REFER TO ELECTRICAL.

CONDUIT SHALL BE ROUTED OVERHEAD OR BELOW GRADE.

ID	POOL	MANUFACTURER	FILTER MODEL	QTY.	FILTRATION TYPE	MAXIMUM FILTRATION RATE (GPM/SQ. FT.)	REQUIRED FILTRATION AREA (SQ. FT.)	DESIGN FILTRATION RATE (GPM/SQ.FT.)	DESIGN FILTRATION AREA (SQ. FT.)	FILTER BACKWASH RATE (GPM/SQ. FT.)	BACKWASH FLOW RATE PER FILTER (GPM)
F1	COMPETITION	STARK	S1-72	3	HIGH RATE PRESSURE	13.5	54.6	12.3	60.0	16.0	246

NOTE:

1. BACKWASH METHOD MUST BE MANUAL.
2. ALL FILTER SUPPORTS MUST BE SEISMICALLY RATED FOR THE SEISMIC ZONE IN WHICH IT IS INSTALLED IN ACCORDANCE WITH LOCAL AND/OR STATE REQUIREMENTS.
3. FILTER MANUFACTURER MUST CERTIFY FILTER MEDIA.
4. VALVES MUST BE PROVIDED TO BACKWASH EACH FILTER VESSEL INDEPENDENTLY.
5. THE BACKWASH PIPING MUST TERMINATE NO CLOSER THAN 6" ABOVE THE FLOOD RIM OF THE BACKWASH CATCH BASIN OR TWICE THE PIPE DIAMETER, WHICHEVER IS GREATER.
6. FILTER TANK ASSEMBLIES MUST BEAR THE NATIONAL SANITATION FOUNDATION SEAL OF APPROVAL FOR A MAXIMUM FLOW RATE 20 GPM PER SQUARE FOOT OF FILTER MEDIA.
7. THE BACKWASH THROTTLING VALVE(S) HANDLE MUST BE REMOVED AND TURNED OVER TO THE OWNER ONCE THE BACKWASH FLOW RATE(S) HAVE BEEN TESTED, ADJUSTED AND BALANCED.
8. PROVIDE 1" DIAMETER, SCHEDULE 80 PIPE FROM THE AUTOMATIC AIR VENT ON EACH OF THE FILTER VESSEL TO THE NEAREST FLOOR DRAIN OR BACKWASH CATCH BASIN. THE VENT PIPE MUST BE SLOPED TO THE DRAIN.
9. VESSEL MUST BE BACKWASHED AT NO LESS THAN 15.0 GPM/SF.

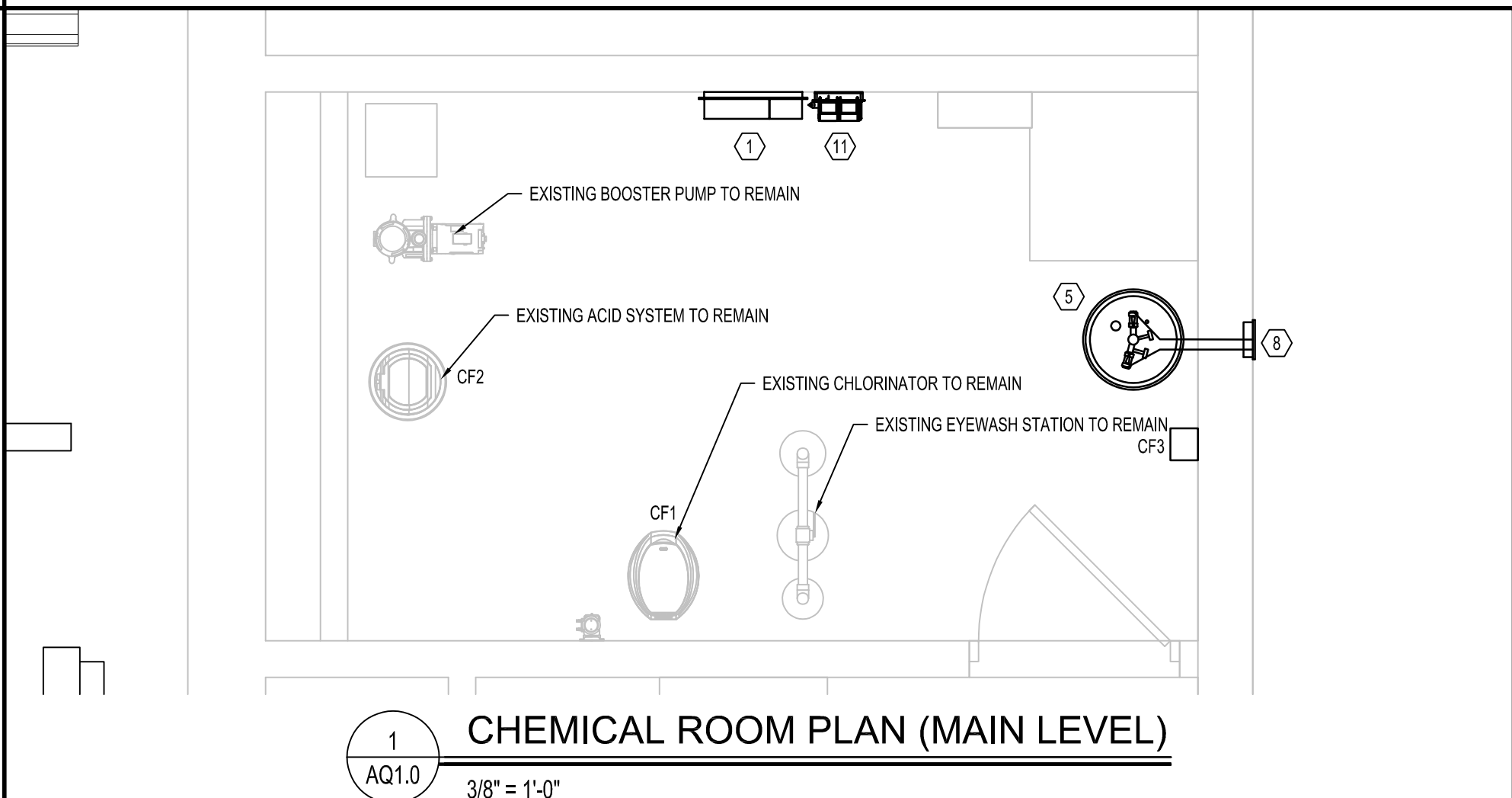
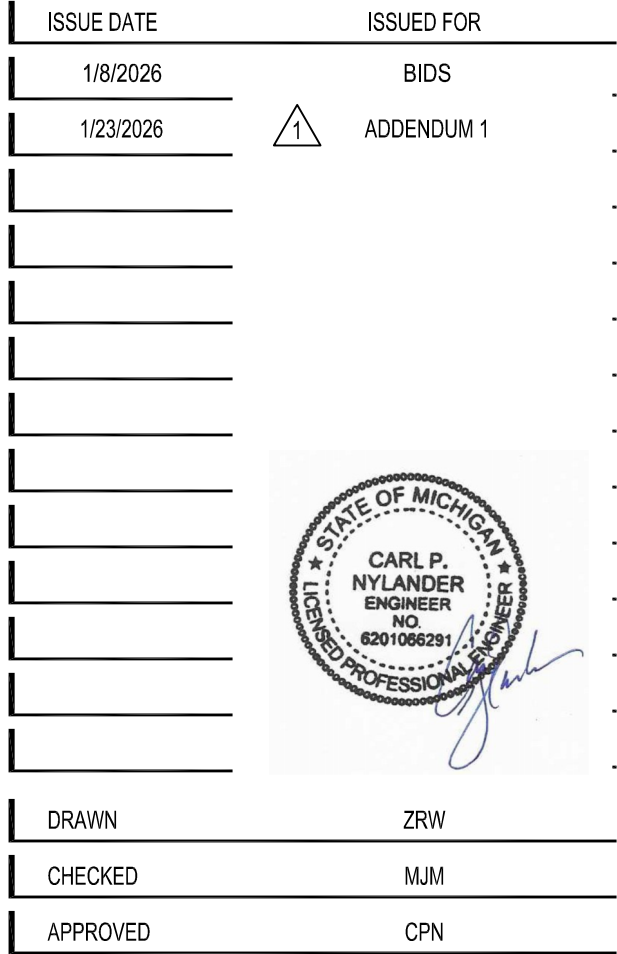
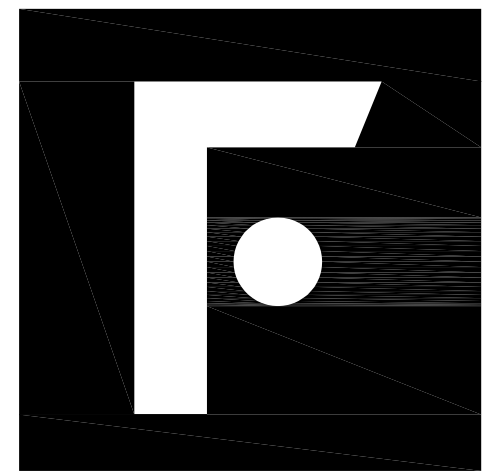
ID	DESCRIPTION	MANUFACTURER	MODEL	SIZE	GPM	TDH	HP	NPSHR	HAIR & LINT		NOTES
									MAKE	SIZE	
PP1	POOL RECIRCULATION PUMP 1 REFER: 1/AQ1.1	AURORA	3801	4"X5"X9.5	737	75	20	10.1	MER-MADE	10"X10"	1-6
PP2	POOL RECIRCULATION PUMP 2 REFER: 1/AQ1.1	AURORA	3801	4"X5"X9.5	737	75	20	10.1			1-6

NOTE:

1. THE MANUFACTURER INDICATED IS BASIS OF DESIGN. PUMP MANUFACTURERS: GRISWOLD, HERBORNOR OR PACO MUST BE CONSIDERED EQUAL PROVIDED THEY MEET SPECIFICATIONS AS INDICATED IN BID DOCUMENTS.
2. POOL PUMPS AND STRAINERS MUST BE INSTALLED ON HOUSEKEEPING PADS.
3. PROVIDE INFLUENT AND EFFLUENT GAUGES FOR EACH PUMP. PRESSURE GAUGES HAVE A RANGE OF 0-60 PSI. COMPOUND GAUGES HAVE A RANGE OF 0-30 HG / 0-60 PSI.
4. PROVIDE WITH 480 VOLT, 3 PHASE, 60HZ, 1750 RPM MOTOR.
5. PROVIDE WITH CHECK VALVE.
6. EXISTING VARIABLE FREQUENCY DRIVE TO REMAIN AND CONNECT TO NEW RECIRCULATION PUMP.

ELECTRONIC FLOCCULATION SYSTEM SCHEDULE								
ID	POOL	MANUFACTURER	MODEL	PIPE SIZE (NOMINAL)	INPUT VOLTAGE	POWER RATING (W)	POWER CABLE LENGTH (FT)	SIGNAL CABLE LENGTH (FT)
E1	COMPETITION	CLEAR-FLOW	CF-800C	8"	100-240 VAC	5.4	15	33
NOTE: REFER: I/AQ1.3								

PIPE SCHEDULE	
ID	DESCRIPTION
P1	10" FROM EXISTING POOL MAIN DRAINS TO SURGE TANK
P2	10" FROM P1 TO PP1 & PP2
P3	10" FROM EXISTING POOL SURGE TANK TO PP1 & PP2
P4	10" FROM EXISTING POOL GUTTER DROPOUTS TO SURGE TANK
P5	10" FROM EXISTING POOL GUTTER DROPOUTS TO SURGE TANK
P6	8" FROM PP1 & PP2 TO F1
P7	6" FROM P5 TO EXISTING POOL DRAIN PIPING
P8	8" FROM F1 TO EXISTING POOL INLETS
P9	6" FROM F1 TO BASIN



FRENCH

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PROJECT

Livonia Public Schools
Churchill High School
Pool Filtration Project

Livonia,
Michigan

SHEET

Unit Q
POOL MECHANICAL &
CHEMICAL ROOM
PLANS & SECTION

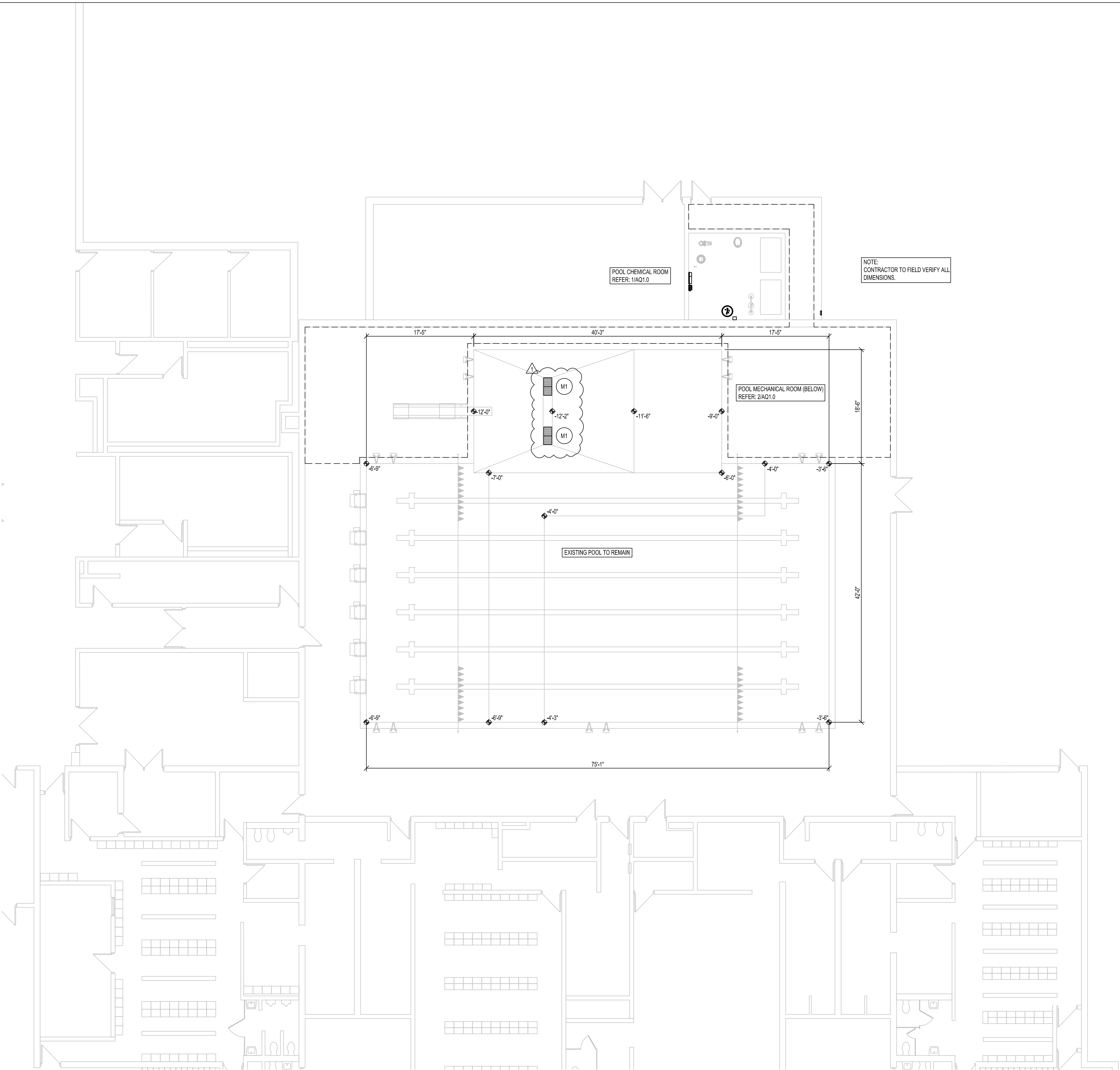
PROJECT NUMBER

2025-042.1

SHEET NUMBER

AQ1.0





1
AQ0.0
POOL REFERENCE PLAN
1/8" = 1'-0"

DESIGN DATA		
	UNITS	COMPETITION POOL
LENGTH	FT.	VARIES
WIDTH	FT.	VARIES
WATER SURFACE AREA	SQ. FT.	3,847
PERIMETER	FT.	268'-0"
VOLUME	GALLONS	186,000
RECIRCULATION SYSTEM		
POOL TURNOVER RATE	HOURS	6.0
RECIRCULATION RATE	GPM	517
SURGE CAPACITY	GALLONS	EXISTING TO REMAIN
SEWER CAPACITY	GPM	REFER TO PLUMBING
BATHER LOAD	PERSONS	234

MAIN DRAIN SCHEDULE							
ID	DESCRIPTION	SIZE	QTY	DESIGN FLOW (GPM)	DESIGN VELOCITY (FPS)	MFG ALLOWABLE FLOW @ COVER (GPM)	MODEL
M1	LAP POOL	12"X24"	2	517	.46	361	(4) WAV12WR101
NOTE: 1. EXISTING MAIN DRAIN SUMPS TO REMAIN. NEW GRATES MUST BE MANUFACTURED BY NEPTUNE BENSON, DALDORADO, AQUASTAR, PADDOCK OR APPROVED EQUAL. THE MANUFACTURER INDICATED IS THE BASIS OF DESIGN. CONTRACTOR TO VERIFY MANUFACTURER OF EXISTING GRATE. 2. MAXIMUM FACE VELOCITY MUST NOT EXCEED 1.0 FOOT PER SECOND. 3. OPEN AREA IS BASED ON MANUFACTURER'S DATA. 4. THE INSTALLED LIFE OF THE MAIN DRAIN COVER MUST BE A MINIMUM OF 10 YEARS. 5. FASTEN MAIN DRAIN COVER TO SUMP WITH SIS TAMPER PROOF FASTENERS AT A SPACING NO GREATER THAN 24" O.C. REFER TO SUMP AND GRATE MANUFACTURER'S INSTALLATION INSTRUCTIONS.							

- GENERAL POOL NOTES
- ◆ DENOTES WATER DEPTH FROM WATER LEVEL.
 - (ALTERNATE #1) POOL FINISH TO RECEIVE ACID WASHING AND REGROUT. REFER TO SPECIFICATION 131100.
 - ALL PROPRIETARY NAMES MENTIONED ARE TO DESIGNATE PERFORMANCE STANDARDS. EQUIVALENT PRODUCTS MUST BE SUBMITTED FOR APPROVAL.
 - ALL POOL REINFORCING STEEL, METAL FITTINGS, EQUIPMENT WITHIN 5'-0" OF POOL EDGE, AND ANY METAL PARTS OF POOL MECHANICAL EQUIPMENT IN CONTACT WITH THE POOL RECIRCULATION SYSTEM MUST BE BONDED PER NEC 680. REFER: 1/AQ1.2

CONTRACTOR SUPPLIED POOL CHEMICALS	
DESCRIPTION	AMOUNT
CO2	FULL BULK TANK(S) : 750 LBS

DRAWING INDEX	
SHEET	DESCRIPTION
AQ0.0	POOL REFERENCE PLAN
AQ0.1	POOL MECHANICAL & CHEMICAL ROOM DEMOLITION PLANS
AQ0.2	POOL MECHANICAL ROOM EXISTING CONDITIONS
AQ0.3	POOL CHEMICAL ROOM EXISTING CONDITIONS
AQ1.0	POOL MECHANICAL & CHEMICAL ROOM PLANS & SECTION
AQ1.1	POOL MECHANICAL DETAILS
AQ1.2	POOL MECHANICAL DETAILS
AQ1.3	POOL MECHANICAL DETAILS
AQ2.0	POOL SYSTEMS SCHEMATIC

POOL ALTERNATES

ALTERNATE #1 - ACID WASH THE INTERIOR POOL TILE AND RE-GROUT WITH MATERIAL COMPATIBLE WITH EXISTING FINISHES.

K

G

H

J

D

E

F

A

B

C

ISSUE DATE

1/8/2025

ISSUED FOR

BIDS

1/23/2026

ADDENDUM 1

DRAWN

ZRW

CHECKED

MJM

APPROVED

CPN

STATE OF MICHIGAN

CARL P. NYLANDER

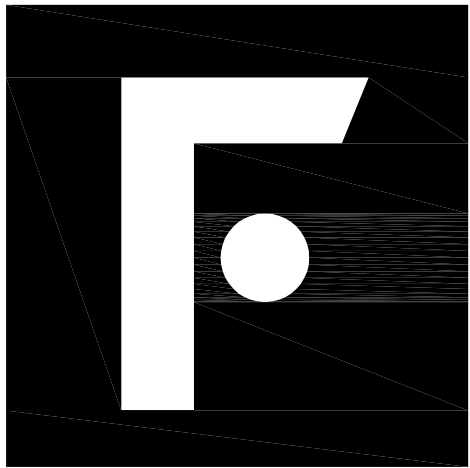
ENGINEER

NO. 650198029

PROFESSIONAL SEAL

1/8/2025

1/23/2026



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PROJECT
Livonia Public Schools
Franklin High School
Pool Filtration Project

Livonia,
Michigan

SHEET
Unit G
POOL REFERENCE
PLAN

PROJECT NUMBER
2025-042.2

SHEET NUMBER
AQ0.0



GENERAL POOL DEMOLITION AND RENOVATION NOTES

1.

COORDINATE ALL DEMOLITION PLANS AND WORK WITH ARCHITECT AND CONSTRUCTION DOCUMENTS PRIOR TO THE START OF DEMOLITION.

2.

REVIEW RECORD DOCUMENTS OF EXISTING CONSTRUCTION PROVIDED BY THE OWNER. NEITHER THE OWNER NOR ENGINEER MAKES ANY GUARANTEE THAT THE EXISTING CONDITIONS REFLECT THOSE INDICATED IN THE RECORD DOCUMENTS. CONTRACTOR TO PROVIDE NOTIFICATION OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH DEMOLITION.

3.

CONTRACTOR TO SURVEY EXISTING CONDITIONS AND CORRELATE WITH REQUIREMENTS INDICATED IN THE CONTRACT DOCUMENTS TO DETERMINE THE EXTENT OF DEMOLITION REQUIRED. CONTRACTOR TO RECORD EXISTING CONDITIONS WITH DETAILED PRECONSTRUCTION PHOTOGRAPHS.

4.

UNLESS OTHERWISE INDICATED, DEMOLITION WASTE BECOMES PROPERTY OF THE CONTRACTOR.

5.

EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE RECYCLED, REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNERS PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM. OWNER HAS THE FIRST RIGHT OF REFUSAL ON ALL DEMOLITION MATERIALS.

6.

IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB. IMMEDIATELY NOTIFY THE OWNER AND ENGINEER.

7.

INDICATE RECEIPT AND ACCEPTANCE OF ANY HAZARDOUS WASTES BY A LANDFILL FACILITY LICENSED TO ACCEPT SUCH HAZARDOUS WASTES.

8.

MAINTAIN EXISTING UTILITIES TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING DEMOLITION OPERATIONS. REFER TO OTHER TRADES FOR COORDINATION.

9.

ELECTRICIAN MUST VERIFY EXISTING BOND GRID. ALL NEW EMBEDS AND MECHANICAL EQUIPMENT MUST BE BONDED AND TIED TO EXISTING GRID PER NEC ARTICLE 680. REFER TO ELECTRICAL.

10.

PROTECT ALL EXISTING POOL FINISHES, GUTTERS, MAIN DRAINS, AND ANY OTHER POOL RELATED APPURTENANCES DURING CONSTRUCTION.

11.

THE CONTRACTOR MUST BE RESPONSIBLE FOR CONTINUOUSLY MONITORING GROUNDWATER LEVELS ON THE SITE DURING ANY AND ALL PERIODS WHEN THE SWIMMING POOL IS NOT FULL OF WATER. PROTECTION OF THE EXISTING POOL STRUCTURE FROM DAMAGE DUE TO HYDROSTATIC PRESSURE IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

12.

CONTRACTOR TO PROVIDE AND EXECUTE APPROVED DUST CONTROL PLAN.

13.

ALL AREAS OF WORK MUST HAVE DOUBLE CONTAINMENT AND DEDICATED EXHAUST INDEPENDENT OF HVAC.

14.

CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST, DIRT, AND DEBRIS FOLLOWING DEMOLITION OPERATIONS. CONTRACTOR TO RETURN ADJACENT AREAS TO CONDITION EXISTING BEFORE THE START OF DEMOLITION OPERATIONS.

POOL DEMOLITION KEYNOTES

COORDINATE ALL DEMOLITION PLANS WITH ARCHITECT AND CONSTRUCTION DOCUMENTS PRIOR TO DEMOLITION

D1

REMOVE EXISTING SAND FILTERS AND FACE PIPING.
REFER: 2/AQ0.2

D2

REMOVE EXISTING RECIRCULATION PUMPS, VFD, STRAINER AND HOUSEKEEPING PADS. REFER: 1/AQ0.2 & 3/AQ0.2

D3

REMOVE EXISTING FLOW METER SENSOR

D4

REMOVE EXISTING UV CHAMBER AND CABINET.
REFER: 4/AQ0.2

D5

REMOVE EXISTING CHEMICAL CONTROLLER.
REFER: 2/AQ0.3

D6

REMOVE TWO EXISTING FISHER VALVES.
REFER: 5 & 6/AQ0.2

D7

REMOVE EXISTING FLOAT VALVE IN SURGE TANK.

D8

REMOVE MECHANICAL ROOM PIPING, VALVES, HANGERS AND SUPPORTS.

D9

REMOVE EXISTING PERISTALTIC FEED PUMP AND ANY ASSOCIATED PIPING.

D10

REMOVE TWO (2) EXISTING VGB COVERS AT EACH OF TWO (2) MAIN DRAIN SUMPS (FOUR COVERS TOTAL).

K

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ISSUE DATE

1/8/2025

ISSUED FOR

BIDS

1/23/2026

ADDENDUM 1

DRAWN

ZRW

CHECKED

MJM

APPROVED

CPN

STATE OF MICHIGAN

CARL P. NYLANDER

ENGINEER

NO. 030108029

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PROJECT

Livonia Public Schools
Franklin High School
Pool Filtration Project

Livonia,
Michigan

SHEET

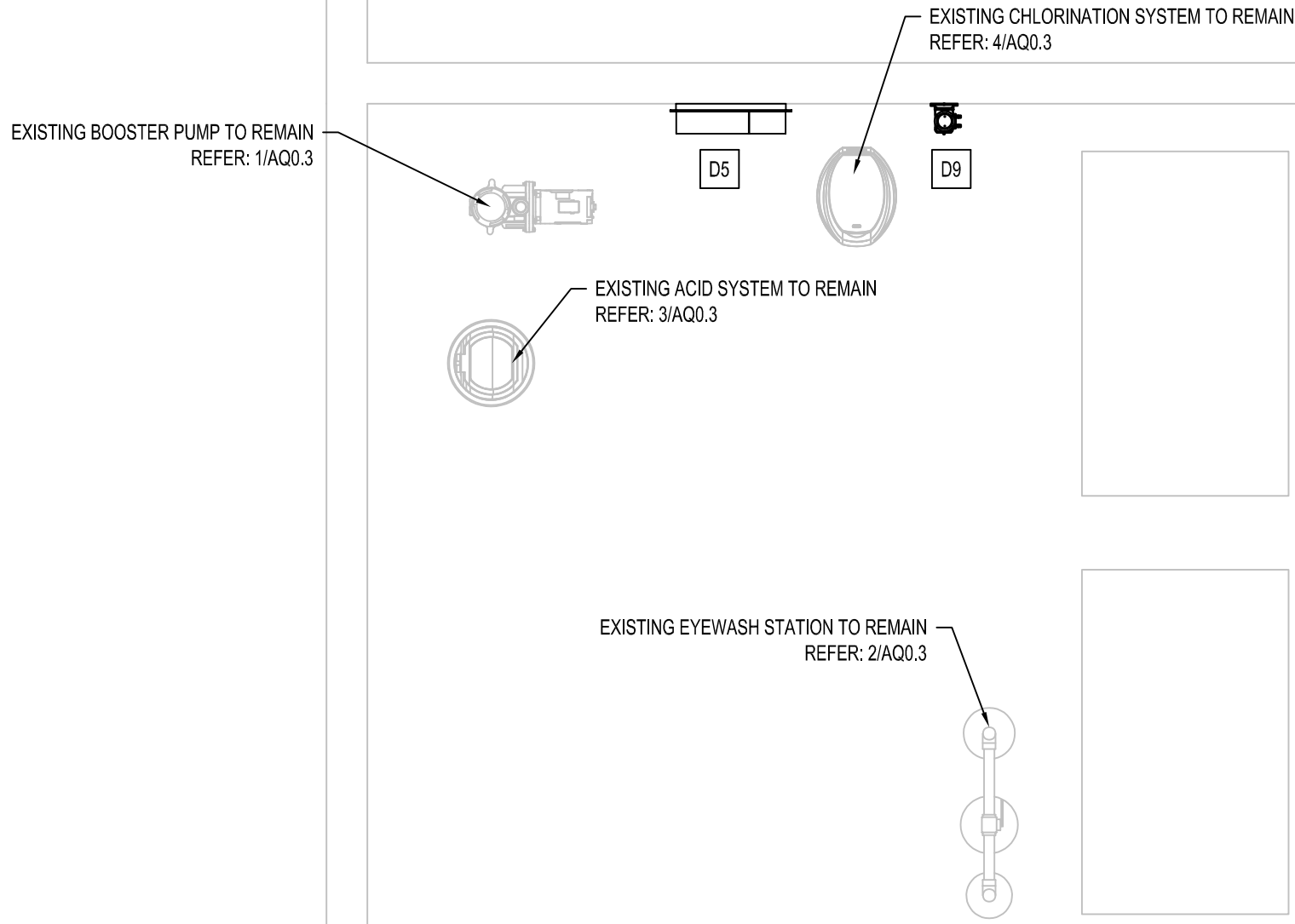
Unit Q
POOL MECHANICAL
& CHEMICAL ROOM
DEMOLITION PLANS

PROJECT NUMBER

2025-042.2

SHEET NUMBER

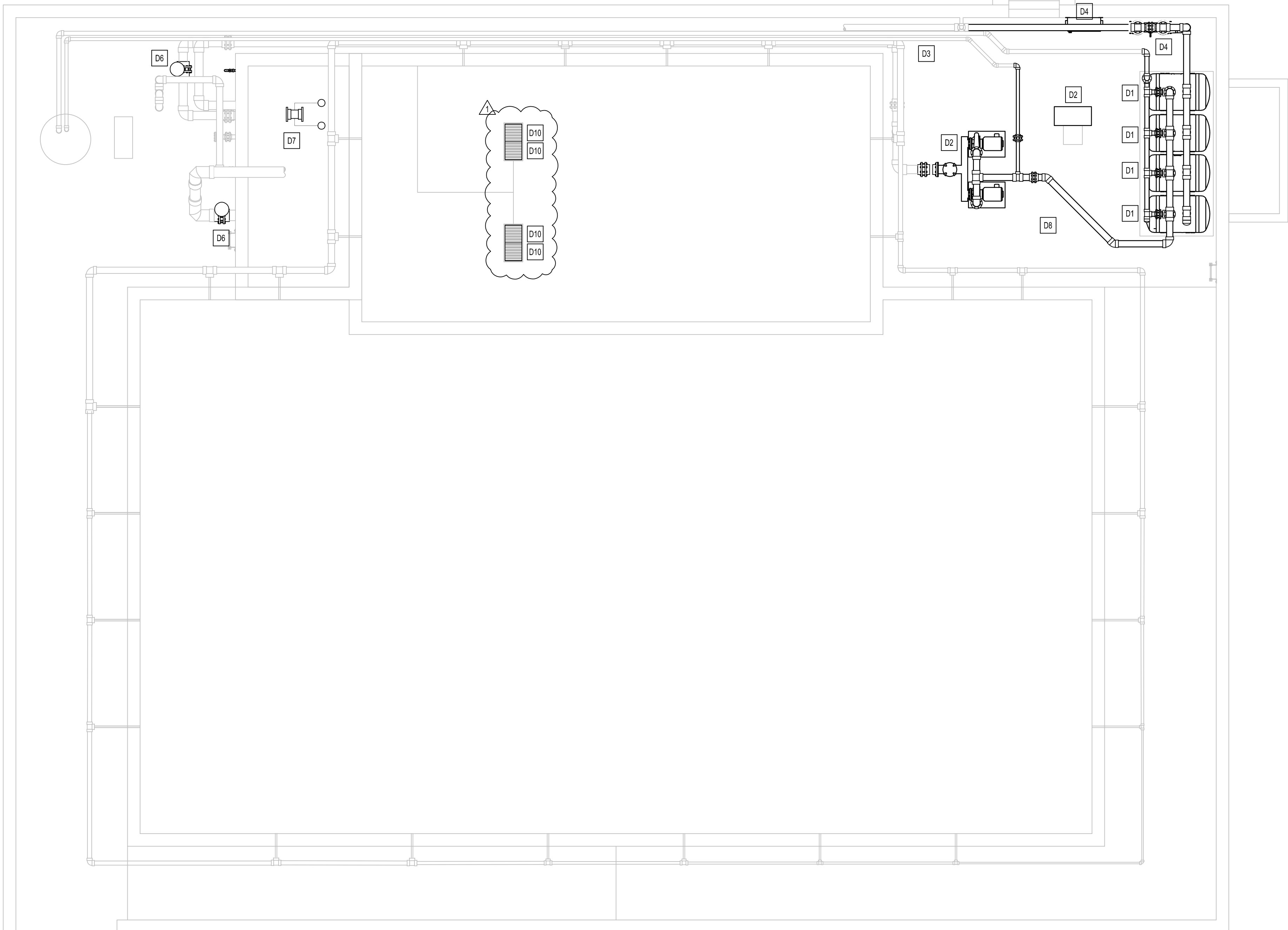
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POOL CHEMICAL ROOM DEMOLITION PLAN (MAIN FLOOR)

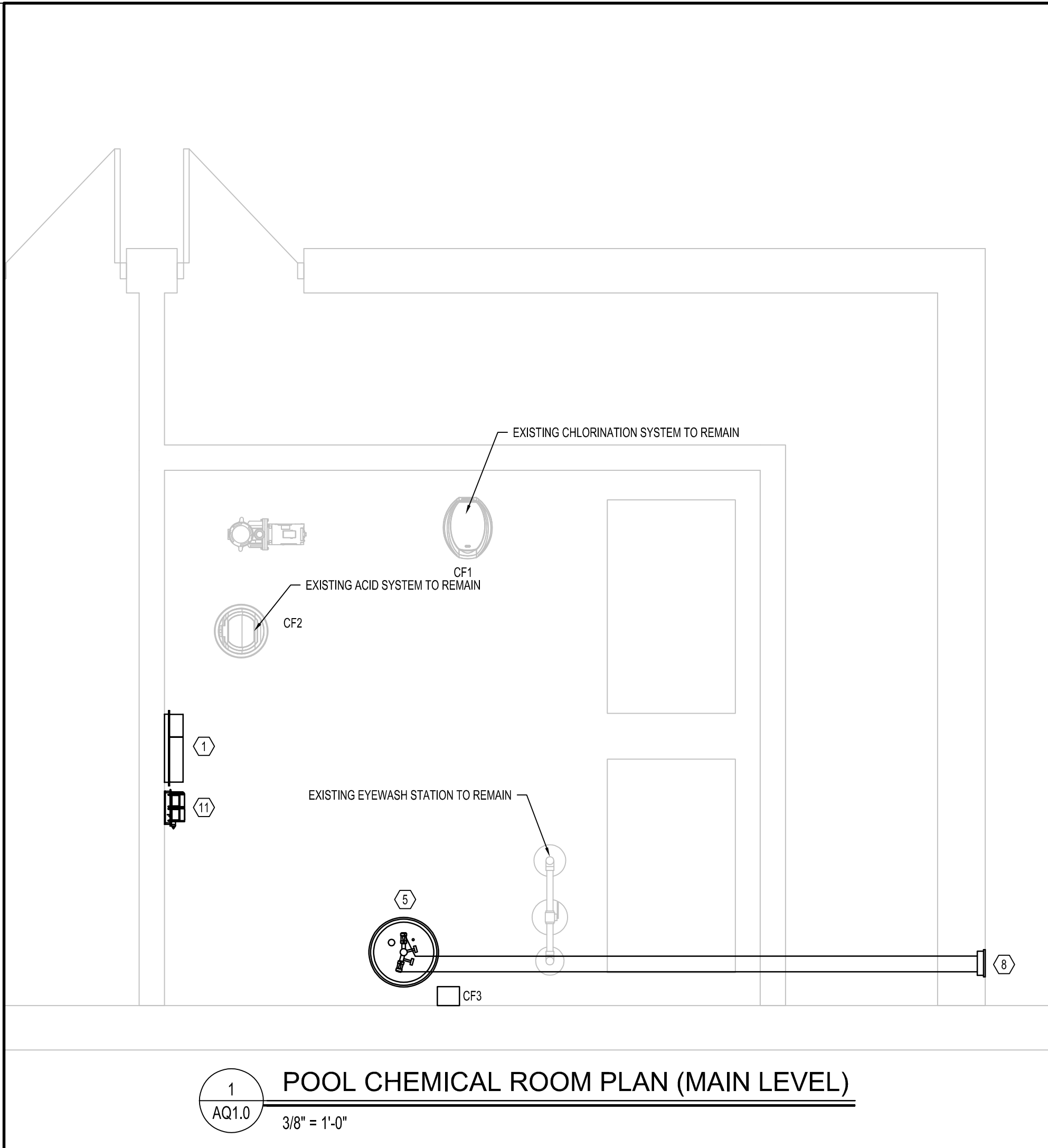


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AQ0.1

POOL MECHANICAL ROOM DEMOLITION PLAN (LEVEL BELOW)

3/16" = 1'-0"



CHEMICAL FEED SCHEDULE						
ID	DESCRIPTION	MANUFACTURER	MODEL	HP	FLOW	NOTES
CF1	EXISTING POOL CHLORINATION BOOSTER PUMP TO REMAIN	PULSAR	PRECISION	1	189 LBS/DAY	4
CF2	EXISTING POOL ACID FEED PUMP TO REMAIN	PULSAR	ACID PLUS		60 LBS/DAY	4
CF3	EXISTING POOL CO2 FEED REFER: 3/AQ1.1	PROMINENT	CO2-200	N/A	20-200 SCFH	1-3
NOTE: 1. THE MANUFACTURER INDICATED IS BASIS OF DESIGN. ALTERNATE MANUFACTURER: PROMINENT, BECS, EKO3 OR APPROVED EQUAL. 2. PROVIDE WITH 120 VOLT, SINGLE PHASE, ADJUSTABLE FEED. 3. INTERLOCK WITH POOL RECIRCULATION PUMP. 4. PROVIDE WITH AN ADDITIONAL 1 HP WHISPERFLO FEED PUMP TO MATCH EXISTING FOR ATTIC STOCK.						

UV TREATMENT SYSTEMS SCHEDULE						
ID	POOL	MODEL NUMBER	CALCULATED 60 MU/CM2 (GPM)	LAMPS	POWER (KW)	VOLTAGE (V) WITH BREAKER SIZE (50 OR 60 HZ)
U1	COMPETITION	WF-125-6-N	616	1 @ 2.9KW	2.5	240 V (1Ø)-30A
NOTE: 1. THE BASIS OF DESIGN MANUFACTURER IS EVOQUA TECHNOLOGIES LTD. ALTERNATE MANUFACTURER: PROMINENT, AQUIONICS OR APPROVED EQUAL. 2. INTERLOCK UV SYSTEM WITH CHEMICAL CONTROLLER OR RECIRCULATION PUMP. 3. REFER: 8/AQ1.1						

EQUIPMENT SCHEDULE					
ID	ITEM	ID	ITEM		
1	CHEMICAL CONTROLLER REFER: 2/AQ1.1	6	8" FLOAT VALVE REFER: 12/AQ1.2	11	TOTAL ALKALINITY PANEL REFER: 10/AQ1.2
2	FLOW METER SENSOR REFER: 8/AQ1.1	7	ELECTRICALLY ACTUATED VALVE REFER: 8/AQ1.2	12	CHEMICAL INJECTION REFER: 7/AQ1.1
3	IMPACT FLOW METER REFER: 9/AQ1.1	8	CO2 FILLBOX REFER: 5/AQ1.1	13	VARIABLE FREQUENCY DRIVE, BYPASS & CMS
4	HARD PIPE TO DRAIN	9	HEATER TEES REFER: 9/AQ1.2		
5	CO2 TANK REFER: 3/AQ1.1	10	WATER LEVEL CONTROLLER REFER: 11/AQ1.1		

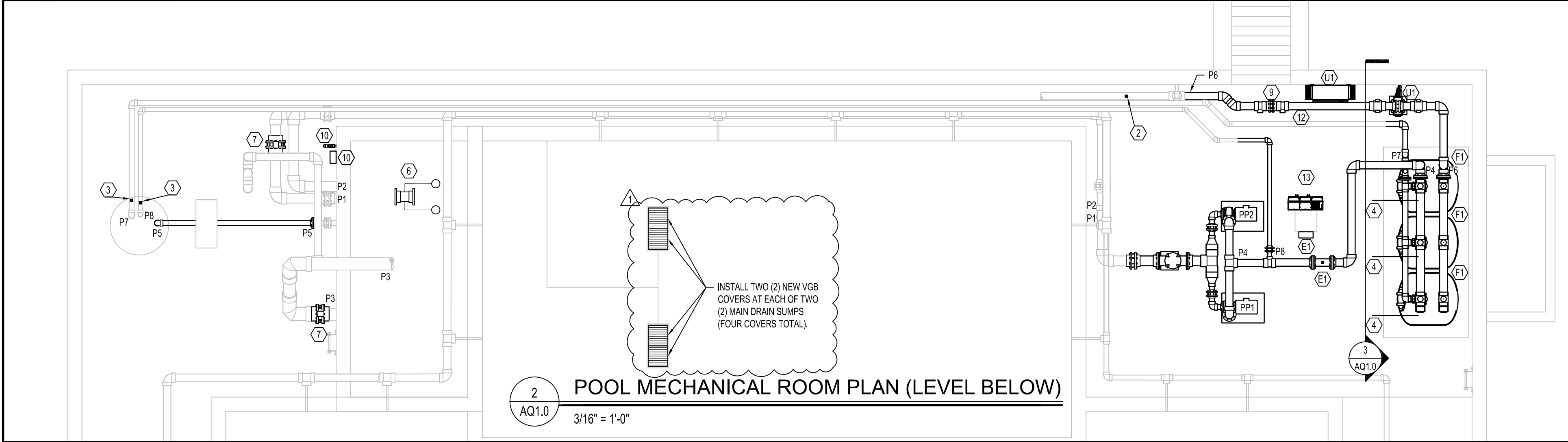
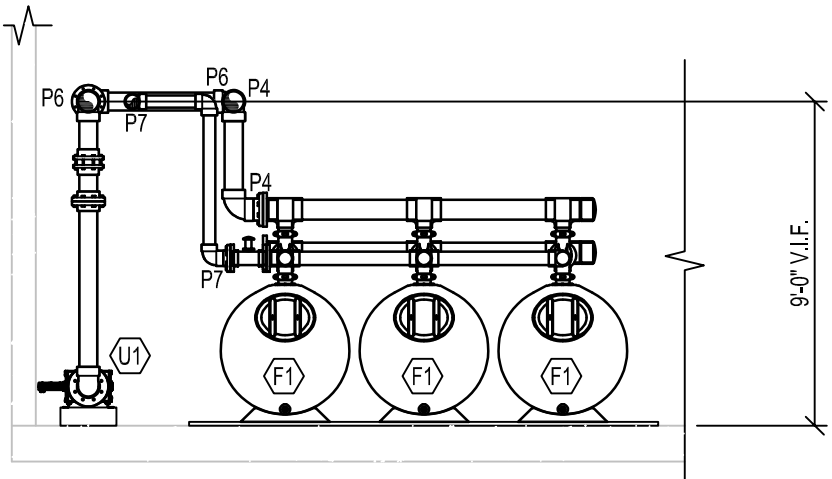
GENERAL POOL MECHANICAL ROOM NOTES	
1. THE FOLLOWING INFORMATION SHALL BE LAMINATED AND POSTED IN THE POOL MECHANICAL ROOM: BACKWASH PROCEDURE, POOL FILLING & DRAINING, VALVE REFERENCE CHART, POOL MECHANICAL ROOM PLAN, POOL PIPING SCHEMATICS & POOL SYSTEMS SCHEMATICS.	
PIPING	
1. MINIMUM 7'-0" CLEARANCE BENEATH ALL OVERHEAD PIPING.	
2. PROVIDE AND SUPPORT OVERHEAD AND VERTICAL PIPING PER SPECIFICATION REQUIREMENTS.	
3. LABEL AND IDENTIFY ALL PIPING IN COMPLIANCE WITH THE SPECIFICATIONS.	
4. ALL FLOW METERS SHALL BE SIZED TO MATCH THE PIPE ON WHICH IT IS INSTALLED. PROVIDE PRESSURE GAUGES ON INFLUENT AND EFFLUENT SIDE OF EACH FILTRATION SYSTEM AND A FULL LINE SIZE FLOW METER ON FILTER RETURN.	
5. HYDROSTATICALLY TEST ALL PIPING AT 50 PSI FOR TWO HOURS AND MAINTAIN A PRESSURE OF 20 PSI IN ALL PIPING THROUGHOUT CONSTRUCTION. SECURE ALL FIXTURES PER SPECIFICATION REQUIREMENTS BEFORE HYDROSTATIC TEST.	
6. REFER TO DETAILS 2-7/AQ1.2 FOR INSTALLATION OF PIPE SUPPORTS.	
7. ALL VALVE HARDWARE MUST BE 316L STAINLESS STEEL AND MEET ANSI HARDWARE INSTALLATION GUIDELINES. REFER: 10/AQ1.1	
CHEMICAL TREATMENT	
1. CHEMICAL FEED REQUIREMENTS - REFER TO THE POOL SYSTEMS SCHEMATIC(S) ON AQ2.0.	
2. INTERLOCK POOL RECIRCULATION PUMP(S) WITH ITS CORRESPONDING WATER CHEMISTRY CONTROLLER, CHEMICAL FEED PUMP(S), AND HEATER(S).	
3. PROVIDE SIGNAGE ON CHEMICAL ROOM DOORS IN COMPLIANCE WITH THE STATE FIRE CODE. REFER: 11/AQ1.2	
4. SECURE CHEMICAL METERING PUMP FEED LINES TO WALL AND/OR OVERHEAD WITH CLIPS OR DEVICES THAT DO NOT CRIMP, DISTORT OR ALLOW HIGH AND LOW AREAS IN TUBING RUNS. PROVIDE CHECK VALVE AND SHUT-OFF VALVE BEFORE LINES ENTER POOL RETURN PIPING.	
5. WATER CHEMISTRY CONTROLLERS SHALL CONTROL THE SANITIZING SYSTEM AND PH CONTROL SYSTEM AND SHUT THEM DOWN UPON LOSS OF SAMPLE STREAM FLOW.	
6. THE CHEMICAL CONTROL SYSTEM BYPASS LINE SHALL SAMPLE WATER AFTER THE FILTERS AND BEFORE THE HEATER BYPASS LINE.	
7. VERIFY REMOTE ACCESS CAPABILITY TO ALL CHEMICAL CONTROLLERS. REFER TO ELECTRICAL.	
8. INSTALL SANITIZER INJECTION POINT DOWNSTREAM OF PH BUFFER INJECTION POINT ON FILTERED WATER RETURN PIPE. CHEMICAL INJECTION POINTS SHALL BE LOCATED DOWNSTREAM OF ALL OTHER EQUIPMENT/SYSTEMS IN THE POOL MECHANICAL ROOM AT A MAXIMUM HEIGHT OF 7'-0" ABOVE FINISHED FLOOR. REFER: 7/AQ1.1	
ELECTRICAL	
1. GFCI'S PROVIDED AT OUTLETS. REFER TO ELECTRICAL.	
2. POOL EQUIPMENT ROOM AND CHEMICAL STORAGE AREAS SHALL BE PROVIDED WITH ARTIFICIAL LIGHTING SUFFICIENT TO ILLUMINATE ALL EQUIPMENT AND SUPPLIES. REFER TO ELECTRICAL.	
3. CONDUIT SHALL BE ROUTED OVERHEAD OR BELOW GRADE.	

FILTER SCHEDULE											
ID	POOL	MANUFACTURER	FILTER MODEL	QTY.	FILTRATION TYPE	MAXIMUM FILTRATION RATE (GPM/SQ. FT.)	REQUIRED FILTRATION AREA (SQ. FT.)	DESIGN FILTRATION RATE (GPM/SQ.FT.)	DESIGN FILTRATION AREA (SQ. FT.)	FILTER BACKWASH RATE (GPM/SQ. FT.)	BACKWASH FLOW RATE PER FILTER (GPM)
F1	COMPETITION	STARK	S1-48	3	HIGH RATE PRESSURE	13.5	38.3	13.5	38.4	15.7	201
NOTE: 1. BACKWASH METHOD MUST BE MANUAL. 2. ALL FILTER SUPPORTS MUST BE SEISMICALLY RATED FOR THE SEISMIC ZONE IN WHICH IT IS INSTALLED IN ACCORDANCE WITH LOCAL AND/OR STATE REQUIREMENTS. 3. FILTER MANUFACTURER MUST CERTIFY FILTER MEDIA. 4. VALVES MUST BE PROVIDED TO BACKWASH EACH FILTER VESSEL INDEPENDENTLY. 5. THE BACKWASH PIPING MUST TERMINATE NO CLOSER THAN 8" ABOVE THE FLOOD RIM OF THE BACKWASH CATCH BASIN OR TWICE THE PIPE DIAMETER, WHICHEVER IS GREATER. 6. FILTER TANK ASSEMBLIES MUST BEAR THE NATIONAL SANITATION FOUNDATION SEAL OF APPROVAL FOR A MAXIMUM FLOW RATE 20 GPM PER SQUARE FOOT OF FILTER MEDIA. 7. THE BACKWASH THROTTLING VALVE(S) HANDLE MUST BE REMOVED AND TURNED OVER TO THE OWNER ONCE THE BACKWASH FLOW RATE(S) HAVE BEEN TESTED, ADJUSTED AND BALANCED. 8. PROVIDE 1" DIAMETER, SCHEDULE 80 PIPE FROM THE AUTOMATIC AIR VENT ON EACH OF THE FILTER VESSEL TO THE NEAREST FLOOR DRAIN OR BACKWASH CATCH BASIN. THE VENT PIPE MUST BE SLOPED TO THE DRAIN. 9. VESSEL MUST BE BACKWASHED AT NO LESS THAN 15.0 GPM/SF.											

PUMP SCHEDULE											
ID	DESCRIPTION	MANUFACTURER	MODEL	SIZE	GPM	TDH	HP	NPSHR	HAIR & LINT		NOTES
									MAKE	SIZE	
PP1	POOL RECIRCULATION PUMP 1 REFER: 1/AQ1.1	AURORA	3801	3"X4"X9.5	517	75	20	7.34	MER-MADE	8"X8"	1-6
PP2	POOL RECIRCULATION PUMP 2 REFER: 1/AQ1.1	AURORA	3801	3"X4"X9.5	517	75	20	7.34			1-6
NOTE: 1. THE MANUFACTURER INDICATED IS BASIS OF DESIGN. PUMP MANUFACTURERS: GRISWOLD, HERBORNER, OR PACO MUST BE CONSIDERED EQUAL PROVIDED THEY MEET SPECIFICATIONS AS INDICATED IN BID DOCUMENTS. 2. POOL PUMPS AND STRAINERS MUST BE INSTALLED ON HOUSEKEEPING PADS. 3. PROVIDE INFLUENT AND EFFLUENT GAUGES FOR EACH PUMP. PRESSURE GAUGES HAVE A RANGE OF 0-60 PSI. COMPOUND GAUGES HAVE A RANGE OF 0-30 HG / 0-60 PSI. 4. PROVIDE WITH 460 VOLT, 3 PHASE, 60HZ, 1750 RPM MOTOR. 5. PROVIDE WITH CHECK VALVE. 6. PROVIDE VARIABLE FREQUENCY DRIVE, BYPASS AND CONTACT MOTOR SELECTOR.											

ELECTRONIC FLOCCULATION SYSTEM SCHEDULE							
ID	POOL	MANUFACTURER	MODEL	PIPE SIZE (NOMINAL)	INPUT VOLTAGE	POWER RATING (W)	SIGNAL CABLE LENGTH (FT)
E1	COMPETITION	CLEAR-FLOW	CF-800C	8"	100-240 VAC	5.4	15
NOTE: REFER: 1/AQ1.3							

PIPE SCHEDULE	
ID	DESCRIPTION
P1	8" FROM EXISTING POOL MAIN DRAINS TO PP1 & PP2
P2	8" FROM EXISTING POOL SURGE TANK TO PP1 & PP2
P3	10" FROM EXISTING POOL DROPOUTS TO SURGE TANK
P4	6" FROM PP1 & PP2 TO F1
P5	4" FROM EXISTING BASIN FLANGE TO DRAIN PIT
P6	6" FROM F1 TO EXISTING POOL INLETS
P7	4" FROM F1 TO BASIN
P8	3" FROM P4 TO BASIN



3
AQ1.0
3/16" = 1'-0"

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ISSUE DATE

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1/23/2026

ADDENDUM 1

CARL P. NYLANDER

ENGINEER

NO. 65019603

PROFESSIONAL SEAL

DRAWN

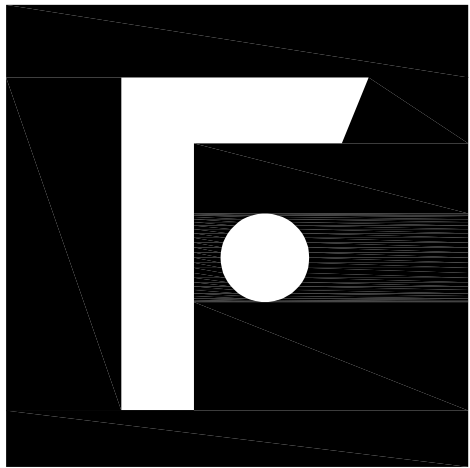
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PROJECT
Livonia Public Schools
Franklin High School
Pool Filtration Project

Livonia,
Michigan

SHEET
Unit Q
POOL MECHANICAL
& CHEMICAL ROOM
PLANS & SECTION

PROJECT NUMBER
2025-042.2

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AQ1.0

