ADDENDUM NO. 1

December 14, 2023

Jeffersonville High School Natatorium
2315 Allison Ln
Jeffersonville, IN 47130

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications, and the Drawings dated November 20, 2023, by Fanning Howey Associates. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Page ADD 1-1 and attached Fanning Howey Associates Addendum No. 1, dated December 14, 2023, consisting of 1 page and added Specification Section 13 15 00 Competition Swimming Pool, Therapy Pool and Equipment.

A D D E N D U M N O. 1

Jeffersonville High School Natatorium

Greater Clark County Schools
Jeffersonville, Indiana

Project No. 222038.00

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Addendum No. 1, 1 item, 1 page
New Project Manual Section: 13 15 00 – Competition Swimming Pool, Therapy Pool and Equipment

Date: December 14, 2023

I hereby certify that this Addendum was prepared by me or under my direct supervision and that I am a duly registered Architect/Engineer under the Laws of the State of Indiana.

FANNING/HOWEY ASSOCIATES, INC.
ARCHITECTS/ENGINEERS/CONSULTANTS

Paul A. Miller, License No. AR10800161
Expiration Date: 12/31/2023

TO: ALL BIDDERS OF RECORD

ADDENDUM NO. to Drawings and Project Manual, dated November 20, 203, for Jeffersonville High School Natatorium for Greater Clark County Schools, 2112 Utica-Sellersburg Road, Jeffersonville, Indiana 47130; as prepared by Fanning/Howey Associates, Inc., Indianapolis, Indiana.
This Addendum shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified in this Addendum.

Each bidder shall acknowledge receipt of this Addendum in his proposal or bid.

NOTE: Bidders are responsible for becoming familiar with every item of this Addendum. (This includes miscellaneous items at the very end of this Addendum.)

RE: ALL BIDDERS

ITEM NO. 1. NEW PROJECT MANUAL SECTION

A. New Project Manual Section 13 15 00 – Competition Swimming Pool, Therapy Pool and Equipment is included with and hereby made a part of this Addendum.

SECTION 13 15 00 - JEFFERSONVILLE HIGH SCHOOL 120823
COMPETITION SWIMMING POOL WITH THERAPY POOL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Related Sections/Divisions as applicable and stated below are for reference only. Specifications as stated herein take precedence over the following:

1. Section 02 00 00 - Backfill
2. Section 03 10 00 – Concrete Forming
3. Section 03 20 00 - Concrete Reinforcing
4. Section 03 30 00 - Cast-In-Place Concrete: Concrete systems.
5. Section 04 20 00 - Unit Masonry Assemblies: Cavity wall construction.
6. Division 05 Metals - Structural steel, metal deck, cold-formed metal framing.
7. Division 07 - Thermal and Moisture Protection
8. Section 09 30 00 - Tiling: Wall tile and misc. tile in pool areas
9. Division 13 15 60 - Scoreboard.
10. Division 22 Plumbing: Fixtures and piping, as applicable.
11. Division 23 Heating, Ventilating and Air Conditioning: Mechanical systems.
12. Division 23 09 04 - Direct Digital Control for HVAC
13. Division 26 Electrical: Electrical systems and components
14. Section 26 05 53 Identification for Electrical Systems: Engraved Nameplates
15. Section 26 28 13 - Fuses

1.02 DESCRIPTION OF WORK

A. This section of the specifications is intended to furnish and install complete Swimming Pool Construction, Decks and equipment, installation and service as specified herein but not limited to the following:

1. Furnish all labor, material and related to construct a +50 Meter X 25 yard Competition Pool with Diving, (2) Two bulkheads, (2) One Meter Diving stands with boards, (1) Three Meter Stand and board, starting platforms, Therapy Pool and chemical feed equipment for a complete turn key Project.
2. Concrete Pool deck with all tile finish sloped to drains with no puddling to occur.
3. Deck drains and related piping
4. Deck signage
5. Ramp with rails
6. Pump pit rails with stairs
7. Filter Systems
8. Sanitary connections
9. Filtration and chemical feed equipment and controls
10. UV Systems
11. Backwash/Deck drain sump
12 Underdrain line with manhole
13. Balance tank overflow and waterproofing

1.03 INSTRUCTIONS TO BIDDERS:

A. The bidding pool contractor is expected to bid on specific products and manufacturers methods as stated herein.

B. TEC Specialty Construction Brand Tile product or accepted equal as evidenced in their System warranty and specifically in accordance with their technical specifications and installation manual is the preferred manufacturer of all tile setting and or grout materials.

C. The Owner/Architect reserves the right to reject any Pool Contractor's request to bid if the evidence submitted by, or investigation of, such Contractor fails to satisfy the Owner/Architect or Designated representative in that such Contractor is acceptable and properly qualified to carry out the obligation of the contract and to complete the work described or if the Contractor does not meet the sum or in part the qualifications or documents as stated herein.

D. The method of water recirculation, concrete gutter, specified and shown on detailed drawings is intended as the basis for receiving bids. Alternate gutter to be bid in accordance with the specifications as stated in another section.

1.04 SUBSTITUTIONS:

A. A detailed investigation has been made before selecting the specified swimming pool, recirculation, filtration and other special pool equipment. If any contractor wishes to submit a substitute swimming pool, recirculation system, filter and/or pool deck equipment he shall submit a formal request in writing prior to bidding with any information related to or layouts required which may be different than what is shown on the bid documents.

B. If a voluntary alternate is offered as an owner's option must be proven design in service for more than two (2) years. After bidding no alternates will be entertained unless requested by the owner or his representative.

1.05 SUMMARY OF WORK INCLUDED IN THIS SECTION

A. This section by Pool Contractor includes the construction of the pool but not limited to:

1. All pool related documents, permits, plans and fees including but not limited to bidding “pool” contractor for submission of all Architects/Engineers plans and project specifications as well as any subsequent changes to the State and County for Construction Permits, Plumbing and or Electrical permits.
2. Site access as described in the front of the documents.
3. Layout pools with benchmark and exact location of finished pool wall supplied by the owners Engineer.
4. Pool excavation, filter fabric, underdrain, underdrain manhole with portable pump, underdrain manhole slab with door and gravel base. Dewater and/or provide subsurface drainage for all work related to the installation of the pool. Keep all areas dry as necessary and free from water.
5. Furnish and install all required bracing, shoring and forms for pool construction. Remove and replace as necessary beyond the limits of pool excavation. Shore building as necessary to facilitate pool construction and installation.
6. Furnish and install reinforcing steel.
7. Construct monolithic pool structure.
8. Pool Excavation material to be hauled off site. After installation of structural shell and related piping the pool contractor shall backfill to bottom of deck as required.
9. Furnish and install the entire recirculating system complete with pipe seals, sleeves, anchorage, supports and pipe hangars. Backfill all piping with granular fill as specified. Pressure test.
10. Furnish and Install ceramic tile racing lanes, end wall targets, trim, depth markers, signage, graphics, markers and other markers as shown on the drawings.
11. Apply interior tile finish on pool and limits of deck as indicated. Deck Tile.

12. Furnish and install filter equipment, electrical control panel, housekeeping pads, pumps with gauges, pump pads and pool mechanical system, heating equipment with bypass and thermometers and immersion wells as specified herein.
13. Furnish recirculation piping sleeves. All sleeves penetrating the balance tank shall be plastic with no leak flanges and link seal. Balance tank drain, overflow and Waterproofing.
14. Furnish and install concrete and tile deck and all deck equipment, cleaning equipment and accessories. Dive stands and diving boards. Dive sprays.
15. Furnish and install in wall anchors and all equipment listed or shown on the drawings.
16. Furnish and install the specified pool sanitizing equipment and controller with drive signal, UV Systems and UV controls, acid feed systems with tanks, chlorine systems, spill containers etc., as specified herein.
17. Furnish and install pool deck equipment and accessory equipment shown and/or specified. All anchorage's contained within the pool deck shall be furnished and installed by the Pool Contractor.
19. Overflow pipes, gutter to waste, underdrain piping, air vent through balance tank with vent fan by pool contractor.
20. Aluminum access hatch for balance tank and ladder rungs for balance tank.
21. Furnish and install slotted deck drain connected into and including drain line below connected into the deck drain sump in the pool equipment room. Deck drain and floor drain sump pumps. Eyewash with mixing valve and shower.
22. Furnish and install bulkheads
23. Furnish and install Therapy Pool with ramp and rails
24. Provide instruction manuals, as-builts, warning signs and labels.
25. Provide start-up chemicals and supervision upon project's completion and instruct.

1.06 SUMMARY OF RELATED WORK:

A. By other related trades as described in a previous section but not limited to:

1. Site access.
2. Demolition and Stripping pool area below finish floor, grading, backfilling, site dewatering or any other area preparation required prior to the start of pool construction. Rerouting of underground utilities if required.
3. Grade and location of pool. Temporary utilities.
4. Construction and backfill of all foundations, piping and HVAC inside the building and the pool area, the equipment room with ventilation, deck drain/overflow sump, backwash sump with discharge to public sewer, storm sewer line into underdrain manhole.
5. Filter room with concrete balance tank with rungs, cover, opening for access door.
6. All electrical power, hookups, control wiring including:

    a. Bonding and grounding as indicated but not limited to anchors, reinforcing steel, deck equipment, rails, ladders, starting platforms, diving equipment.
    b. Electrical hookups for disconnect, GFI'S, starters, timers, relays and electrical controls with panel with inter-connecting wiring and control wiring.
    c. Junction boxes and hookups of controls for pumps.
    d. Controls for pumps furnished by Division 13, wired, connected and hooked up with remote controls by Division 26 Contractor.
    e. Electrical plugs and all timing system related junction boxes, sleeves, conduit and power around pool area.
    f. Dedicated 110 for chemical controller
    g. Hookups of all chemical feed equipment
    h. Estops in pool area
    i. Plugs in natatorium and equipment area.
    j. Power and GFI's
    k. Emergency phone

l. Plug for underdrain pump

7. Underdrain manhole with pool lead, storm sewer lead, pumps and controls.
8. Building Concrete wall/footing contractor shall set all necessary sleeves, openings or other penetrations in equipment room as required for pool construction work.
9. All piping and valves to and from the pool equipment room for influent and effluent piping for HVAC equipment and controls. HVAC pump, piping, valves and controls. Setting of sleeves. Filter room ventilation.
10. Source tempered water with pump, heat exchangers, valves, gauges, thermometers and controls for pools exchangers.
11. All general construction work not called for in the specifications in this section.
12. Backwash sump with sanitary line to public sewer, overflow sump, vents, hose bibs around pool area. Equipment room floor drains with piping. Balance tank vent thru roof.
13. Fresh water to pool equipment, valved. Hot and cold water for Eyewash mixing valve, Recessed hose bibs in pool area. Drinking fountain with drain in pool area.

1.07 QUALITY OF MATERIALS

A. Special attention is directed to the materials, products and equipment described in these specifications. They establish a standard of required bidding, function, dimension, appearance and quality. Where only one manufacturer's name is mentioned for a particular item of equipment or material, the Pool Contractor's base bid shall be on that item. Whenever the words "or equal", "or approved equal", or "equal as approved" appear in the specifications, they shall be interpreted to mean material or an item of equipment equal in quality to that named. The burden of proof of equality or service shall be on the supplying contractor.

B. Proof of inequality is not implied by the specifications and is not a burden of the Owner or his representative. If the Pool Contractor submits a substitution of an "equal" basis, he shall assume all risks involved should the Architect find it not acceptable. The Pool Contractor shall assume all costs for changes in drawings and specifications affected by the substitution, and the cost of the increase, if any including adjoining work.

C. Where references are made to Federal Specifications, American Society for Testing and Material, American Standards Association, American Institute of Steel Construction, Steel Institute, and similar associations, organizations and standards, it shall be construed to mean their current specifications and designations as amended as of the date of the opening.

1. Concrete
   a. Tests shall measure slump, air and compressive strength as measured by a testing lab.
   b. Compressive strength shall provide for 50 cubic yards or some fraction thereof for each day the concrete is poured.
   c. Comply with section ACI-318, Sub 4.3 with samples ASTM C172, cylinders ASTM C31 and tested ASTM 39. Moist cure for 5 days @ 70 degrees.
   d. Slump and air shall be on site and comply with concrete section as contained in this section and concrete section. Slump Tests shall be made in accordance with ASTM C143. Air shall be in accordance with ASTM C231 for normal weight concrete. If slump or air is outside the parameters the concrete shall be rejected.
   e. Concrete temperature ASTM C 1064, When air temperature is above 90 degrees F maximum delivery time shall be 60 minutes. Less than 90 degrees maximum delivery time shall be 75 to 90 minutes. For cold weather placement follow ACI 306. Concrete at no time shall reach a temperature of 50 degrees F or less and not more than 80 degrees at point of placement.
   f. All tests shall be as specified or greater than the average of 3 consecutive tests but no more than 500 psi below the average. All cylinders shall be moist cured to

assure a proper test. Additional tests may be procured in accordance with ACI-318 Sub 4.3.

g. For placing concrete follow ACI 304, “Guide for Measuring, Mixing, Transporting and placing Concrete” and as specified.

h. Fly ash shall not exceed 25 percent of cement content by weight.

2. Plumbing/Mechanical

a. All pools piping shall be installed and maintained as stated in another section. Initial testing shall be subject to 50psi maintained for 4 hours. Testing shall be hydrostatic with all air being removed from the pipes.

b. Maintain pressure as stated in another section during construction.

1.08 PATENTED MATERIALS**:**

A. This contractor shall pay all royalties and license fees. He shall defend all suits of claims for infringement of any patent rights and shall save the Owner or his invitees harmless from the loss on account thereof, except that this contractor shall not be responsible for all such loss when a particular manufacturer or manufacturers are specified, but if this contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the contractor, Owner or Architect.

1.09 CODES

A. All work in this division shall be according to current applicable Local, State and National Codes and Regulations.

1**.** State Health Department for Public Pools
2. National Swimming Pool Institute for Public Pools
3. Consumer Products Safety Commission
4. State Plumbing and Electrical Codes
5. National Electrical Code
6. National Sanitation Foundation
7. American Society for Testing and Materials
8. American Concrete Institute
10. American Society of Mechanical Engineers
11. American National Standards Institute
12. Consumer Product Safety Commission
13. NEMA ICS 7, 7.1, 250, 4X Enclosures
14. NFPA 70 National Electrical Code, National Fire Protection Association
15. NETA STD ATS Testing
16. ADAAG, American Disabilities Act Guidelines
17. National Federation for High School Athletics Association

1.10 QUALIFICATIONS OF POOL CONTRACTOR:

A. The bidding pool contractor must be pre-approved and have constructed at least Five (5) pools of this type and size.

B. The Owner/Architect reserves the right to reject any Pool Contractor's request to bid if the evidence submitted by, or investigation of, such Contractor fails to satisfy the Owner/Architect that such Contractor is properly qualified to carry out the obligation of the contract and to complete the work described.

C. It is the desire of the Owner and by the intent of these documents that this bidding contractor furnish and install a complete pool package so that all warranties and/or guarantees become

the sole responsibility of one single contractor and further to be able to furnish a necessary service staff who are capable of properly servicing emergency situations.

1.11 QUALIFICATION SUBMITTAL:

A. The bidder shall, within (7) seven days of notification of selection, for this award, submit to the Architect. A designation of the work to be performed by the bidder with his own forces.

1. A designation of the work to be performed by the bidder with his own forces;
2. The proprietary names of the suppliers and/or subcontractors of principle items or systems of materials and equipment proposed for the work; Including phone numbers, contact person, date of equipment order and expected delivery dates.
3. A list of names of the subcontractors and other entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principle portions of the work. In the event of long lead items or those items that could jeopardize the project schedule the pool contractor shall so state at this time. If no statements are contained in this notice the owner assumes all equipment will be available as needed.
4. Assuming there are no objections to the information as stated herein and within 7 more days make application with fees to the State and submit necessary drawings as required.
5. The bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the suppliers, persons, or entities proposed to furnish and perform work described in the bidding documents. Prior to the award of the contract, the Architect will notify the bidder in writing if either the Owner or the Architect, after due investigation, has reasonable objection to any such proposed supplier, persons, or entity.
6. If the Owner or Architect has reasonable objection to any such proposed suppliers, person or entity, the bidder may, at his option:

    a. Withdraw his bid
    b. Submit an acceptable substitute supplier, person or entity, with an adjustment in his bid price to cover the difference in cost occasioned by such substitution. The Owner may, at his discretion, accept the adjusted bid price or he may disqualify the bidder.
    c. In the event of either withdrawal or disqualification under the subparagraph, bid security may not be forfeited, no compensation will be given for any efforts made; not withstanding the general provisions or qualifications on his bid security.
    d. Suppliers, persons and entities proposed by the bidder and to whom the Owner and the Architect have made no reasonable objection must be used on the work for which they were proposed and shall not be changed except with the written consent of the Owner and the Architect.

7. The owner may at his option interview contractor(s) with the aide of a video camera or recording device.

1.12 SUBMITTAL:

A. All submittals will be made in accordance with the requirements of Division 1 - General Requirements and in strict compliance of the following:

B. Within 30 days of Notification of award the Pool Contractor shall submit Shop Drawings electronically or on a thumb drive and any information pertaining to this project. This information shall contain all relative information covering equipment and fabrication(s) as required. A transmittal letter shall be submitted with the shop drawings with a copy of the State Permit Application as well as fees paid.

1. The front of the shop drawing submittal shall contain a numbered list of all equipment with the same numbers and the same order as indicated herein with each tab item and

section number contained within the submittal, this must be in the same order as the specifications section for each item and shall have a blank, blank piece of paper in front of the item need to review, as well as plans listing at the top of the item along with plan sheet numbers and information contained on the plan. In front of each cut sheet or submitted item shall be a blank, blank white page with a heading and description for each item and indicating what is on the next page. This will be used for any particular notes at the time of review. If assembled in any other manner the entire submittal shall be rejected. If rejected the submitting contractor must hand deliver and resubmit all information as required within 48 hours.

2. The submittal is stamped indicating it has been checked for compliance. Other conditions or factors related to the installation which may affect performance or operation is the responsibility of the pool contractor/manufacturer. Compliance with other trade Divisions is the responsibility of the pool contractor.

    a. Stamp will state Rejected indicating the item does not comply with the specifications and/or Bid Documents
    b. Accepted as Noted or Approved as Noted: Indicating it is accepted under the conditions or as indicated in the specifications or on the plans
    c. Accepted or Approved indicating the item complies with the specifications
    d. No Exceptions (Pool Contractor is expected to submit what is specified).

3. At the time of owner instruction, final approved submittals will be given by the pool contractor, to the owner with the as-builts.
4. Timely submittal is the responsibility of the pool contractor. No portion of his work shall commence without shop drawing approval including sleeve elevations and locations. The checking is intended to verify the sleeves with the bidding contractor making sure these sleeves correspond with the piping. Pool Contractor is cautioned that if during this period he is expecting to start his portion of the work and he assumes all responsibility for such in the event proper approvals have not been obtained. The completeness of the shop drawings are the responsibility of the pool contractor. Review will only be for the information submitted and not as a check list for items not submitted or not properly marked on the submittal. Contractor has bid the project with the equipment as specified he is expected to furnish and install what is specified.
5. Contractor shall accept full responsibility for all information as contained herein and on the drawings. Some items are not show on the drawings but are listed in the specifications they are expected to be submitted and show up on the site and be installed in accordance with this information. Submittals lacking proper descriptions may not be marked up or may be marked as approved or accepted on the item specified. Any additional coatings or performance related information not noted is expected to be installed even though it was not noted in the shop drawing review. Omission does no exonerate the contractor from installing the item as it is described herein. The review is for general conformance with layouts elevations and quantities being the responsibility of the contractor. Not submitting this information as described or within the time frame as required does not allow the contractor additional time. This contractor is totally responsible for any errors or omissions in locations especially as they relate to location or elevation that directly affects it connection to another component.
6. Engineering data covering all systems, equipment, structures and fabricated materials, which will become a permanent part of the Work under this Contract shall be submitted for review. This data shall include drawings and descriptive information in sufficient detail and scale to show the kind, size, arrangement and operation of component materials and devices, external connections, anchorage's, supports required, performance characteristics, fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification with the shop drawing shall state in writing indicating that all equipment will connect into, fit into and be connected into the space allotted and as shown in the drawings.

7. All submittals shall be stamped and checked off indicating the item does comply with the documents with the approval of the contractor as well as project name. Each submittal shall indicate the intended use of the item, as well as any specific item related to that item. Each item must be approved. Multiple items requiring approval/acceptance shall have a blank page in front of each of the items. Information on that page shall be as stated above. Specific information related to that item shall be submitted.
8. Contractors stamp of acceptance and or approval is a representation that the accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data and that he has review or coordinated each submittal with the requirements of the Work and the Contract Documents. Each submittal shall include a statement prepared by the originator of the Drawings with a certificate certifying compliance with the Contract Documents along with any deviations specifically identified.
9. Note certification of or equal or approved equal status. Any and all deviations from the Contract Documents shall be so listed as a deviation or alternate with a description as it relates to the deviation. Note substitution section herein. Any deviation not accepted requiring additional work by another trade division shall be paid by the Pool Contractor.
10. Contractor shall accept full responsibility for the completeness of each submission and in the case of a resubmission, shall verify that all exceptions previously noted have been taken into account. In the event that more than one resubmission is required because of failure of Contractor to respond to exceptions and rejections previously noted, Contractor shall make all further resubmissions in person at the consultant's office.
11. 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 all dimensions, quantities and details of the material, equipment, device or item shown. Review of submittals shall not relieve Contractor from responsibility for errors, omissions or deviations or responsibility for compliance with the Contract Documents. When the information is returned Rejected, Revise and Resubmit or no exceptions submit specified item, the corrections shall be made as noted thereon and as instructed and six corrected copies (or one copy and one corrected reproducible copy) needs to be resubmitted. Approved as Noted or Accepted as Noted indicates the conditions of acceptance, the item does not need to be resubmitted. The contractor is responsible for installing the item as corrected or so noted.
12. When correct copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately and revisions made other than those call for on previous submissions.

C. Submit shop drawings with any specific notes for all components as contained in each section of this Division in the order and format as indicated in another section indicating all equipment as stated herein and related to but not limited to the following equipment or details such as must be submitted with the shop drawings to scale as required. If some of the information related to that item is not on the cut sheet then write that information on the submittal sheet. If the information is needed for other trades then a separate submittal shall be made and submitted including but not limited to:

1. Design mix
2. Pool details
3. Sleeves with locations and elevations
4. Pipe sleeves
5. Reinforcing/Concrete details
6. Typicals with penetration details
7. Special fabrications
8. Sections
9. Locations
10. Settings
11. Plumbing details
12. interconnecting parts
13. Manufacturers names and Model numbers
14. Filtration equipment components

15. Chemical feed equipment with components and connections to related equipment
16. Electrical components
17. Electrical layouts
18. Electrical controls
19. Filter room layout
20. Fill equipment
21. Valves
22. Drains and any other components stated herein or required to complete the installation of the facility.
23. Layout details for all equipment involving other trades.

D. Upon receipt of the marked up submittal the contractor shall submit a separate listing with a description and 8.5” X 11” of all details detail for all items requiring a Model No. or color selection for all areas of the pool and deck especially for any change in direction. These items shall include model numbers as well as a detail indicating how that items or piece of tile will be used and how it will be installed. Final color selections shall be by the Architect. A separate color list shall be submitted along with a mock up of all tile and or finishes to be used with the actual colors for each area of field and trim colors. 1% Additional tile for stock.

E. Shop drawings missing from this submittal shall be so stated on a piece of white paper as pending with a description of what is missing. Missing, rejected or shop drawings not submitted in the order as stated herein shall be rejected and the contractor shall hand deliver to all parties required. Pending shop drawings requiring additional time shall be hand delivered to the Architect no later than 30 days from the original notice. Any shop drawings returned to the pool contractor as accepted with specific corrections marked as resubmit or rejected shall be resubmitted within 10 days.

1.13 CONTRACTORS RESPONSIBILITY:

A. The owner hereby assumes that the systems as installed are compatible with the water as used and maintained.

1. Pool drawings and fees shall be submitted and paid by the architect. Pool permit will be submitted for a permit specifically the Department of Homeland Security or Director of the Health Department and pay all necessary fees and obtain any inspections associated with obtaining permits to construct and or erect a completed Pool as stated herein and shown in the documents. All other permits and inspections are by each trade.
2. Pool as-built Drawings shall be properly detailed and dimensioned with photographs for every item including showing the locations and installation of all hidden items, piping, steel or the like with the photographs verifying the accuracy of the as-builts. All items shall be submitted to the owner at project completion.
3. Pool contractor is responsible for bidding any and all items as specifically stated within all of the documents for this project, specifically items as contained herein. If he is making interpretations as to or about the "or equal", "or approved equal" or "Accepted Equal" without verification, in writing from the Architect for any item that is not specifically listed herein or accepted separately, he assumes all risk or liability in the event item(s) are rejected and shall not receive any additional compensation for such items.

B. If there is a subsurface water condition on the site; the pool shall be kept full of water at all times and a plexiglass sign shall be placed in each of the equipment rooms.

1. The pool contractor shall hang with stainless steel screws and anchors an 18" X 24" permanent plastic sign with 2" letters, DANGER- HIGH WATER CONDITION UNDER THE POOL DO NOT DRAIN POOL WITHOUT PROPER SUPERVISION IT COULD COME OUT OF THE GROUND. Procedures shall also be in place for draining and maintaining the pools as indicated in other sections.

2. In any case a separate permanent laminated in plexiglass sign with isometric as any or all wording for any or all instruction in Microsoft word or autocad in a minimum number 12 font shall be hung in the pool equipment room detailing procedures for safely draining the pool.
3. The pool contractor is responsible for posting a 18" X 24" procedure laminated in ¼" plexiglass and mounted on the filter room wall any and all procedures and or cautions related for or to the owners draining of the pool.

C. A 18" X 24" laminated sign set in plexiglass and shall be hung with stainless steel anchors in the pool equipment room detailing a step by step instruction for operating the systems.

1. An isometric shall show the locations of all valves and pool related equipment in the pool equipment rooms with detailed step by step instructions for backwash and all functions of the pool. The numbers shall correspond to white tags with black numbers the valve tags on each item.
2. Each pump shall have a laminated 8.5 X 11 mounted in plexiglass above each of the pumps. The sign shall have the pump curve and conversions of 1# differential for 5" or 5# for vacuum and head converted from the pump curve to flow typed in the sign.
3. A separate warning sign shall also be hung in the room is 1" high vinyl red letters stating, DANGER MIXING OF CHEMICALS COULD CAUSE DEATH OR PERMANENT EYE AND/OR LUNG DAMAGE OR BURNS and any specific instructions related to the operation or draining of the pool.
4. Along with the valve tags equipment, filters, pumps, boxes, chemical equipment shall be properly identified as described in another section.

D. Pool contractor is responsible for the pool shells, tanks, building and components and everything as stated herein for the duration of construction. He shall make no assumptions as to outside conditions or events, which may occur during construction, such as power failures, spilled paint or the like, which could cause damage to the pool tank such as not being cleaned and prevent tile adhesion or if the pool tanks were to float during construction.

1. Pool Contractor shall take all necessary precautions to make sure such things or event do not occur. Should the conditions dictate and such an event should occur this contractor shall provide whatever monetary and labor means deemed necessary, as directed by the Architect or Engineer to fix repair or replace and complete all work as described herein and with the same standards.
   a. When initial draining is required (first time the pool is drained for cleaning) this contractor shall supervise at no charge to the owner such draining and instruct Owner as to proper procedures for future draining.
   b. The pool contractor shall post a permanent plastic sign in the pool equipment room detailing procedures for operating and draining the pool even if a high water condition does not exists.
2. If some portion of the work as specified in this section or another section that is related to this section and a clarification has not been raised to the Architect ten (10) days prior to bid time or at the time of interview it is assume to be included in this contractors scope of work.

E. Contractor is expected to Punch out the Swimming Pool as the project progresses. Final Punch list shall be sent by the Pool Contractor to the Architect 30 days prior to job completion for verification. Items not completed in 30 days shall be completed by other trade Divisions or a separate Pool Contractor. Punch List shall be presented by the Pool Contractor in writing to the Architect no later than 45 days prior to completion of the entire project. The owner using the pool does not constitute substantial completion. Warranties do not commence until all items on the Punch List have been completed. If the pools need to be drained due to faulty workmanship or warranty items, the costs of 1 cent/gallon shall be paid by the pool contractor; faulty or incomplete items shall be paid by the Pool Contractor.

F. Contractor is responsible for maintaining 10# min. of pressure on all circulating piping until pool deck has been placed. Protection of piping from freezing shall also be taken into consideration. It is the sole responsibility of the Pool piping contractor and or Pool Contractor to maintain the integrity of all recirculating piping. Dry fit equipment in filter room and verify with the owner or pool operator the placement of all equipment especially chemical storage and controller location. All drop outs shall be sealed so loose debris does not get into the dropout. If dropouts are not properly sealed the Pool Contractor shall provide video camera footage to prove debris has not entered the piping systems.

G. Contractor is also responsible for protecting all new equipment from damage, dirt, paint, or any abuse until the project has been finally turned over to the owner. If damage, paint or excess dirt and debris accumulates on any equipment and it can no longer look the same as it did when it left the manufacturer the contractor is expected to replace such equipment at his expense.

H. Contractor shall furnish a layout and statement of pitch prior to installing any deck tile or depth markers or signage. Any areas requiring pitch to drain shall be ground or raised to assure no puddling occurs. Statement shall indicate deck was flooded and all water pitches to deck drains with a maximum slope of 1% to 2% maximum to the deck drains and no puddling occurs.

1.14 START UP AND ENGINEERING SERVICES:

A. A qualified representative of this contractor or the manufacturer shall visit the site after the installation of the filter has been completed and shall put the filter into operation and shall assist and instruct the Owner's representative in the operation of the filter and related pool equipment. This is over and above inspection and placing the system in operation.

B. The pool contractor shall supply the services of a competent and experienced field engineer for a period of at least three (3) days during and after installation to inspect the completed installation, and before the owner is instructed to adjust the automatic controls to the proper set points, place the system in operation and give operating instructions relative to its care and use. This is over and above owner training.

C. The pool contractor shall place the operating instructions Laminated in a chemical resistant 18” X 24” with diagrams outlining the valve legend with each valve tagged to correspond to the valve chart in a permanently laminated clear Plexiglas frame mounted in the pool equipment room. Operating instructions shall be step by steps starting with Number one through normal operation, backwash and draining of the pool. Valve numbers on chart shall correspond to valve tags. Valve tags shall be Recreonics Model No. 80-506.H.R and 80333.

D. All pool piping within the pool equipment shall be clearly marked with directional arrows indicating normal direction of flow. The pool shall be balanced to the Langlier Index and all chemical containers shall be filled at the time of instruction. State required signage as well as additional signage as contained herein shall be furnished and or installed as described herein.

E. Pool Contractor shall place the pool systems into operation, balance the pools and furnish a 30-day supply of all chemicals. During the instruction the Pool Contractor shall check all items related to the installation of the pool and verify that installation of these items will not affect the warranty of any pool-related item. If this condition exists the Pool Contractor shall send the Architect a registered letter describing these items.

1. The owner's representative shall also receive 3 days of video taped (15 hours) instruction.

2. Over the next 6 months the pool contractor shall make (1) (3 hours minimum) additional visit to the site to reinstruct or answer any questions.
3. At the time of startup the Pool Contractor shall set up the dates for (1) additional visit to assist the owner. Each additional visit shall be for 3 hours at which time the entire system shall be checked over and if requested the owner representative shall be reinstructed.
4. The additional visits and Guaranties/Warranties shall not commence until the punchlist items have been satisfied. Owners use of the pools does not constitute acceptance nor does it place the warranties in effect.
5. Each contractor is expected to punch out their own work as they go. Punch list should not included items omitted or changed.
6. As-builts along with extra tile or spare parts shall be provided at the time of start up. The as-builts shall clearly indicate the as-built condition with exact dimensions off of the inside of the pool where piping and or materials lay below the pool and or deck.
7. A ledger with time line and manufacturers name shall be hung on the wall with a schedule of when and where regular maintenance should occur. The maintenance procedure must be outlined and sandwiched between (2) 18" X 24" X ¼" thick laminate. Listing shall also include specific information related to future maintenance as well as any manufacturer or type of product to be used in future maintenance.

F. All equipment shall be clearly labeled in the filter room with black plastic signage with white lettering and numbers. The numbers shall correspond with the instructions. Signs shall state FILTERS with SQUARE FOOTAGE AND RATE, EACH FILTER PUMP WITH SIZE (HP) VOLTAGE, ALL PUMP DESCRIPTIONS WITH HORSEPOWER VOLTAGE AND PHASE, CHEMICAL PUMPS AND FEEDERS, CHEMICAL CONTROLLERS, ULTRA VIOLET UNITS AND CONTROLS, ULTRAVIOLET REACTOR (with lamp model no), POOL OXYDIZER SYSTEM, ELECTRICAL CONTROL PANELS, DECK DRAIN OVERFLOW CONTROL BACKWASH PANELS, CONTROL PANELS, FLOW METER AND SADDLE, BOILERS WITH BTU'S AND WHAT THEY HEAT, BY-PASS VALVE, FILTER FLOW CONTROL VALVE, BACKWASH VALVE, POOL DRAIN VALVE and any additional items requiring identification. Signs shall be 3" X 8" White with black letters.

G. Any caution signs unless stated otherwise shall be custom made with minimum ½" vinyl lettering mounted on white ¼" plexiglass mounted as directed by the owner. All safety lettering shall be in red on a white background with all notes related to operation in black lettering on a white background. Caution signs shall be as described in another section.

H. Provide detailed shop drawings of the items of equipment being provided, indicating the dimensions, material and characteristics of the filter tanks, lining, exterior face piping, internal manifolds and laterals, and filter media.

I. Provide a complete set of operating instructions, embracing the operational functions and recurring maintenance processes involved in connection with the complete filtration and chemical treatment system. Dry fit equipment in filter room and verify with pool operator the placement of all equipment especially chemical storage and controller location.

1.15 WARRANTY:

A. Standard one-year contractual warranty for the project shall apply to all work of this section unless stated otherwise. All warranties shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the Pool and Systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.

1. Pool structural tank - One year against defects in material or workmanship. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
2. Pool Tile – 25 YEAR Warranty by the Manufacturer with a minimum of Three (3) years against defects in material or workmanship by the Pool Contractor. Warranty shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the tile and systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
3. Pool Filter - Fifteen (15) years against defects in material or workmanship. Warranty shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the filter and filter related systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor and the manufacturer hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
4. Electrical Controls - Three (3) years held joint between the electrical installer and supplier to repair and or replace labor and material any or all components at no cost to the owner from the date of install.
5. All other construction, deck, water features and filtration equipment - One (1) year against defects in material or workmanship. All warranties shall remain as joint responsibility of the pool Contractor and the Manufacturer. Pool Contractor warrants that the installation of the Pool and Systems are at the time of bid and completion of the project in compliance with the intent of this installation and in accordance with the manufacturers recommendations. Pool Contractor hereby agrees to repair or replace any work or component at no cost to the owner during the warranty period.
6. No warranty as stated above, herein or implied shall be Pro-Rated with all warranties being held joint by the Pool Contractor and the Manufacturer.

B. The pool equipment supplier/pool contractor shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other and operated in accordance with his instructions, the system will perform the prescribed intended functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, and will be sanitary to the satisfaction of all authorities having jurisdiction.

C. Filter tanks piping, pool system piping, valves and accessories shall include a three (3) year warranty and shall be repaired or replaced at no cost to the owner for labor or materials during the warranty period.

PART 2 PRODUCTS

2.01 FILTER WATER INLETS AND GUTTER GRATING*:*

A. It is the intent of these documents to achieve overflow through the Gutter System without discharging to waste except when cleaning or draining. Products purchased on the open market must be delivered and received by the Pool Contractor to the project in their original containers.

B. The filter water supply piping shall be rigid PVC Schedule 80 NSF Approved for potable water. Contractor shall install piping below the pool floor and bedded in clean sand around the outside and under the pool. Contractor is responsible for maintaining pressure on all circulating piping until the pool floor and pool deck have been placed. It is the sole responsibility of the Pool piping contractor and or Pool Contractor to maintain the integrity of

all recirculating piping. Inlet fittings shall be constructed of 2" ABS Floor inlet Starite Model #08417 white in color.

C. Furnish and install Hayward Model No. SP-1022 1 1/2" inlet fitting with SP-1419 directional inlet fittings in the side walls. All supply piping shall be rigid PVC Schedule 80 NSF Approved for potable water connected to inlets. Contractor is responsible for maintaining 10# min. of pressure on all circulating piping until pool deck has been placed.

D. Where piping or fittings penetrate floor or walls furnish and install no leak flanges around all fittings 1 1/2 times the diameter of the fitting. All primary feed lines especially the return line shall have 45 degree bends at least 5' before the connection to the main line. Synko- flex SF-302 preformed plastic Adhesive Waterstop, by the Henry Company, meets Federal Specifications SSS-210 and Certified to ANSI/NSF 61 for use in potable water is also an approved no leak seal around pool tank penetrations.

E. Gutter shall be covered with DuraTech HDPE Poly Grate grating by pool equip as indicate on the drawings.

F. Parallel Grating with angle shall be as indicated by each manufacturer as standard grating. All Color choices/samples shall be presented separately in conjunction with all color choices as indicated elsewhere in these documents. Gutter grating shall cover the entire perimeter of the gutter. All edges shall fit flush and smooth with no sharp edges and all grating parallel and square to the pool and deck. The grating shall be supported in accordance with the Manufacturers maximum support and sit on a bearing angle and stiffeners. The angle is used to allow the grating to sit flush with adjacent surfaces and to allow the installation to true all areas that may have not been install true and level around the perimeter. Grating shall be uniform and there shall not be any gaps in the angle against the tile at either the edge of the pool or at the deck. Angle shall be bedded in caulking equal to Deck O Seal to seal all gaps around the perimeter of the pool. All edges and ends shall be supported in accordance with the Manufacturers technical specifications. Spacing of bars shall be true and consistent around the entire perimeter.

G. The system shall consist of Radial Supports running parallel to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the 24 inch long Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 41/2 foot inside radius. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform. The overall height of the finished grating system is 1.0". The Radial Grate Strips are 5/8" wide with the Radial Supports providing a consistence space between them of 3/8" (max). The system therefore provides 37.5% open area for water flow. Both the Radial Supports and Radial Grate Strips are made of a high grade PVC, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154.

H. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028 and ASTM D2047 wet. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11".

I. Sections of U.V. stabilized PVC parallel grating, with a depth of 1.0". Components must meet ASTM G-154 standards, which require finished products to withstand 750 hours U.V. exposure. The top surface shall have a raised, non-slip diamond ridge pattern to meet the static coefficient of friction, while wet or dry, of ASTM E-C-1028. The space between the

pieces shall not exceed 0.375" and provide a minimum of 35% open area per foot to allow unrestricted water flow. Grating shall also meet or exceed ASTM E-661, which states allowable deflection at 200lbs and load to failure criteria. All grating is to be secured with 316 stainless steel hardware as supplied by manufacturer. Radius sections of grating must be on-site adjustable to conform to the constructed profile of the pool. Compliance with ASTM standards listed must be documented and accompany submittal data.

1. Grating shall be cut to follow the profile of the gutter and the shape of the pool. Imbed a PVC angle below the grate to finish the edges of the grating and to level out the gutter. The system shall consist of Radial Supports running perpendicular to the trench. The Radial Supports are secured by stainless steel fastener, plastic anchor and stainless steel screws. All stainless is grade 316. The Radial Supports are used to accept the Radial Grate Strips that interlock end to end. The radial Grate Strips are engineered to flex sideways to form any radii down to 1.37m (4 1/2') inside radius. The Radial Supports provide the strength for the system and keep the gap between the Grate Strips uniform and allow 1/8" gap at corners for thermal expansion.
2. The overall height of the finished grating system is 2.54cm (1.0"). The Radial Grate Strips are 1.58cm (5/8") wide with the Radial Supports providing a consistence space between them of 9.5mm (3/8").
3. Both the Radial Supports and Radial Grate Strips are made of a high grade HDPE, UV stabilized, low heat absorption with a PSI in excess of 1,200 with flexible strength. The PVC has been tested and passed for 750 hours UV Stability under ASTM G-154. The top surface shall have a raised diamond ridge design to create good friction, wet or dry. ASTM C-1028 and ASTM D2047.
4. The engineered design of the system and the PVC material specifications used mean that for all widths, the grates will not deflect more than 0.20 inches. Load to failure for all widths is in excess of 1,000 pounds and failure was by deforming. Deflection at 200 pounds is only 0.059" for 8 inch widths and up to 0.159" for 24 inch under ASTM E-661. Deflection at 200 pounds for the 21 inch width is 0.11". Specific standard warranty shall be 10 years.

2.02 GUTTER CONVERTERS:

A. Converters shall be located in the gutter perimeter where shown on the plans. Flanged piping connections shall be as shown and shall connect the converter piping to the balance tank.

1. Converter Boxes shall be constructed of 12 gauge 316L Stainless Steel with no leak Stainless Steel angles, stainless steel nipple and stainless steel flanges.
2. 8" flanged piping connections at each dropout and 6" for Training Pool.
3. Gutter piping connections shall be S.S. flange to PVC flange with stainless steel nuts, gaskets, bolts and lock washers.
4. PVC piping shall be rigid PVC Schedule 80 NSF Approved for potable water.
5. All gutter piping shall pitch +1% min. to transition points and balance tank.
6. Converters shall be installed prior to concrete walls to encase dropout box and maintain continuity of reinforcing steel behind and in front of each drop out box.
7. Open area of each dropout including grates covering all dropouts shall be 147.09 square inches.
8. All pipe ends in the gutter shall also be covered with a grate.
9. All reinforcing required to properly encase, support or make the box part of the pool construction and shall be stubbed out the back of the pool wall. The reinforcing shall encase the penetration and all materials shall properly placed around the entire box. No leak flange shall be around the perimeter of the box.

B. Convertors shall be covered with plywood and sealed so construction debris does not get into the piping system. This shall be at time of installation and through construction. Reinforcing shall be installed in front of and behind the drop out boxes. If the boxes do not remain

covered the contractor will be required to place and record a camera in the piping systems to verify that debris has not collected and or taken a permanent set within the piping systems.

C. At all transitions to steps or common walls where gutter stops shall have 8” PVC with no leak flanges to interconnect all gutter sections. At the ends of each section of pipe furnish and install 1" X 1" X 1" FRP grating to protect the ends of the pipe and over dropouts.

2.03 FILTRATION SYSTEM

A. It is the intent of these specifications to describe a water filtration systems for the:

1. Competition Pool
2. Therapy Pool

B. Systems shall be complete with all necessary items. It is the further intent of these specifications that the filtration system shall be a complete unit from the pump through the backwash system, including all filter control valves and all accessories such as gauges, needle valves and sight glass or the like shall be furnished and installed by the bidding contractor. The filter offered under these specifications shall be NSF approved. Such approval shall be evidenced by the filter model number appearing in the current NSF Testing Laboratory Listing for swimming pool filters at the flow rate required for this project. The filter specified shall be pressure sand. The filter shall be a product of a manufacturer regularly engaged in the fabrication of water filtration equipment and who has a minimum of five (5) years' experience in this field.

C. Pool contractor shall furnish and install additional valves to isolate filter system effluent and filter influent.

2.04 CIRCULATION SYSTEMS

A. It is the intent of these specifications to describe a water filtration system for the Competition Pool and Therapy Pool.

B. Pools complete with all necessary items. It is the further intent of these specifications that the filtration system shall be a complete unit from the pump through the rinse or backwash system, including all filter control valves and all accessories such as gauges, needle valves and sight glass or the like shall be furnished and installed by the bidding contractor. System shall not drain the Pool(s) with the water passing thru the filters in backwash.

1. The filter offered under these specifications shall be NSF approved. Such approval shall be evidenced by the filter model number appearing in the current NSF Testing Laboratory Listing for swimming pool filters at the flow rate required for this project.
2. The filter specified shall be Regenerative DE.
3. The filter shall be a product of a manufacturer regularly engaged in the fabrication of water filtration equipment and who has a minimum of five (5) years' experience in this field.

2.05 BASE BID

A. It is not the intention of the specifications to limit competition. Incomplete substitutions request shall not be reviewed. Any such proposed substitute system must comply with NSF, State and Local Health Departments.

2.06 REGENERATIVE DIATOMACEOUS EARTH FILTER SYSTEM

A. General:

1. The equipment manufacturer/supplier basis for design is based on:

AQUA REVIVAL
1417 Racine Street
Delavan, WI
1-262-725-6081

2. The filter system under this section for the Competition/Lap Pool shall be Model BSG 50T.
3. The Filter system for the Therapy Pool is based on Model No. BSG 20

B. It is the intent of these specifications to describe a filter system complete with all accessory items supplied and warranted by one manufacturer including NSF Certification.

C. The primary components of the systems consist of the main filter tank, flex tube filter elements, element assembly, media revival mechanism, vacuum or flow transfer systems, tank sight glass, influent, effluent, and revival loop sight glasses; valves and pressure transducers, RMF system controller.

D. All components and related subassemblies, to the extent possible, shall be factory assembled and tested before shipment.

E. Neptune Benson carbon steel tanks with lining, Paddock stainless steel and Filtrex stainless steel are acceptable manufacturers.

2.07 FILTER SYSTEM CAPACITY

A. The Competition Pool filter system shall be Model No. 50T and have a capacity of filtering the pool in 6 hours or less. The system shall consist of (1) Aqua Revival® filter tank(s) with a total effective filter surface area of 1,488 square feet and operate at a rate of 1.55 gallons per minute per square foot of filter area and less.

B. The filter area shall be provided as specified and as listed in NSF-Standard 50 to provide the specific filter rate.

C. Filter system shall be designed to maximize sq. Ft. of filter area while minimizing operating weight. Systems that operate more than 11 lbs. Per Sq. Ft. of filter area shall not be considered.

2.08 FILTER TANKS

A. The filter tanks shall have a side shell less than or equal to 50 inches tall, ASME Code stamped for 50 psi working pressure. All material shall be Type 304L or dual rated 304/304L Stainless steel.

B. All welding shall be performed by certified Code welders. All welds to be neat in appearance, free from slag and other defects, ground and polished to minimum 63 RMS. All tanks must be passivated post hydrostatic test.

C. All tanks must have four (4) legs. Tank legs shall be constructed of 304/304L stainless steel. Bearing plates shall be a minimum 1/4” type 304/304L stainless steel. Each bearing plate shall have one (1) 5/8” drilled holes to secure to the floor with the 1/2" x 4”-1/2” stainless steel concrete anchors provided.

D. The tank cover flange shall be bolted to the shell flange with ASME Section VIII approved hardware.

E. Tank shall incorporate Van Stone (ANSI) connections for filter influent, effluent, drain; media vacuum or pressure transfer piping, ASME viewing window (sight glass). NOTE: Tanks with blind threaded pad flanges for attaching filter influent, effluent, or drain piping shall not be considered.

F. The tank shall include brackets for mounting of RMF system controller.

G. The tank shall include an integrally mounted lifting device (davit). The davit assembly shall be designed to lift the filter head and include a pivot mechanism allowing the head to rotate for access to the tube sheet. – With support as required for workmen safety.

H. BSG 20 is 64” tall, 20” in diameter and has a filtration range of 50 to 260 GPM. Tank weighs 450 pounds empty. 4” in, 4” out and a 4” precoat and 4” drain. BSG 50T is 88” tall, 50” diameter, 10” In and out, 6” drain, 8” pre coat and weighs 1,992 pounds empty.

2.09 LININGS AND COATINGS

A. Tanks shall be manufactured such that interior and exterior linings and coatings are not required.

2.10 INTERNAL COMPONENTS

A. The filter shall consist of flex tube elements, filter tube sheet, stainless steel lift shaft, and internal flow diversion assembly.

B. The filter elements shall be flexible tubes that provide the support structure for the media. The outer wall of each element shall be fabricated of multi-filament high strength polyester braid. Each element shall have an internal T304 stainless steel spring, which acts as a support structure for the braided filament.

C. The filter element tube sheet shall be fabricated of 304 stainless steel and provide both support for the top of the element assembly.

D. The tube sheet hold-down plate shall be fabricated of 304 stainless steel and shall provide a water tight seal to prevent media from escaping the filter tank.

E. All stainless-steel wetted fasteners shall be 304 stainless steel. NOTE: Systems utilizing rigid elements with replaceable filter septum shall not be considered.

2.11 REVIVAL MECHANISM

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

2.12 MEDIA TRANSFER SYSTEM

A. A vacuum or positive flow transfer system shall be provided to allow the recharging of media into the filter for either bag or bulk media.

B. The manufacturer shall provide all necessary pipe, fittings, and hardware for field plumbing of the vacuum or positive flow transfer system.

2.13 AUTOMATIC CONTROLLER

A. The automatic controller shall be of the capacitive touch screen type, with a graphical user interface and password protected in layers to provide general operation separate from system setup screens.

B. The automatic controller shall provide total control of the system's filtration and regeneration cycles and provide all necessary equipment interlocks and timing mechanisms to execute the filter program.

C. The controller shall include an adjustable pressure transducer, factory set to 50 psi. The switch shall stop the recirculating pump and close the pneumatic valves if air pressure falls to 50 psi.

D. The controller shall contain a microprocessor that will activate the following functions of the system:

1. Revival cycle/manual or automatic.
2. Precoating of the filter elements.
3. Stopping and starting the main recirculating pump.
4. Opening and closing of pneumatically operated valving.
5. Vacuum or positive flow media transfer system.
6. Heater cool down delay.
7. Auxiliary contacts to interlock chemical control or other equipment.
8. Parameter settings to activate continuous, intermittent bump cycle for flex tube cleaning.

E. The controller panel shall display the following functions:

1. Media health.
2. Filter status.
3. Precoat status.
4. Recirculating pump status.
5. Vacuum or positive flow media transfer pump status.
6. System power.

F. The controller enclosure shall be stainless steel, rated NEMA 4x, and approved to UL 1081 Standard for Swimming Pool Pumps, Filters, and Chlorinators or UL 508, provided a metallic enclosure rated to Nema 4x is utilized.

G. The RMF system controller will provide signal power to the main recirculating pump motor starter. The unit is required to be a variable frequency drive (VFD) and is to be installed with control wiring. System controller shall consist of Invertex Pump drives for each filter pump.

H. The RMF system controller shall be 120V, 1 phase, 20 amp rated and shall be UL 1081 labeled. Systems without programmable, automatic bump/regeneration/filter modes shall not be considered.

2.14 FLOWMETER

A. System controller shall interface directly with a Georg Fischer brand digital flowmeter 3-2551-P1-XX and provide a direct readout on the capacitive touch screen if the parameters are set to display flow rate.

2.15 AIR COMPRESSOR

A. The system will require one (1) air compressor per mechanical room. The following is the

minimum requirement: 6-gallon tank, 115v, 1 phase, 10-amp, 2.6 CFM @ 90psi, air pressure gauge, pressure relief valve, pressure switch, air filter, tank drain.

2.16 PNEUMATIC ACTUATORS

A. Each filter shall include Georg Fischer or Colonial/Bonomi valve pneumatic actuators for one (1) effluent valves, and one (1) precoat valve.

B. The actuators shall be double acting.

C. The actuators shall include two (2) 1/4" FPT ports for open/close connections. Flow control valves with quick connect fittings shall be provided at each port to allow speed control adjustment for the open/close function of the actuators.

2.17 SOLENOID VALVES

A. Each filter shall include three (3) 24v single solenoid, 4-way pneumatic valves mounted on a multi-station manifold for the operation of the pneumatic actuators and bump mechanism.

B. The solenoid valves shall include lighted DIN connectors.

C. The solenoid valves shall be factory lubricated and shall not require any field lubrication.

D. The solenoid valves with multi-station manifold shall be located on the bottom of the automatic controller, factory wire and include quick connect fittings for the attachment to the pneumatic actuators and bump mechanism.

E. The solenoid valves shall be SMC Series SY 7000.

2.18 VALVES

A. All valves 3"-12" shall be constructed with Glass-filled Polypropylene Compatible with ANSI and DIN flanges. Internal components include PVC, EPDM, with a shaft made from 304 Stainless Steel (non-wetted).

B. Valves shall be butterfly valves and shall be provided for the influent, effluent and precoat lines.

2.19 SYSTEM VALVES

A. Each Aqua Revival® filter shall include five (5) system valves to facilitate system fill after media recharge, precoat/regeneration, influent and effluent for filtering and media dump/drain valve.

B. The precoat/regeneration and effluent valves shall be butterfly type with pneumatic actuators per 2.11

C. The system fill valve shall be butterfly type with lever operator and shall be the same size and the precoat/regeneration valve.

D. The shall be butterfly type with lever operator.

E. The dump/rinse valve shall be butterfly type with lever operator.

2.20 MAIN DRAIN REQUIREMENT

A. A sump pit or standpipe is required for dumping spent media and rinsing tube elements.

B. To prevent overflow, the sump or standpipe drain piping should be sized for 300 gpm capacity.

C. If drain piping cannot be sized for 300 gpm, or if the sewer is at an elevation higher than the filter tank drain, use a sump supplied by others that will accommodate the volume of the filter and receive gravity flow from the bottom of the filter.

2.21 PACKAGING

A. All tanks shall ship in the upright position.

B. All tanks shall be shrink-wrapped to prevent damage during transport.

C. The components shall be carefully packaged in an enclosed wooden crate to prevent damage during transport.

2.22 MEDIA

A. Media shall be expanded perlite with a median particle size of 37 microns. Percentage retained on a +150 Tyler Mesh shall not be less than 8% or more than25%. Darcy permeability shall be between 1.2 – 1.85.

B. The media shall contain no more than one-tenth of one percent (.001) of crystalline silicate.

C. The media shall be certified by Manufacturer for use in Aqua Revival® filter. The media shall be NSF50 listed, or in the case of Diatomaceous earth listed for use in aquatic filters.

D. The preferred media shall be Harborlite.

2.23 FILTER CLEANER

A. Each Aqua Revival® filter includes one (1) charge of chemical for cleaning and degreasing

2.24 RECIRCULATION PIPING AND FITTINGS:

A. The Contractor shall furnish and install new piping and valves for each beginning at each of the main drain sumps, gutter through the to the balance tank, gutter to waste, pump suction line, pump discharge to filter, pump to waste, filter effluent through boiler/exchanger, filter backwash to waste and overflow and drain pump to waste.

B. In addition to the material hereinafter indicated to be furnished by the equipment supplier/contractor, the Pool Contractor shall furnish all other material and parts necessary to complete the installation.

C. All pipe and fittings shall be Schedule 80 PVC with all fittings being molded. Piping five (5) feet on both the influent and effluent lines of the boilers which shall be copper or CPVC NSF Approved. Connections shall be flanged with stainless steel nuts and bolts and lock washers.

D. Piping arrangement shall be in accordance with the intent of the drawings and with equipment manufacturer's recommendations.

E. All chemical feed equipment, tubing and Schedule 40 sleeves shall be properly supported so it does not sag. Piping and chemical control sample streams shall be installed in strict accordance to the manufacturers installation instructions.

2.25 FACE PIPING - EXTERNAL:

A. External face piping shall be Schedule 80 PVC pipe and fittings. Flanges shall be located so as to allow for easy dismantling of face piping. All fittings shall be molded and solvent cemented. No bolt on valves or operators shall be permitted.

B. Piping shall be drilled and tapped where necessary to accommodate gauge tubing connectors. Manufacturer supplied combination gauges shall be furnished and installed for each tank. Filter face piping as with all floor supported piping shall be supported to the floor with hot dipped galvanized or St. St. unistrut,

1. Concrete to unistrut shall have channel capping strip #20E-52000, caps AIC-EC with channel fittings of heavy duty plastic post base #20PV-5853HD by Aikinstrut for all unistrut that touches the floor or concrete surface.

C. Filter face piping shall be supported on each side of each tank connection. All face piping shall be supported independent of each of the filters.

2.26 FILTER SYSTEM PACKAGING:

A. All filter piping and valves shall be factory assembled and knocked down into sub-assemblies for shipment.

B. The components shall be carefully packaged in a totally enclosed wooden crate to prevent damage during transport.

C. Filters shall be treated as furniture. They shall be protected from the time they arrive on site and through the installation. Scratches are not acceptable.

2.27 SYSTEM ACCESSORIES:

A. PRESSURE GAUGE: One (1) 4" dial Marsh type 1CP BM threaded, 0-60# pressure gauge for installation with snubber and Crane #88 needle valve on the discharge side of the recirculating pumps.

B. COMPOUND GAUGE: One (1) 4" dial Marsh type 3CP BM threaded, -30 0 30" vacuum gauge for installation with snubber and Crane #88 needle valve on the suction side of the pumps.

2.28 THROTTLING VALVES:

A. Two (2) Flanged mounted gear operated throttling George Fisher or Astral valves (as specified in another section) to be located on pumps discharge lines. One for filtration and one for pump to waste.

B. Provide all swimming pool filtration/recirculation equipment and necessary work to completely install the specified equipment as indicated on the drawings and specified herein, including: Assembly and installation, Piping and valves, Filter system with all inter related piping.

2.29 PUMPS, MOTORS AND ELECTRICAL

A. Competition Pool Pumps and Motors to be furnished and installed are (2) Redundant end suction close coupled, straight centrifugal pumps and motors, NSF Approved. The main filter pump(s) shall be close coupled 3800 Series Aurora pump and motor Model No. 6X8X11A with a capacity of 2,308 GPM against a total dynamic head of 70 feet. Each of the motors supplied shall be a 50 HP, 3 phase, 480 voltage, 60 cycle, 1750 RPM, ball bearing, bronze fitted,

bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, EPDM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainers.

1. The 3800 Series are close coupled horizontal/Vertical with 316 SS Impeller, 316 SS shaft, internal shaft grounding, double volute on 4" discharge and larger, gauge taps on suction and discharge flanges, 304 SS motor riser, casing feet, regreaseable bearings, field convertible conduit box positions, stainless steel plates on pump and motor, NSF 50, epoxy coated, discharge increasing elbow, base elbow for vertical configuration, 304 SS elbow pedestal.

B Therapy Pool Jet Pump and Motor to be furnished and installed is (1) One 5HP end suction close coupled, Pentair EQ Series Model No. EQK 500 /EQKT 500 208/230/460, 13.5, 12.3, 6.2, 3 Ph, 5HP, self priming pump and motors with a capacity of 200 GPM against a total dynamic head of @70 feet. The motors supplied shall be a 5 HP, 3 phase, 480 voltage, 60 cycle, 3500 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, EPDM, low starting current, normal torque induction motor. Pumps to be NSF Approved. There shall be supplied a self-priming close coupled pump directly connected to an electric motor.

C Therapy area filter pump to be furnished and installed is (2) two 7.5HP end suction close coupled, 3800 Series Aurora Model No. 2-1/2x3x9, 262 GPM against a total dynamic head of 75 feet. Each of the motors supplied shall be a 7.5 HP, 3 phase, 480 voltage, 60 cycle, 1750 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, EPDM, low starting current, normal torque induction motor. Motor shall be premium efficiency and drive compatible. With Mermade strainers. Pump to be NSF Approved.

1. The Contractor shall supply materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and accessories, as indicated on the contract drawings and following the instructions specified by the manufacturer. The Contractor shall ensure that the pumps and motors are properly installed, including rotation and checked in accordance with the standard of the Hydraulic Institute and there shall be no undue pipe strain transmitted to the pump casing.
2. The pump shall be a centrifugal horizontal close-coupled end suction pump, suitable for operation with a VFD, Pentair Aurora Model 3801 or pre-approved equal with following characteristics and materials of construction:
3. Pump volute shall be Ductile Iron (ASTM A536) with integrated foot to support the volute and allow back pullout feature. Pump shall include gauge tappings at the suction and discharge flanges and vent and drain tappings at top, bottom and side of the volute. Simple design with no center drop out spacer coupling needed to disassemble the rotating elements without disturbing the casing or suction, the discharge pipping, and the electrical motor connections.
4. Impeller shall be of enclosed type Stainless Steel (ASTM A743 Type 316), finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. Impeller shall be dynamically balanced to ANSI/HI 9.6.4 balance grade G6.#, keyed to the shaft, and fastened with a washer, gasket and cap screw.
5. Pump internal design shall include a self-flushing Mechanical seal with Stainless Steel (ASTM 303) metal parts, Buna-N elastomers parts, Ceramic seat and Carbon washer suitable for continuous operation at 225°F (107°C). Pump shall be equipped with a Steel (AISI C1045) shaft and fitted with a replaceable Stainless Steel 316 ASTM shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.

6. Pump seal plate and motor bracket shall be of a two piece design, and shall provide an adequate area for internal recirculation of the pumped fluid around the sealing medium.
7. Pumps shall be able to handle 175 PSI working pressure.
8. The pump and motor shall be able mount on a concrete foundation base using bolt or lag screws into threaded inserts to allow removal of the drive motor without disturbing the pump liquid end or the piping.
9. Motor(s) shall be a NEMA configuration in accordance with the latest NEMA Standards and shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency.
10. Each centrifugal pump furnished under these specifications shall be tested at the factory to Verify Individual Performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards. Pump manufacturer warranty shall be for a period of five (5) years from the date of installation or start-up, or for five (5) years after the date of shipment, whichever comes first.

D. Competition Pool Drain Pump and Motor to be furnished and installed is (1) One 5HP end suction close coupled, Pentair EQ Series Model No. EQK 500 /EQKT 500 208/230/460, 13.5, 12.3, 6.2, 3 Ph, 5HP, self priming pump and motors with a capacity of 200 GPM against a total dynamic head of @70 feet. The motors supplied shall be a 5 HP, 3 phase, 480 voltage, 60 cycle, 3500 RPM, ball bearing, bronze fitted, bronze impeller, Scotchkote 134 fusion bonded epoxy coated pump head, EPDM, low starting current, normal torque induction motor. Pumps to be NSF Approved. There shall be supplied a self-priming close coupled pump directly connected to an electric motor. Pump shall be connected to a separate drain line under the pool floor and piped separately to waste

1. The recirculation pump shall be centrifugal design with a hair and lint strainer. The pump body, seal plate, and attached hair and lint strainer shall be constructed of non corrosive PPO resin materials and close-coupled to an electric motor by means of an adaptor of the same material. The pump body shall have a single suction port with ANSI Rated 150 bolt flange to the hair and lint strainer. A centerline discharge port of ANSI Rated 150 bolt flange and a winterizing drain port of 1/4" NPT shall be a part of the design. The pump shall be a back pull-out design to allow servicing without disturbing piping. The pump shall have a PPO resin diffuser to aid in priming and it shall contain a replaceable bronze wear ring for the impeller. The impeller shall be of the closed type and PPO resin, non-overloading at any point on the performance curve. The mechanical shaft seal shall be constructed of ceramic and carbon seal faces, with stainless steel and Buna N materials in the spring bellows portion. The impeller shall be secured to the motor shaft by means of stainless key and locking screw into the end of the motor shaft. The pump shall be capable of operating up to 50 PSI, 104 degrees continuous water temperature. The electric motor shall be NEMA rated series JM construction with stainless steel shaft inside a shaft sleeve of 303 series stainless steel. Motor shall be TEFC JMZ frame with double shielded single row deep groove ball bearing cont duty rate at 40C degrees. All pumps shall be NSF and installed per the manufacturer and the information as contained herein.
2. Hookups of each of the motors to be by the Electrical Contractor.
3. Motors shall have an efficiency of 90% or greater and be drive compatible.
4. Pumps to be coated and NSF Approved.

E. Furnish to Division 26 contractor electrical components to be installed with each of the motors as listed below the following but not limited to: The Pool Automation system shall be shop manufactured and assembled by the Manufacturer of the Automation System. Provide DDC control sequence of proposed equipment; provide temperature sensor location, and wiring

diagram for all related equipment. Automation System shall be compatible and integrated into the owners energy management system.

F. Pump(s) shall be mounted vertically or horizontally. All gauges shall be liquid filled compound gauges constructed of stainless steel bourbon tube type with 2 ½" stainless steel case with white scale and black numbers. Series 700 SS/SS 30 in Hg vac. to 60 psi stainless steel movement and back plate. SS movement with 316 SS tube and socket. Gauges shall be calibrated in accordance with ANSI B40. Scale shall be selected for pointer to operate at mid scale. Each compound gauge shall be connected to the suction and discharge of each pump(s) and strainer(s). A stainless steel snubber No 872-11, stainless steel tube and socket Type FFG No. 740-11 S.S. needle valve as manufactured by Trerice.

G. All pumps shall have flanged structural fiberglass eccentric connections or stainless steel flanged flexible eccentric discharge connections with hypalon spools with stainless steel internal or external wire or in line EPDM rubber matching the return line with 1" deflection with drilled flange. All strainers shall have eccentric increasers from the strainer to the pump to match pump suction. Connections for flexible connectors shall be full face 125# to 150# flanges manufactured into the fitting. As with all pumps connectors shall match pipe suction and discharge pipe size, not pump size unless they match pump and return line size. Flex-hose, Metraspere or National Line. All pumps shall have double door check valves of epoxy coated cast iron body, 316L springs, EPDM seat, wafer style, T 316 stainless steel doors, T 316 stainless steel pin and stop. As with all pumps match pipe discharge pipe size, not pump size, return line size. DeZurik or accepted equal.

H. All pump suction in balance tank shall have a PVC anti vortex plate in the balance tank flange mounted to floor of balance tank along with gutter line flange mounted to floor of balance tank. Gutter line shall have 3/8" air bleeder drilled into gutter line before it turns down to bottom of tank. Install all housekeeping pads below pumps with Stainless Steel anchor bolts, washers and nuts. All piping to allow for ease of service to be true level and plumb. This contractor shall supply complete drawings and printed instructions for the installation and operation of all equipment specified herein and shown on the plans.

I. Furnish and install (2) Float operated sump pumps for the deck drain overflow sump and (2) Float operated sump pumps for dewatering manhole. Both the deck drain overflow and dewatering manhole shall have a separate NEMA 4X control panel. The Mahole shall also have a 4X disconnect in sight of the pumps for servicing the pumps. The 1/2HP Pump pit Floor drain sump pump to be piped into the backwash sump. Pumps shall be Submersible 2" discharge heavy duty non-clog sump pumps with cast iron housing ball bearings stainless steel shaft and mechanical seal.

1. Pumps shall be Submersible Sewage type Pumps (2) 1.5 HP, 1750 RPM, 3 phase, 460 volts each, pump(s) are rated for 90 GPM 42 FT. Total Dynamic head. Pump(s) each shall have 2 inch NPT integral vertical discharge and shall be capable of handling a sewage containing non-abrasive 2 inch maximum solids. The motor shall be protected by a mechanical shaft seal mounted on the pump shaft. The mechanical seal shall be constructed of silicon carbide vs. silicon carbide sealing faces. The mechanical seal shall be tensioned by an independent spring constructed of series 300 stainless steel metal components and BUNA-N elastomers. All pumps shall have check valves and ball valves to regulate flow.
2. The impeller shall be semi-open with ejector (pump out) vanes on the top of the impeller for protection of the mechanical seal and hydraulic balance. Due to design, only single plane spin balancing shall be required for smooth operation. The impeller shall be threaded to the solid series 400 stainless steel shaft. Three phase pump impellers shall be secured by a thread-locking feature which will prevent the impeller from loosening during short periods of reverse rotation as might occur when rotation direction is being verified outside the installation.

3. The casing shall be cast from ASTM A48 class 30 gray cast iron of sufficient thickness to withstand 1.5 times the shut off pressure generated by the largest impeller available for this model in accordance with current revision of the Hydraulic Institute Standards. The discharge connection shall be a standard 2 inch and 4 inch NPT suitable for direct connection to the station piping, without the use of any external fittings or adapters for vertical orientation of the discharge direction. Integral feet of cast iron shall be made a part of the casing for accurately positioning the pump suction opening at the correct elevation off the sump floor for good pump down capability.
4. The impeller, casing, bearing/seal housing and motor cover shall be of ASTM A48 Class 30 high quality cast iron for strength and long life. Silicon Bronze impeller shall be cast from ASTM B584 CA836.
5. The pump/motor shaft wetted-end shall be series 400 stainless steel. Both inner and outer surfaces of cast iron shall be electro-coat-painted with thermo-setting Acrylic baked 20 minutes at 350 degrees F., after casting are completely machined.
6. The integral motor shall be completely sealed from the environment by use of circular cross section o-rings accurately fitted into machined grooves which shall provide designed compression of metal to metal fits. The motor shall be rated for continuous duty under full nameplate load while at full submergence in the station. The motor shall be provided at the specific site conditions of 460 V, three phase as required, all shall be at 60 Hz. Three phase motors shall be protected by ambient compensated quick-trip heaters or adjustable motor circuit protectors provided in control panel. The stator winding shall be open type with class B insulation suitable for operation in clean dielectric oil for efficient heat transfer and lubrication of the ball bearings. The stator shall be a register fit into the bearing housing to ensure positive alignment and bolted for ease of serviceability. The motor shall be provided with ball type anti-friction bearings which shall support the heavy duty rotor shaft and to handle all radial and axial loads imposed by the impeller while limiting shaft deflection at the mechanical seal faces. The ball bearings shall be designed for a life of 30,000 hours minimum. The motor shall be designed and tested to withstand an 18 day locked rotor operation without damage. Lower seals shall be constructed of Tungsten Carbide.
7. The power cable shall be sealed at the motor end as it enters the motor casing by a two part barrier to moisture intrusion. The first line of defense shall be the compression of the oil and chemical resistant grommet which shall seal the outer jacket of the power cord. In the event that the outer jacket of the power cord should become damaged, then the second line of defense shall be the epoxy poured isolated conductors within the jacketed cable itself. The insulation shall be removed from the individual conductors and the epoxy shall be allowed to form a leak-proof seal against wicking of the power cable between the outer jacket and the insulation of the individual conductors. The outer jacket of the power cord shall be oil resistant and water resistant. The power cable shall be rated for NEC severe service “S”, type “SJTOW” or “STOW”.
8. Sump panel shall be duplex weatherproof Panels Centri Pro Superior quality duplex liquid level controller with automatic alternation for two pump operation.
9. Each pump shall have a High level alarm warning, 2 hand-off-automatic (H-O-A) pump switches, On-off control circuit Switch, oversized magnetic contactors, Numbered terminal strip-screw type, Float Switches, Three Phase, High Level Alarm, Alternator, NEMA 4X Fiberglass Enclosure, NEMA 4X, 30 watt, flashing red light, NEMA 4X, fiberglass enclosure with gasketed, hinged door and stainless steel hardware, NEMA 4X, alarm horn -95db, Electronic pump alternator, Alternator selector switch, Lag pump start delay, Field adjustable for 208/230/460/575V, 60Hz, 115V control circuit transformer and 2 adjustable motor overload protectors.

    a. Rugged NEMA 4X construction
    b. Provides fully automatic operation for each pump. Alternates pump starting to distribute operating time.
    c. Provides extra pumping capacity in times of high inflow by energizing both pumps.
    d. Hinged door with lockable stainless steel latch for safe operation indoors or out.

e. High level alarm circuit includes through door mounted silence switch for manual silence of alarm horn.
f. Through door mounted alarm test switch insures proper operation of the alarm circuit without the need to open the panel
g. 2 through door mounted pump run lights.
h. Top mounted high intensity flashing red light provides 360 degree visibility.
i. Pulsating, corrosion proof alarm horn.
j. These duplex controls are factory wired for operation with three float bulbs. An easy field modification for four float bulb operation using separate “lag-on” and “alarm bulbs” is provided.
k. Solid state pump alternator circuit displays float status for ease of installation and trouble shooting.
l. Alternator selector switch allows a choice of automatic alternation or operation of only pump 1 or pump 2.
m. Lag pump start delay built-in. Delays starting lag pump for 5 seconds if both pumps attempt to start simultaneously as after a power outage.
n. Panel can be wired for a single power feed for pumps and control circuit or the control circuit can be wired to a separate power supply to insure alarm integrity in case of a tripped main breaker.
o. Auxiliary alarm contacts provide for remote alarm connection.
p. Entire unit is UL and CUL listed.
q. Color coded siring, screw type terminals and plug in sockets, ensure ease of field servicing.
r. Field wiring diagram, panel schematic and installation instructions included.
s. Guaranteed pump submergence circuit
t. Three phase lightning arrestor
u. Seal fail circuit (2) - Duplex
v. High temp. indicator with pump shutdown – Duplex
w. Special duplex seal fail and high temperature circuit 15/20GD, 15/20GX and 1GA/2GA pumps.
x. Motor circuit protectors (RB52 through 57)

10. Each pump shall allow installation and removal of the pump without the need for any personnel to enter the pit and unions to allow each pump to be removed individually .
11. Sump shall be covered with FRP grating as manufactured by Fibergrate. Fibergrate type IFR polyester resin reinforced with fiberglass roving. Use 1" X 4" X 1" rectangular mesh to accept 300 pound load. Resins shall be fire retardant vinyl ester meeting the requirements of Class 1 rating of 25 or less per ASTM E-84 and meets the self-extinguishing requirements of ASTM D-635. Color shall be yellow. Resin shall be UV inhibited and the composite shall include a veil on all exposed surfaces. The top of the panels shall be covered with a bonded grit, baked epoxy, anti skid surface. Cut holes in grate as needed.

J. Install all housekeeping pads below all pumps with Stainless Steel anchor bolts, washers and nuts. All piping to allow for ease of service. All piping to be true level and plumb. This contractor shall supply complete drawings and printed instructions for the installation and operation of all equipment specified herein and shown on the plans.

K. Jet air blower Roton regenerative blower Model No. DR404AL72M, 1 HP with built in silencer direct drive, enclosed fan cooled, perma lube sealed bearings, built in thermal protection non pulsating oil free.

2.30 POOL CONTROLS:

A. Division 26 Contractor to provide 250 amp service to filter pumps control panel. All conduits, junction boxes control wiring, hookups, panel mounting, interconnecting conduit and wiring for

all switches, timers or the like shall be by Division 26 contractor. It is assumed that all connections rough-ins, junction boxes, grounding, bonding, conduit and installation of items below are by Division 26 contractor.

1. Filter pumps drives shall be controlled by flow meter or pressure differential
2. Filter pumps are redundant with only one pump operating 24/7.
3. All pumps must have separate start/stop and controls
4. E stop with alarm shall shut off power to jet pumps
5. Drain Pump does not require a VFD
7. If individual panels other than chemical controller are installed they must be complete with numbered pigtails and installed/hooked up by the supplying contractor.
8. Flow shall be indicated on the chemical controller
9. Differential measurements set display shall be capable of displaying flow or Hz
10. All motors 1HP and larger shall be 480V/3Phase
11. Control panels shall provide:

    a. Starters, disconnects and VFD's for Competition Pool filter pumps and Training Pool Pumps
    b. Starters and disconnects for (1) 5HP drain pump, (2) 1HP Pulsar pump
    c. Filter room floor drain (2) 1HP float operated sump pumps
    d. 20 amp Disconnect for Dedicated 110 for chemical controllers
    e. 30 amp disconnect for pool vac pump plug. Plug to be twist lock type.
    f. Breakers for UV systems
    g. vacuum plugs @100' apart or less
    h. estop for jet pump

B. Panel shall provide power and control of all filter pumps manually switched by the owner every 30 days and Therapy Pool Filter pump with Drive.

1. Chemical systems shall not feed in the event of no or low flow by way of the in line flow sensor wired into the chemical controller.
2. All pumps 3HP and larger shall have VFD's unless otherwise noted

C. LON Works or BACNET based communications shall be provided in the control panel so the owner can remotely monitor all functions of the equipment. For owners purposes and future service for all Drives shall be:

1. Variable Frequency Motor Controllers
2. Section 26 05 53 Identification for Electrical Systems
3. Section 26 28 13 Fuses.

D. Monitoring of the pool systems shall be compatible with the owners management system and in conjunction with their Energy Management System and provide the same readout as the chemical controller. Locations shall be as indicated on the control diagram. The owner will monitor the following with wells furnished and installed by Division 13 Contractor as located by controls contractor:

1. Pool Temperature/Hi Limit
2. Boiler #1 influent
3. Boiler #1 effluent
4. Training Pool temperature/Hi limit
5. Heating supply to heat flow on
6. Pump 1 on/off with flow and off alarm
7. Pump 2 on/off with flow and off alarm
8. Training area heat #2 influent
9. Training area heat #2 effluent

10. Training area filter pump flow and on/off with off alarm

E. Monitoring of the pool systems shall be by the owner in conjunction with their Energy Management System as installed by Controls Contractor. Pools filter systems shall operate 24/7. Chemical feed systems shall automatically control and maintain pre set levels of chemical for the pool Balanced to Langlier Saturation Index and pre set to 2 to 3 PPM chlorine with a Ph level of 7.5 and in conjunction with State required levels. 110 volt for (2) 5-24 VDC 1.5mA for flow sensor and (2) 12-24 VDC 10 watts flow monitor. All electrical and data connections to the controller shall be by the pool contractor. The owner will monitor the following in conjunction with Division 13 contractor Controls and Chemical Controller: Flow switch shall not permit chemicals to feed into each of the pools when filter pumps are not running.

1. Pool Mixed Temperature
2. Hi Limit
3. Chlorine levels
4. Ph
5. Flow rate
6. Filter pumps off alarm
7. Filter pumps one or two operating
8. Training Pool filter pump operating
9. Controller function monitoring
10. Heating for both pools

F. Electrical Controls shall be Furnished and installed as listed below to NEMA 4X FRP control panel with 250 amp disconnect.

G. Panel shall be prewired with individual start, stop, controls and drives for all pumps. Panel shall provide disconnect for UV, Chemical controller and UV control but not limited to:

1. Furnish and install new combination start/stop and variable frequency drives. Wiring shall be wired to a numbered terminal strip for simplified identification and ease of trouble shooting. Panels shall be built in accordance with UL 1995/CAN/CSA/ No. 236-M90. Filter frequency drives shall be controlled by the flow meter, thru the Chemical Controller regulating the flow for each of the filter pumps.
2. The manufacturer must have a quality management system in place, equal to the quality assurance standard ISO 9001-2000, for the design, manufacture, and service of control systems. Standard catalog motor control centers requiring modification to meet these specifications or panels that are field assembled from pre-fabricated panels shall not be considered or accepted.
3. The Contractor shall provide a written warranty, signed by the manufacturer, agreeing to replace/repair, within warranty period, components with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required provided manufacturer's instructions for handling, installing, protecting, and maintaining panels have been adhered to during warranty period. Warranty Period shall be 1 year labor and material and provided by the Unit Manufacturer.
4. Contractor shall provide the following detail as a minimum requirement:
   a) Complete ladder type wiring diagram in AutoCAD format.
   b) Detailed sequences of operation for each controlled device.
   c) Complete bill of material listing manufacturer, model and part number for each device in excel spread sheet format.
   d) Scaled panel layout drawings in AutoCAD format
   e) Catalog cut sheets for all major components and sensors.
   f) Input and output point table

5. The Pool Automation system shall be shop manufactured and assembled by the Manufacturer of the Automation System. Arrangement of all panels shall be as shown on the Shop Drawings. All panels shall be factory assembled, internally wired, and 100% tested to verify proper operation and control sequence before leaving the factory.
6. Manufacturers must have experience in Swimming Pool Control Systems and have specific control personnel who can service the controls under emergency situations. Alternate manufactures are cautioned to follow the guidelines as indicated in the substitution section herein.
7. Certified factory drawings detailing overall panel layout, dimensions and devices.
8. Provide DDC control sequence of proposed equipment; provide temperature sensor locations, and wiring diagram for all related equipment.
9. Main Cabinet enclosures shall be FRP free standing panel mounted on ½" PVC with hot dipped galvanized unistrut with plastic feet secured at floor and ceiling. Starters and related shall be individual and mounted individually in the panel with runs and connections to each starter and its related component in a NEMA-4X panel. NEMA-4X for all panels located with pool environment or outdoors. All electrical components within the enclosure shall be mounted on a removable back plate. Each Unit shall be complete with:
    a. Flange mounted disconnect with circuit breaker load protection. Rotary style disconnects will not be accepted.
    b. Single point power connection from main incoming voltage
    c. Fluorescent light interlocked with door and external switch(es)
    d. Programming shelf
    e. 110 volt courtesy duplex GFI receptacle
    f. Control and step down transformers
    g. DDC controls
    h. Power distribution blocks
    i. Phase and voltage protection
    j. Starters with integral circuit breaker overloads
    k. 20% free area
    l. All wiring rated at 600Volts
    m. All wiring to terminated at terminal strip
    n. VFD's
    o. Ventilation as required
    p. Externally mounted operator interface
    q. Control relays
    r. Alarm enunciation local and remote
    s. Interface 4-20mA signal from flow meter/chemical controller
10. Components shall be the product of a Manufacturer regularly engaged in electrical controls. VFD's shall be as manufactured by ABB or Danfoss Graham VLT Drive shall be LON Works or BACnet compatible. Drives shall be suitable for cabinet mounting, IP20 rated enclosure, integral display, variable torque rated for centrifugal pump application. VFD's shall be supplied for all filter pumps with differential pressure control. Motor starters shall be integrated circuit breaker overload type, IEC rated. Buttons, switches and lights shall be of AB T-800 style or equal
11. Sub panels and safety devices shall be Pool Equipment Room panels NEMA 4X, fiberglass and hinged. Mechanical fasteners will not be accepted. All satellite panels shall be 30 VAC/DC or less. All wiring terminated to terminal strip and 600 volt type MTW or equal.
12. E-Stop shall provided where shown on plans and shall be NEMA 4X, mushroom type, push to stop, keyed reset. Estops at the pools shall have a lexan hinged cover. Estops shall also have a switched audible alarm built into the panel.
13. Pump safety disconnects shall be provided and shall be NEMA 4X with auxillary contacts. All disconnects shall be mounted with in line of site of pumps and clearly labeled with lamacoid tag with the pump ID.

14. Operator Interface Panel shall contain LCD display capable of monitoring/controlling all system control points. Panel shall include manual push button start/stop control for pumps and E-Stop for pool. E stops shall be 12 volts or 24 volts so they may installed within 5' to the waters edge and comply with Article 680 of the NEC. Enclosure shall flush mount, NEMA-4X/12. Alarmed E-Stop with lexan cover shall be furnished and installed as NEMA 4X, mushroom type, push to stop, keyed reset with fiberglass enclosure with hinged cover. Lamacoid sign shall be placed over the Estop indicating emergency stop alarm will sound.
15. Controls shall be mounted in a NEMA 4X watertight fiberglass control box and have a green running light with red off light to signal the operator the equipment is on or off.
16. Panel shall also house pump controls for the dewatering manhole. These pumps shall be float or sensor monitored with each pump having its own circuit. Each pump is sized for 100% of the design flow rate with the second pump being considered backup. Pumps shall on off auto with time clock to cycle every 30 days.
17. Panel supplier shall provide up to (4) four hours installation supervision as required by the electrical contractor.
18. Panel supplier shall be responsible for start-up, commissioning and (4) four hours formal class room owner training as required for operation and maintenance of system. Pool Contractor shall calibrate via the pump(s) curve, flow requirements to automatically control the VFD's against the flow meter with the chemical controller.
19. Information as stated herein is based on Automation Logix 386 313 2791 klantaigne@automationlogix.com.

2.31 STRAINER:

A. Each filter pump shall be protected with a non-corrosive strainer on the suction side of the pump, either a strainer for each or one strainer for both.

B. There shall be a Eccentric Reducing Strainer for the filter pump and suction piping or eccentric and concentric fiberglass reducers or increasers with a compatible fiberglass strainer. Filtration pump strainers constructed of non-corrosive materials. Body shall be Schedule 80 PVC rated at 75 P.S.I. Strainer to have minimum open area of 4.7 to 1. Inlet and outlet to be flanged connections drilled to 150# ANSI vanstone style.

C. Lid to be manufactured of clear acrylic to allow unobstructed visual inspection of basket and a viton o-ring. Strainer shall be complete with perforated stainless steel basket of 16 gauge 316 stainless steel with 1/8" holes on 3/16" staggered centers with a staggered design. Strainers shall have a 316 stainless steel screw down clamp. Match strainer suction to pump suction and balance tank suction line and main drain line. Supply one spare basket for each strainer. Strainer shall be Mermade, Neptune Benson.

2.32 RECIRCULATING PIPING AND FITTINGS:

A. All pool recirculating piping and fittings shall be delivered to the site and placed in an area as directed by the General Contractor/Construction Manager. All pipe and fittings shall conform to the information as stated herein. All piping shall be installed in accordance with the information as stated herein and manufacturers guidelines for basic materials and methods for installing piping systems. All fittings shall be Molded. All piping shall be rigid PVC Schedule 80 NSF Approved for potable water.

1. All unistrut, hangars, threaded rod, nots bolts, washers and or components shall be hot dipped galvanized
2. All Unistrut, hangars, threaded rod, nuts, bolts, washers, lockwashers and or components installed in wetted areas shall be 316L stainless steel.

B. All balance tank penetrations and or pool wall or floor penetrations shall be with no leak flanges sized 6" (3" each side) larger than the O.D. of the pipe. All penetrations requiring sleeves shall be PVC sleeves with Link seal installed around all piping. Balance tank connections shall be flanged with stainless steel nuts bolts and lock washers.

1. The balance tank shall have a level indicator visible in the filter room consisting of clear 1½" Schedule 40 with 1 ½" solid PVC Schedule 40NSF piping cored and sealed with Link Seal thru the wall of the balance tank. The Level indicator shall also have (2) 1½" PVC ball valves to isolate the view tube.

C. All building wall penetrations and filter room penetrations shall be cored. Piping and fittings shall be the product of one manufacturer George Fisher, Eslon, Asahi, Spears, Plastinetics, Harvard, Chemtrol or the like provided they comply with the information as stated herein.

1. All piping shall meet ASTM-D1785 to indicate Manufacturers Name or trademark, material designation code, nominal pipe size, schedule size with the pressure rating in psi for water at 73 degrees, the ASTM designation number D-1785 and NSF seal for potable water.
2. All fittings shall meet ASTM-1785, ASTM D2467 and be molded.
3. No stresses shall be placed on any fitting or pipe during installation nor be placed in such a fashion to support the pipe from or off of a fitting or section of the pipe. The pipe shall be installed in accordance with the information as contained herein and all manufacturers technical installation.
4. All trenches to following the run of the pipe and supporting the entire length of the pipe and fitting in their entirety, prior to and consequently during the backfill process. Maintain pressure and testing as described in this section. All pipe and or fittings shall be bedded in compacted to minimum of 95% compacted sand fill in accordance with the information as stated in another section herein. No pea gravel or split shot shall be used for backfill unless stated otherwise for specific conditions.
5. All fitting shall be installed in accordance with manufacturers technical installation and bulletins. A manufacturer approved primer must be used. Primer must not be the same color as the pipe or fitting unless it is recognized by the manufacturer and if used each fitting must be painted red after pipe and fitting are glued together. Solvent weld all PVC pipe and fittings as indicated unless otherwise noted.

D. The pool contractor shall remain responsible for all pool-piping installed for the operation of the pool for the duration of the project. All plumbing outside and under pool floor pool shell shall be bedded in sand with all trenches also backfilled with sand, smooth and free of rocks and debris.

E. Piping trench bottom shall be compacted smooth and angle with the bottom of the pipe to support all piping and fittings. Fittings shall not support the pipe.

F. Do not support underground piping over any type of chair or bolster.

G. Backfill in accordance with Division 02 and ASTM D2774, in layers of 6" or less.

H. Piping under pool floor may be bedded in pea gravel provided the pea gravel has sufficient quantity of crushed limestone below and adjacent to the pea gravel and with at least 3" of pea gravel between the pipe and the limestone or base material. If pea gravel is used filter fabric shall be installed between the pea gravel and the stone. No pea gravel or split shot shall be used for backfill material.

I. All changes in direction shall be with 45 degree fittings. No tees shall be installed on primary runs to branch lines. Drawings are for clarity and simple interpretation other conditions such as fittings and other related trade piping along with other pool related lines must be taken into

consideration when laying out pool piping. Flush all piping with potable water and seal all ends after flushing with caps or duct tape. Thrust blocks shall be installed at the end of all primary runs to secure the pipe and fitting from potential thrust or movement.

J. After rough piping and prior to the installation of any concrete and through the installation of the deck pressurize all piping with 10# min. until the installation of the deck (this includes all gutter piping). Note initial testing shall be hydrostatic with 50# for 4 hours minimum. Pneumatic testing shall not be allowed.

K. Concentric reducers shall be fiberglass, PVC or stainless steel. Cast iron may be used provided it has a Scotchcoat lining.

L. All piping shall be marked with directional arrows indicating normal direction of flow. Minimum 1” tall by 3” long arrows shall be placed at intermediate positions and at any (both) changes in direction. Arrows shall be painted or color taped shall be used. Arrow head shall be larger than the width of the body. Colors are as follows. Heating pink, Fresh water dark blue, backwash black, main drain (if exposed) medium blue, Filtered water Return lines light blue, Gutter dark green, Chlorine conduit yellow, acid red, auto fill medium blue, water feature lines shall be labeled as to the feature and have orange arrows.

M. 3" overflow piping shall be set 1" above the rim of the gutter and gravity drain to backwash/ overflow sump with @1” pitch to the sump. Gutter to waste.

2.33 PIPING SUPPORT SYSTEMS:

A. Overview

1. Furnish and install anti vortex plate or 4 times the suction pipe diameter with a PVC flanged connection in the balance tanks above the balance tank floor for connection to pump suction line within the balance tank. Gutter line flange shall be secured to balance tank floor with 3/8" hole in gutter line before it turns to floor of tank.
2. Prior to the installation of the final deck the pool contractor shall verify in writing to the construction manager that all pool piping is sound, workable and free from leaks. Paint directional arrows on all filter room piping indicating normal direction of flow as indicated in another section.
3. Install piping and hangars in accordance with the information as stated herein, manufacturers guidelines and Section 22 04 50 Hangars. Supports and inserts Section 22 05 00 and Pool Section 13 15 00. The more versatile and corrosion resistant as well as compatibility of the information shall prevail.

B. Piping hangars, Unistrut and Support:
Piping supports shall be Hot Dipped Galvanized in dry areas and stainless steel in wet areas. Any place galvanized is mentioned it shall be interpreted as Hot Dipped galvanized. Supports shall be arranged and as installed to best utilize pump head and reduce friction loss. Changes in direction shall be with 45 degree fitting especially for all effluent line involving start stop of the system. In the shop drawings when laying out piping systems account for layout to best suit gravity and pressure systems. All gravity systems shall allow for a minimum of 1% pitch to the balance tanks and or pump systems. Bedding or deep lines shall not allow for differential settlement of the fitting. No fitting shall support the weight of the pipe or soil. All piping shall be sufficiently bedded so movement does not occur causing the fitting to fail. All molded fittings shall be used to provide additional strength to the fitting.

1. Pipe clamps must be installed to properly disburse the load over the beam or truss. Verify if truss or beam is top or bottom cord bearing before making connection.
2. C Clamps shall include set screws and locknuts such as B line B351 or B3036L. Top flange type shall be equal to B line Model No. B3034 or B3033. Retaining straps shall

be used to keep the clamp in position. Models B3050 and 3055 shall be used for center position. Cross bolt style B3291 thru 97 as required.

3. All hangars, rod, saddles, anchors, clamps, bolts or hardware in the balance tank shall be stainless steel.
4. All threaded rod, rod supports, bolts, anchors, nuts and washers for valve assemblies and piping to be stainless steel. All hangar rods must include locking nuts, lock washers or double locking nuts.
5. Wall mounted or ceiling mounted unistrut hangars shall be hot dipped galvanized with painted ends. Wall supports shall be welded strut type B Line model B3064 and B2000 series with brackets Model No. 3066 or 67 with adjustable steel pipe roll Model no B3120 or 3110. For smaller pipe Jhook hangars Model no. B3600 may be used.
6. Cast in place concrete inserts painted steel B line B2500 or 3014N. Inserts shall allow for lateral adjustment and must match rod size. Where continuous inserts ar located the galvanized steel insert must be painted with epoxy prior to installing and must be minimum of 12 gauge ASTM A1011 Grade 33 with Styrofoam and have a load rating and be installed to support the piping and or loads hung off of the hangar with a minimum of 2,000 pounds per foot. B221, 321 or 521. Proper Channel nuts for this application shall be used.
7. Floor mounted piping or equipment fiberglass designed and approved by the manufacturer for the weight, vibration, spacing and thrust for this type of installation. All floor supports shall be have fiberglass or PVC floor flanges or separation thereof to the concrete floor or pads.
8. All anchors and or bolts and washers shall be galvanized steel except in balance tank or wetted areas which shall be stainless steel nuts bolts lock washer and related hardware.
9. All turns in piping shall have horizontal thrust blocks braced to the wall or floor to prevent piping from movement.
10. Preferred method for hanging piping is on wall of mechanical room. In mechanical room any ceiling mounted piping shall disperse the load over structural members.
11. All piping shall be installed so pipe does not move when the pump is turned off or on. All piping shall be plumb and level in pool filter room.
12. All hangars shall be placed at valve locations.
13. Multiple hangars, gang hangars or unistrut pipe racks must be minimum of double back 12 gauge hot dipped galvanized ASTM A1011 Grade 33, 2 5/8” or greater with verification of the manufacturer and must comply with the information as stated herein and is in accordance with the manufacturer and the piping will be properly supported by the ceiling, truss, floor, deck ect. Roof deck, truss or beam supports will not be changed modified or increased to carry the load of any of the piping systems.
14. Make allowances in all piping for expansion and contraction.
15. Minimum Guideline for Maximum spacing for pipe hangars is as follows (additional supports and or spacing may be required based on manufacturers or structural engineers determination related to conditions of building members):

SCH 80 PVC Piping	Max. Spacing	Round Rod support (min.)
3/4" - 2"	5'-0"	3/8"
2 1/2" - 4"	6'-0"	1/2"
6"	6'-0"	3/4"
8" - 10"	6'-0"	7/8"
12”- 16”	8’-0”	1”

C. Valves:

1. The pool contractor shall supply the following George Fisher, Astral or Nil-Cor Valves: main drain, perimeter overflow, balance tank to waste, overflow to waste, main drain to waste, filter, filter pump(s) to waste, drain pump to waste backwash drain, pump suction(s) and discharge(s) and filter water supplies and all other required valves to achieve a complete installation and fully functional system.

2. Valves shall be of the filter water type butterfly PVC with polypropylene disc, stainless steel shaft, EPDM seals and stainless steel stops. All valves in the balance tank shall be operable from the floor of the filter room via stainless steel sleeves with stainless steel caps, stainless steel extensions, stainless steel guide sleeves thru balance tank via gear operators for each valve.
3. Valves shall be lockable in position. Valve are to have gear operators for all valves 3" and larger in the filter room.
4. All connecting hardware in balance tank shall be to flanges shall be with stainless steel bolts, nuts and washers.
5. All valves and or connecting hardware in the filter room non-submersed and above the filter room floor shall be galvanized steel.
6. Float valves in the balance tank shall be constructed of stainless steel and designed for submerged service. The valve body shall be fabricated of Schedule 10 T304L stainless steel with 1/4" thick standard flange pattern. The internal disc shall be 12 gauge T304L material and positioned with 1/8" opening around the perimeter of the disc. The valve body shall incorporate exterior stops constructed of T304L stainless steel to define the allowable range of float arm motion. The valve shall have valve stops to secure the positioning of the valve disc. The dual ball floats shall be constructed of T304L stainless steel and be 7" in diameter with internal weighting. The floats shall also be adjustable using sliding collars.
7. Valves must have the Cv rating as indicated for the George Fisher, Astral or Nil-Cor valve. All stainless steel bodied valves may be used.
8. Furnish and Install New main drain and Gutter actuators with Series 30 Bray valves with undercut discs. Fisher 1051 and 1052 with positioner or Mermade Level Control Valve Assembly. Actuator valves on gutter line and main drain line to fail closed. The gutter and main drain valve shall be normally closed to prevent flooding during periods of a power failure. Furnish and install a new stainless steel pilot valves mounted in the balance tank with accessories. Furnish and install 1/2" CPVC pilot line with 1/2" in-line strainer, 1/2" brass needle valve, and 0-60 2 1/2" pressure gauge. Valves to be controlled from pump pressure. All control piping shall be CPVC and horizontal runs shall be continuously supported in FRP unistrut.

D. All pool recirculating piping in the pool equipment room 3" and larger shall be water tight gear operated George Fisher, Astral or Nil-Cor valves with PVC disc, EPDM. Valves smaller than 3" shall be PVC true union, full port and three piece construction. No valves shall be bolted directly to any pump where the valve or valve disc may interfere with the performance of the valve. Other types of valves may be submitted as an alternate for consideration provided they are submitted and comply with the information as stated herein.

1. All check valves shall be non-slam type check valves, ANSI 300 flanged furnished and installed for all pumps and be located above the eccentric fitting of the pump and shall be Technocheck or Centerline Stainless steel Series non-slam, double door and match return line size. Valve shall be elastomer hinge style 5000 Series with epoxy coated cast iron body with 316L stainless internals, 316 stainless steel spring with EPDM member materials or Centerline Series 800 with stainless steel, elastomeric lined 316L stainless fitting. Crane, DeZurik with stainless steel doors and hinge pins all with stainless steel bolts, connections and fittings
2. Any valves to be controlled above 5' in height shall be accessible from the floor of the filter area and clear below and shall be gear operated chain operated with #16 brass or stainless steel chain.

E. All piping and or valves in balance tank shall be supported and held in place with stainless steel hardware with threaded rod and or supports.

1. In all wetted areas all PVC or Stainless Steel flanges shall be installed with stainless steel nuts and stainless steel bolts, stainless steel washers or threaded stainless steel

rod. All nuts shall have stainless steel lock washers or lock-tite. Bolt ends shall be filed or ground to eliminate any burrs.

2. In filter room PVC or Stainless Steel flanges shall be installed with galvanized steel nuts and galvanized steel bolts, galvanized steel washers or threaded galvanized steel rod. All nuts shall have stainless steel lock washers or lock-tite. Bolt ends shall be filed or ground to eliminate any burrs.
3. Valves in balance tank shall have valve stops, sleeves, covers, extensions and gear operators for operation of valves above the floor of the balance tank.

F. Influent and effluent piping for pool boilers shall be NSF approved, CPVC with CPVC to Schedule 80 PVC Flanges with gaskets, stainless steel bolts, nuts and lock washers.

G. All wafer, float or check valves shall be furnished and installed with PVC Flanges, stainless steel bolts, stainless steel nuts and stainless steel washers and lock washers except in the pool equipment room which can be hot dipped galvanized steel nuts, bolts and washers. Liquid "Cold galv" shall be used to touch up any areas where galvanizing may have been stripped away.

2.34 FLOW METERS:

A. Both Pools shall have a means of measuring flow by use of a flow meter and gauges located on each of the pumps.

B. The filter flow meters measuring filter and backwash flow rates shall be an assembly consisting of a Signet 2551Magmeter with Signet 9900 flow instrument, transformer, universal adaptor, 4 to 20mA input polypropylene and 316L St.St. sensor body and electrodes, programmable, EPDM rings and relays. Flow sensor wired into the display. The sensor shall be installed with saddle fitting or clamp on fitting for larger pipe and wired into the controller and flow instrument with 24 volt power with 4 to 20mA signal by the pool contractor. The flow sensor shall be fabricated of stainless steel. Internal circuitry eliminates the need for magnets. Unique rotor has bearing design increased reliability. The flow sensor shall be accurate to +/- 1% of full scale reading with repeatability of +/- .5% of full scale. The flow sensor shall be set for mid range on the gauge scale. The flow meter shall be calibrated from the pump curve and gauge readings. Install flow meter sensors in a straight pipe with no changes in direction for 10 pipe diameters downstream from the bypass in the return line and 5 pipe diameters downstream to the nearest obstruction or fitting. Flow meters sensor shall be 5-24 VDC 1.5ma and monitor is 12-24 VDC 10 watts max. One flow control valve shall be placed 5 pipe diameters upstream from each of the flow meter sensors and 10 pipe diameters downstream from each flow meter sensors.

2.35 AUTOMATIC WATER LEVEL CONTROLLERS:

A. Pool shall have an automatic and manual fill with overflows from the balance tanks or direct sensing. Pools shall have a device allowing for 3” manual and automatic makeup water in the balance tank. Watts No. 900 RPZ 3" fill shall be provided from the filter room. There shall also be a 3” quick fill for the Therapy Pool from the Competition Pool dive spray control.

B. There shall be an automatic water level furnished and installed for the Pool. Auto fill for the pool shall be Cla-val Model No. 124-01 bronze body, bronze disc retainer and diaphram washer, stainless steel trim, disc guide, seat and cover, buna N disc, nylon reinforced buna N rubber diaphram, stainless stem, nut and spring, stainless steel float valve as indicated on the drawings. Float operated fill valve shall be complete with stilling chamber, X46 flow clean strainer, CK2 cock (isolation valve), closing speed control, independent operating pressure, speed control (opening) X 43 "Y" strainer. Float valve is non modulating controlling the level in the tank. Valve is designed to open fully when liquid level is reaches the low point and preset high point. The valve is hydraulically operated diaphragm valve with the pilot control and float

mechanism mounted on the cover of the main valve. The stainless steel float mechanism shall be located in a 10" diameter PVC stilling well. Stainless Steel Float shall be mounted to a stainless steel rod.

C. Also acceptable is to furnish and install electrode sensing water level controller for the Therapy Pool. Link, Gem, Blue/White, Neptune Benson or Water Witch automatic water level controllers provided they comply with the information as stated herein. Furnish and install Level Link 6200 Liquid-level indicator and control unit. NEMA 12 Enclosure with clear cover houses level indicator panel. Optimum water level indicator hi-level, low-level and adding liquid indicators. External alarm interface. 24-hour clock for selection of acceptable fill times. Clear PVC level sensing chamber separate from level control unit. ¾" brass NC solenoid valve provided.

1. It shall be the electrode probe type.
2. The electrodes shall be installed in the view tube
3. The electrodes shall be placed through the top of the holder, which is to be located above the rim of the balance tank
4. The sensor shall have a repeatability of .05" WC.
5. The switch shall be connected to the pool by a water sensing line complete with shut-off valve and air release drain cock.
6. Sensor and a 3/4" UL approved normally closed 24 volt slow closing solenoid valve with manual override, sensing delay to prevent valve chatter and 7 day 24 hour programmable time clock and flow adjustment control shall be supplied.
7. Auto fill to be set to fill pool via an air gap above the balance tank. Mount control and electrical sensor on balance tank wall @5' above the floor and not on the open side of the balance tank wall.
8. Secondary contacts shall control the high level in the tank with an additional set of sensors and control set to turn off the fresh water fill solenoid valve.
9. All sensor wire in pvc conduit, junction boxes and power in pvc conduit by Pool Contractor.

2.36 UNDERDRAIN MANHOLE, ALUMINUM DOORS AND LADDER RUNGS:

A. Access hatch into balance tank shall be furnished as indicated on the drawings. Pool Contractor shall verify exact location so that the hatch does not interfere with piping, equipment and valve extensions. The hatch shall be a single door 3'-0" X 3'-0" for the balance tank. The channel and pan shall be 1/4" clear anodized aluminum. Hinge shall be constructed with 316 stainless steel tubular type operator's spring operated with a lock to hold open. All hardware shall be 316 stainless steel with a lockable latch. Apply chemical resistant finish to the interior of all components. Door shall be as manufactured by Nystrom or Bilco with solid lockable aluminum cover. Any exposed concrete areas including to the entire top of the concrete decking at the balance tank door shall be coated as described in the waterproofing section herein.

B. Furnish and install ladder rungs (10 and 5) for each balance tank. Ladder rungs to be self-securing type set with epoxy. 1/2" Grade 60 steel with manufacturer applied co-polymer polypropylene coating.

C. Furnish and install 5' diameter concrete reinforced manhole. Manhole shall be precast concrete sections. Each section shall have manufacturer installed ladder rungs for access to bottom of manhole. Bottom section shall be installed on a base furnished by the manufacturer of the type to properly support all sections. Each section shall be bedded in nonshrinking waterproof cement to achieve a waterproof joint at each section. The bottom of the manhole shall be minimum 24" below the invert of the underdrain line. Seal underdrain with waterproof cement to prevent leakage. Backfill around entire manhole to prevent movement of the manhole during the backfill process.

D. Access into the manhole shall be through a Bilco door 5’ X 5’ Type TRD flat aluminum as manufactured by Bilco or Nystrom with solid aluminum. Aluminum, 300# wt. Access door with all 316 stainless steel hardware throughout set in concrete slab around the outside of the manhole. Continuous stainless steel hinges shall have compression spring enclosed in telescopic tubes. Vinyl grip handle shall provide release for closing. The door shall be designed to allow for a live load of 300# lbs. per square foot. Installation shall be according to Manufacturers instructions. Access door to be lockable with a pad lock. Set door with pitch of slab. Field apply corrosion resistant coating to the underside of the door and components.

E. Underdrain manhole shall have ladder rungs installed by the manufacturer @12” apart from the top entry point to the bottom of the manhole.

F. 6" rigid PVC Schedule 80 underdrain line from manhole to pool by Pool Contractor. See Civil for location, elevation and invert connections to the manhole. A 6” drain line shall be installed by Civil into the manhole with wafer style valve to allow the owner to shut off the storm connection side during periods of potential flooding from the storm water.

2.37 FRESH WATER FILL, TANK VIEW TUBE AND BALANCE TANK VENT:

A. Pool shall have a means of manual fill provided in the filter room and run to the Balance Tank and Auto fill.

1. Manual fill 3" valved in the filter room and piped into the fill area by Division 13 Contractor and protected by the Pool Contractor with a Watts No. 900 reduced pressure zone backflow preventer located in the pool equipment area. Pool Contractor to run 3" manual and 1" auto fill at balance tank access door. Furnish and install all piping connections in the pool equipment room including connections to the filter control valve.
2. Furnish and install a 4” PVC vent thru the balance tank for connection to ventilation fan and a 3” vent and U set @12” above the top of the tank for ventilation air. Vent to outdoor by other than Div 13.

2.38 MAIN DRAIN OUTLETS AND HYDROSTATIC RELIEF VALVES:

A. All Pool drains shall be encased in concrete and reinforcing steel to drain 100% of the water from the pool via pool pump and gravity flow to drain into a separate floor sump provided by with a minimum of a 6" air gap.

B. All drains shall be VGBA compliant under APSP 16/ASME A 112.19.8. Daldorado Sumps with 25 year service life 18” X 36” X 28 sump and suction outlet cover, Floor 2,480 each flow with 401 square inches of open area with 61% Open Area. VGBA compliant and NSF Approved under main drain outlets. All covers shall be secured in at least 4 places with stainless steel screws. Box shall have no leak flanges around the box and around all pipe connections.

1. Drains shall have a Maximum velocity shall be 1' per second. In the bottom of each box shall be a 2" hydrostatic relief valve. The body of the hydrostatic relief valve shall be high impact schedule 80 PVC pipe, perforated with 3/16" release hydrostatic pressures under the pool. The commercial valve shall be 12" beneath the check valve. At the end of the perforated section, the hydrostatic relief valve body shall be capped to prevent clogging and at the top there shall be provided a check valve allowing water to enter from under the pool only. The check valve shall be of heavy PVC construction with a machined interior to insure water tightness.
2. Pipe connection shall have a minimum of 1 1/2 pipe diameters from the top of the grate to the pipe connection in the box.
3. Flow for Competition Pool filter system is 2,308 GPM. Each drain shall flow @577 GPM. Maximum velocity is .461’/sec. thru each drain.

4. Flow for the Therapy Pool filter system is 262 GPM and 200 GPM for the jet pump for a total flow of @462 GPM. Maximum velocity is @.10'/sec. thru each drain.

C. Drains shall comply with ANSI/APSP 16-2011, which replaces ASME/ANSI A112.19.8-2007 and addn. 8a-2008. Virginia Graeme Baker Pool and Spa Safety Act, Consumer Products Safety Commission and Association of Pool and Spa Professionals.

D. Floor drain sump shall be covered with 1 ½" X 1 1/2" X 1 ½" FRP grating with 1 ½" bearing, set flush with filter room floor.

2.39 AUTOMATIC SWIMMING POOL WATER TREATMENT AND CONTROL SYSTEM:

A. Each Pool Shall have an Integrated water treatment control system shall provide continuous monitoring and control of sanitizers, oxidizers, pH, temperature and system flow rate. Installation of the system shall be per the manufacture's specification. A factory trained/authorized representative shall provide training to the owner. The specified controller is a BECSys7 with all features as manufactured by BECS Technology including flow meter read out and 4-20mA control sensor. Chemtrol, Becs and Prominent are an equal based on the information contained herein. All data and electrical connections to controller are by the Pool Contractor.

1. The controller shall have 120 VAC; <1A fused input and shall come in a NEMA 4X polycarbonate enclosure. The controller shall come with 4 integral 3 A solid-state relay outputs that shall allow assignment of master alarm and pump control. The controller shall carry the following product certifications: UL 61010-1, (CSA) C22.2 Number 61010-1, European Union Low Voltage Directive 73/23/EEC EN 61010-1, and FCC part 15 sub part B. Controller shall include a LAN base communications.
2. Controller shall be complete with 32 gig I pad interfaced with controller readout.

B. Controller Functions for Water Chemistry Control

1. Continuously monitor and control pH, ORP and Cl/Br ppm
2. Selectable control of sanitizer through ORP and/or amperometric ppm
3. Selectable on/off feed or time based proportional feed
4. Time based proportional feed cycle time will vary based upon variance of measurement to set point
5. Proportional band of 0 to 2.0 pH units, 0 to 100 mV, 0 to 2 ppm with increased offset from set point causing increased feed system operation
6. The controller shall regulate the output of the chemical feed system from 10% to 100% of capacity
7. Sanitizer min/ max residual selectable for non-primary control method (i.e. ORP control can have min/ max amperometric ppm value)
8. Feed duration alarm circuit shall disable appropriate feed and activate alarm circuit
   a. Sensor failure
   b. Chemical feed malfunction
   c. Low chemical feed inventory
   d. Overfeed time (programmable from 0 to 18 hrs, 1 minute resolution)
   e. Visual Hi/ Lo pH, ORP and ppm alarms
   f. Hi/ Lo pH alarm shall disable sanitizer chemical feed based on pH feed direction (programmable)
9. Flow Monitoring with Paddlewheel flow sensor, Flow rate, gpm/ lpm, Flow volume totalizer
10. Temperature control, heater on/ off and Energy saving mode, on/ off set time and secondary temperature set point.

C. Control Displays shall be a backlit LCD with 12x40 alpha/ numeric, graphical characters that will continuously display information related to the following:

1. pH: 0.0 to 14.0, 0.1 or 0.01 resolution (programmable)
2. ORP: -1000 to 1000 mV, 1 mV resolution
3. PPM: 0 to 20 ppm 0.1 or 0.01 resolution (programmable)
4. Temperature: 32-212°F, 1°F resolution; 0-100°C, 1°C resolution
5. Flow rate: 0-8800 gpm, 0.1 gpm resolution; 0-33265 liter/min, 0.1 liter resolution
6. Flow volume: 999 trillion gallons, 1 gallon resolution; 999 trillion liters, 1 liter resolution
7. Chemical Inventory: programmable range 0.1 ft., 0.1 m
8. Heat set point & alternate heat set point (4 Event 28 day timer)
9. Alternate ORP control set point (4 Event 28 day timer)
10. Cl/ Br booster ORP and/or ppm feed points with a separate trigger set points
11. Ozone ORP and/or ppm set points
12. Dechlorination ORP or ppm set point
13. Superchlorination ORP or ppm set point
14. Display of Ca hardness & alkalinity
15. Langelier & Ryznar index calculated
16. Smart menus w/ integrated help

D. Feed Mode and Data Logging The controller shall have auto/ manual off/ manual on, which will provide on/off or proportional feed modes. The Data Logging shall have 512K battery backed-up RAM for input level recording and events.

1. Seven input level recordings for 10 to 56 days depending on sample rate (2 to 10 minutes)
2. pH, ORP, ppm, Temperature
3. Flow Rate
4. Two chemical inventory levels
5. 1100 events over a maximum of 14 days recording all alarms, menu changes and operational cycles related to the following parameters:
   a. pH, ORP & ppm Hi/ Lo w/ interlocked failsafe
   b. Temperature Hi/ Lo w/ heater failsafe
   c. System Lo flow & sample stream No flow
   d. Chemical inventory level
   e. Battery Lo

E. Safety Systems: The controller shall have three security password levels with six for operators, two for managers and one for the distributor. The controller shall also have programmable alarms (some disabling chemical feed) for pH, ORP, free chlorine ppm, temperature, no and low flow and chemical overfeed. All alarm conditions shall activate a master alarm relay.

1. Alarm Indicators: The controller shall have a flashing LED alarm indicator with an auto polling LCD display of Hi/ Lo out of range, overfeed, low system flow and sample stream no flow.

F. Remote Operation: The controller manufacturer shall provide BECSys for Windows™ based remote operation software with graphical display, for interactive connection and direct connect capability to a PC with the controller. Operational data logs, graphs and event calendars shall be included with the software.

G. The controller shall have four (4) standard sensors and three (3) optional sensors.

1. Standard Sensors**:** Potentiometric (pH and ORP) The standard pH and ORP sensors shall have an ABS body with ½" NPT process connection. The standard pH and ORP sensor shall contain 32 milliliters of electrolyte gel. Inorganic electrolyte shall be used to avoid breakdown in the presence of strong oxidants. Each potentiometric sensor shall

have a porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction. The pH sensor range shall be 0 - 14. The ORP sensor range shall be 0 - 1000 mV. Each potentiometric sensor shall have a silver/silver chloride (Ag/AgCl) reference element. The pH element shall be a General Purpose Glass Membrane. The ORP sensing element shall be a solid platinum or gold band, not a plated substrate which is susceptible to abrasives. The ORP sensing element shall have a minimum of $1cm^2$ surface area. The environmental characteristics for the potentiometric sensors shall be: temperature range 0 - 80 degrees C, pressure range 0 - 100 psig.

2. Temperature: The standard temperature sensor will be a 2 wire, 100 ohm resistive temperature detector (RTD) with a 0.00385 Alpha.
3. Pressure: Each flowcell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 ½" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to –30 in./ Hg.
4. The controller shall provide an optional measurement of pool circulation flow rate utilizing a frequency output paddle wheel flow sensor with a 50 ft. cable and saddle.
5. Amperometric Sensor or Free Chlorine sensor shall be an amperometric probe system with a measuring range of 0.05 to 20 mg/l with a fully selectable scale and a temperature range of 36°-113° Fahrenheit. The amperometric probe shall come with a PVC body, replaceable PTFE membrane and electrolyte, gold cathode and silver/ silver chloride anode.
6. Liquid Level Sensor shall provide an optional measurement of two liquid levels for chemical inventory. The sensor shall be field-calibratable allowing for site modifications within an operating range from 3 ft to 15 ft.
7. Flowcell shall have a PVC body with two ½ -14 FPT ports for potentiometric probes, two ¼-18 FPT ports for temperature probe and acid wash injection, and a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and standard reed or optional rotary flow switch.
6. Chemical control to be installed by the pool contractor with the sensors and the feeder lines and or solenoid valves into the system. Contractor or qualified representative of the manufacturer shall check out final installation, start-up, calibrate and instruct the owners representative.

H. The controller shall trigger a Fail Safe alarm if a chemical feed relay remains on longer than the programmable Feed Limit Timer. Chemical feeds shall automatically be disabled if the corresponding reading goes into a Fail Safe alarm condition.

1. Dedicated Emergency Off button on the front panel of the system, which immediately halts all chemical feeds and control outputs when pressed. This feature shall be password protectable, which shall require entry of one of the Security passwords.
2. Safety shield or other mechanism for allowing fuse replacement without access to high voltage circuitry or wiring.
3. Controller shall have three security password levels: six for operators, two for managers and one for the distributor providing for a history of access identified by the user.
4. 512K battery backed-up RAM for input level recording and events. All input level shall be recorded for 10 to 56 days depending on sample rate (2 to 10 minutes).
5. Record and maintain the latest 1100 events over a maximum of 14 days recording all alarms, parameter changes**,** user logins, and operational cycles related to all control features.

6. Signal all alarm conditions with a bright red flashing LED on the front of the controller, activation of a master alarm signal provided as a dry contact relay enabling the use of 0-240 VAC alarms and each active alarm listed on the LCD display along with time activated.

I. The controller shall come with a standard, integral 100BaseT Ethernet connection. The controller shall be capable of providing Remote Access via PC with Ethernet connection and Alarm Notification via email or text message via an Ethernet connection to the Internet. Capable of providing Remote Access via PC with and Alarm Notification. The controller manufacturer shall provide BECSys for Windows™ graphical remote operation software, for interactive connection to the controller from a PC. Remote operation software shall be Vista-compatible, and have all of the following operational modes but not limited to:

1. Site Data Base – for organizing and accessing multiple controllers on site, or at multiple sites,
2. Graphical Operator's Console – to display current readings, setpoints, alarm points, Ryzner in an easy-to-read graphical mode,
3. Data Log Graphing – to review data logs with time-synchronized event data; data log traces shall be configurable, with color and line style selectable by operator,
4. Full Menu Tree – All system parameters accessible through a full menu tree interface.
5. Auto-Polling – to allow automatic download of data logs from all controllers in site database.
6. Alarm notification to 8 different recipients. Each recipient shall be individually configurable to receive alarm notification by system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered. System type such as email, fax or numeric pager with serial number, location, system ID, and all active alarm.

J. The controller shall be housed in a NEMA 4X polycarbonate enclosure with PVC flow cell with PVC body with two ½" NPT ports for pH and ORP sensors, two ¼"NPT ports for temperature sensor and sensor wash acid injection, and a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and standard reed or optional rotary flow switch. Each flowcell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 ½" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to –30 in./ Hg. The flowcell shall have a teflon body with two ½" NPT ports for pH and ORP sensors, two ¼"NPT ports for temperature sensor and sensor wash acid injection, and a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and standard reed or optional rotary flow switch. Each flowcell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 ½" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to –30 in./ Hg. Controller shall be covered by a standard manufacturer's 5 year warranty. Standard sensors shall be covered by a standard manufacturer's 2 year warranty. Optional sensors and flow cell components shall be covered by a standard manufacturer's 1 year warranty. The control system shall be provided with on-site start-up, on-site operator training, and 1 year on-site warranty service performed by a representative trained and authorized by the controller manufacturer.

K. Controller shall be hooked up to a dedicated 110 volt 20 amp circuit from the pool control panel with connection provided by the Electrical Contractor supervised by Pool Contractor. Controller shall interface with the circulating pumps to turn off the controller and chemical feed pumps when the pump is shut off or in the event of a power failure. This is over and above the built in flow switch.

2.40 CHEMICAL FEEDERS:

A. Accutab or Pulsar (including pump and hookups) Chlorine and Accutab or Pulsar (Including pump and hookups) acid feed system shall be Installed and shall be controlled by the chemical controllers direct wired into the controller by the pool contractor for:

1. Protective goggles, Respirator with replacement cartridge, Face Mask, PVC Gloves, 55” apron Recreonics Model No. 12-638 thru 677
2. Chlorine Sign, Acid Sign, Enzyme Sign on each of the containers. Recreonics Model No. 53-150 thru 155.
3. Furnish and install spill containers under under chemical feeders. Each of the chemical storage containers spill florinated pallets with a capacity of at least 66 gallons and grating with 1.75" square openings and a 3/4" drain plug. Containers shall be Interstate Products Model No. UT-1233 51” X 51” X 10 tall. Maximum storage capacity of 6,600#.
4. Each Filter room shall have CO2 with the fill piped to the outside. Becs CO2 controller with Carbo-Mizer 750 High Capacity CO2 with regulator outside fill/vent lockable stainless enclosure. (2) 50# CO2 Storage container. All storage containers shall be chained to the wall in storage room on the first floor. Regulator shall be installed in filter room with the Pool contractor to wire CO2 feed regulator into the chemical controller.

B. Chemical Feed System shall be Pulsar or Accutab Calcium Hypochlorite Tablet Chlorination System complete. The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for Competition Pool and Therapy Pool. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator, electrical box, centrifugal pump, and balance tank for ease of installation and operation. The system shall be the Power Base Model 3150 and 3070AT by PPG Industries, Inc. Only Accu-Tab® Blue (or Blue SI) calcium hypochlorite tablets by PPG Industries, Inc shall be used, with the patented solution modifier and the patented blue colorant added for safety (to help prevent accidental mixing with other chemicals). System is NSF Approved under Standard 50 listed erosion feeder and tablet combination and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.

1. A maximum chlorine solution level of 0.05% (500 ppm) shall be maintained to prevent calcification in system components. Systems producing chlorine concentrations higher than 0.05% shall not be acceptable.
2. Delivery shall be by erosion feed technology to control accurate and consistent concentration limits in the chlorine treatment solution. Soaking type, spray and/or vortex technology systems shall not be acceptable.
3. The chlorinator and acid shall automatically and continuously feed a limited quantity of chlorine in solution as needed; when the system is not running, no more chlorine than that amount which can be fed in one minute or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
4. A pump wired to the system electrical box shall feed freshly mixed chlorine treatment solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
5. All piping in the chlorinator unit shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.

C. Tablet Chlorinator. Pulsar or Accu-Tab® chlorinators are designed exclusively for Accu-Tab® Blue (or Blue SI) calcium hypochlorite tablets by PPG Industries, Inc. Tablets are placed on a sieve plate inside the chlorinator; as water flows across the sieve plate, the tablets erode at a rate proportional to the flow rate.

1. Accutab Feeders shall be:

a. Competition Pool: Model 3150AT
b. Training Pool: Model 3070

2. A rotameter (flow-through) flow meter, measuring the flow of the water-dissolving stream to the chlorinator.
3. Flow Control Valve. PVC gate valve mounted in line with the flow meter allows operator to adjust flow of water-dissolving stream.
4. PowerBase units made of high-density polyethylene, PowerBase AT units made of PVC. Capacities: Model 3070AT
5. Primary Solution Tank Level Control. Made from Schedule 80 PVC and 316L stainless steel, this 1" float valve meters the tablet by-pass flow. The by-pass stream balances the variation in the water-dissolving stream. The float valve opens or closes to maintain the pump rate as it is manually throttled.
6. Secondary High Level Solution Tank Control. Prevents the solution tank from overflowing. High level: when activated, a switch opens the circuit to the solenoid valve, causing the valve to close.
7. Solution Delivery Pump shall be an optional constant run pump. Delivers chlorinated solution to the return line. A single-stage centrifugal pump is provided for systems with pressures up to 20 PSIG. (For systems requiring a discharge pressures greater than 20 PSIG, a custom selected pump shall be utilized.)
8. Solution Injection Pump Air Bleed. Used to prime the pump at start-up, or at any time, if necessary. Primary Backflow Prevention. A PVC-spring-assisted check valve prevents reverse flow of water into the system. Discharge Control Valve (manual). Used to balance system output water flow with system input water flow.
9. Nema 4X Electrical Enclosure. Aluminum Frame, Type 6061-T. Two electrical circuits are required for operation: (1) 110v 20 amp power, and (1) 110v control circuit from a pool controller.

B. Double wall chemical storage containers

1. Furnish and install spill containers under (2) Pulsar Feeders and (2) Bisulfate (Acid) Feeders and (2) additional spill pallets for owners chemical storage. Each of the chemical storage containers spill florinated pallets with a capacity of 66 gallons and grating with 1.75" square openings and a 3/4" drain plug. Containers shall be Interstate Products Model No. UT-1233 51" X 51" X 10 tall. Maximum storage capacity of 6,600#. urnish and Install (4) 120 gallon DCT Sodium Bisulfate (acid) and enzyme storage container(s) (33" dia. X 44"). Tanks are based on Snyder Industries double wall linear polyethylene storage containers constructed of HDLPE under ASTM D-1998. All Storage tanks shall be set over Interstate Products Spill Palets.
2. Protective goggles, Respirator with replacement cartridge, Face Mask, PVC Gloves, 55" apron Recreonics Model No. 12-638 thru 677
3. Chlorine Sign, Acid Sign, Enzyme Sign on each of the containers. Recreonics Model No. 53-150 thru 155.

2.41 TEST KIT:

A. Taylor Series K-1741C; Professional Series test kit complete. Chlorine shall be capable of measuring chlorine residual to 10 PPM. DPD Test kit shall test ranges of chlorine from 0 to 10 PPM, Free Available and Combined chlorine, PH 6.8 to 8.4, Total Alkalinity, and Hardness. One separate Taylor series test kit capable of measuring of chlorine residual to 50 PPM.

2.42 PORTABLE VACUUM PUMP AND AUTOMATIC CLEANER:

A. Furnish and install Spectra Vac I electric vacuum system Model No. 10700 Hramsco BKP 1HP 13.8 amps, 5300 GPH, 105 sq.ft. filter and 1.5" connections. Electric pump with a 50' heavy

duty cord and GFCI shock protector and twist lock type connection in accordance with current NEC requirements. Cart to be of stainless steel with 13" pneumatic tires. Unit shall have shut off valves for both influent and effluent lines with quick disconnect hose connectors. Vacuum cleaner shall have an over all width of 18". The 1-1/2" hose connection. Hose shall swivel 360 degrees and is tapered to accommodate the hose without the use of hose clamps. The white rubber wheels and nylon brush shall be adjustable. A hard plastic flap shall be provided at the front and rear edge of the head to dislodge foreign caked material. The cleaner shall accommodate flows ranging from 50 to 75 GPM. The swivel handle shall permit the cleaner head to remain parallel to floor at all times. Vacuum set shall include head, 20' and 50' of 1-1/2" floating hose with skimmer adaptor, one 8' to 15' handle and hose sleeve and nut.

B. (1) Automatic pool cleaner shall be 3002 Dolphin Commercial Automatic Cleaner Complete with caddy and remote, extra bag and replacement scrubbing brush.

C. Furnish and install 10 fiberglass hooks at the owners direction for storage of vacuum hose and equipment.

2.43 HANDRAILS, GRAB RAILS, CUSTOM HANDRAIL, PUMP PIT STAIRS AND HANDRAIL :

A. Furnish and install custom stainless steel Hand rails on both sides of steps. Rails shall be stainless steel fabricated from 1.50” OD X .120” wall, type 316 stainless steel. Exposed surfaces shall be Powder coated and protected. All in pool hand rails shall be double rail with handicap returns on the deck side of each rail. Use bronze anchors on the deck side of the rail and Model No. 24090 stainless steel anchors on the water side of the rails to secure handrail and cover with escuteons. Intermediate rail shall be half way between the top rail and the step treads. Rails shall be by SR Smith, Paragon or Spectrum Products.

B. Furnish and install grab rails Spectrum Products Cisco Model No. 35121. Rails shall be fabricated from 1.50” OD X .120” wall, type 316 stainless steel. Exposed surfaces shall be Powder coated. Deck anchors Spectrum Stainless Steel No. 24093 1.5" compression anchor, 24094 spanner wrench, 24098 compression anchor cap, 23636 removal key, 30038 bumpers, 24095 escuteons. All tile recessed in-wall steps shall be incorporated into the pool as indicated on the drawings.

D. Furnish and install Custom Handrail down ramp into Training Pool. Rails shall have handicap returns on ramp and step rails. Rails shall be fabricated from 1.50” OD X .145” wall, type 316 stainless steel. Exposed surfaces shall be powder coated. Deck anchors Spectrum Stainless Steel No. 24060 1.5" X 6” deep anchor.

E. Furnish and install Lapeyre stairs into pump pit. Stairs shall be 56 degrees and constructed of Hot Dipped Galvanized with optional handrails. Stair shall be installed with all stainless steel hardware and anchors.

F. Furnish and install 1 ½” or 1.9” OD X .109 wall x 42” tall steel hand rail around pump pit constructed of Hot Dipped Galvanized painted with epoxy paint. Hot Dipped Galvanized shall be with (1) primer coat and (2) coats of epoxy paint around pump pit. Grout all supports into place with non shrink grout. Furnish and install 1/8” stainless steel chain at top of stairs. Section directly adjacent to the pumps shall be set with wedge type or 10” deep s.s.anchors to remove the rail and access the pumps. Railing shall step up at balance tank location and consist of a double rail.

2.44 LIFE LINE AND RACING ACCESSORIES:

A. Furnish and install all anchors embedded into the pool shell for connection to the life line and racing lane lines. All metallic bodies shall be cast bronze with heavy chrome plate on all surfaces. All anchors shall be pinned into the pool shell with minimum #4 dowel rods. Lifeline

floats shall be 5" diameter x 9" long. Cup anchors are eyebolt design suitable for 3/4" terminals. Twelve (12) lifeline floats shall be provided for each life line. Lifeline shall be blue and white polyethylene rope. Lifeline rope hook terminals shall be connected to the lifeline by a fusion of the polyethylene rope in the conical shaped anchor terminal. Paragon #14-501 or Recreonics #14-501 Cup, 14-456 Hook, 14-438.BW Rope, 14-404 Float

2.45 DECK DRAIN OVERFLOW SUMP AND BACKWASH SUMP:

A. Grating shall be Gator Deck Pultruded grating FRP grating to be Isophthalic-Polyester or Vinylester) pultruded and shall meet ASTM E-84 Class 1 Flame Spread of less than 25 and ASTM D-635 self-extinguishing. Grating shall be GatorDeck I4010 1" deep .6" top flange and 1" bar spacing. Color shall be Gray and supported every 4' with the fiberglass strut system. Grating and Stair Treads shall be made from pultruded bearing bars and cross rods. Grating shall be assembled using a locking cross-rod design that makes a permanent connection between the cross-rod and bearing bar, and shall completely bonded into a one-piece panel. Shelves shall have a square tube nosing, Grating clips with 316 stainless steel. Minimum of 4 clips per piece. Manufacturers Seasafe Inc., Lafayette LA, (800) 326-8842 or approved equal

B. All FRP Grating set in concrete openings shall have a FRP embed angle frame. The minimum physical properties shall be:

Property	ASTM	Longitudinal Direction	Transverse Direction
Tensile Stress	D-638	30,000 psi	7,000 psi
Tensile Modulus	D-638	2.5 x 106 psi	0.8 x 106 psi
Compressive Stress	D-695	30,000 psi	15,000 psi
Compressive Modulus	D-695	2.5 x 106 psi	1.0 x 106 psi
Flexural Stress	D-790	30,000 psi	10,000 psi
Flexural Modulus	D-790	1.8 x 106 psi	0.8 x 106 psi
Modulus of Elasticity, E	Full Section	2.8 x 106 psi	

B. All structural shapes shall be fabricated per the drawings with good workmanship, closely fitted joints, and finished true to line and in accurate position to permit installation and proper joining of parts in the field. Use 316 stainless steel bolts and washers. All joint surfaces to be bonded shall be abraded to remove surface gloss and be free of burrs or other foreign materials that would prevent proper adhesion. Use high-strength epoxy adhesives designed for FRP use and mechanical fasteners.

C. Furnish and install Floor drain Sump and Backwash Sump are based on Prefabricated concrete sump with grate cover. Grate shall be bolted down with hardened 5/8" stainless steel bolts, nuts and lock washers to a stainless steel flange provided by the Mechanical contractor. Concrete prefabricated backwash sump with concrete bottom and waterstops shall be in one piece and waterproofed as stated in another section. Modular in design and shall provide a 1 ½" deep recess or bell top to accept a custom FRP grating. Backwash sump shall be covered with 1 ½" X 1 1/2" X 1 ½" FRP grating with 1 ½" bearing, set flush with filter room floor.

D. Backwash sump, overflow/deck drain sump shall be covered with FRP grating as manufactured by Fibergrate. Fibergrate type IFR polyester resin reinforced with fiberglass roving. Use 1" X 4" X 1" rectangular mesh to accept 300 pound load. 1" min. bearing on at least 2 sides of the grate. Resins shall be fire retardant vinyl ester meeting the requirements of Class 1 rating of 25 or less per ASTM E-84 and meets the self-extinguishing requirements of ASTM D-635. Color shall be yellow. Resin shall be UV inhibited and the composite shall include a veil on all

exposed surfaces. The top of the panels shall be covered with a bonded grit, baked epoxy, anti skid surface. Cut holes in grate as needed.

2.46 STARTING PLATFORMS AND ANCHORS:

A. SR Smith Velocity Long Reach Dual Post Platform with Track Start Long Reach Model No. VELOUR-DP-TS-SA. Standard Dual Post with Track Start and Wedge, Velocity dual post Model VELO-DP-TS-TA. Starting platforms with dual anchor side step, grab rails, foot chocks, powder coated stainless steel with anchors. Track Start Model shall be full height with 24" X 32" top sloped 10 degrees. Furnish and install 6" deep anchors for starting platforms at the 50 meter and 25 yard/25 meter courses. Platforms shall have new kick sand style tops. Height must allow for RJP tops and kick plate.

B. Platforms shall have wiring harness by Colorado Time Systems, marine deck connection and wiring from deck to bottom of platform and backstroke harness for each starting platform. Deck boxes shall be protected by the platforms.

C. Division 26 contractor to bond all anchors.

2.47 WAVE QUELLING RACING LANE MARKER LINES:

A. Each Lane marker lines shall be Competitor 6" Model for 50 Meter course and (2) 25 yard and (2) 25 Meter courses and shall consist of individual float segments measuring 6” in diameter by 1-15/16" wide, butted end to end on 5/32" clear vinyl plastic covered aircraft type stainless steel cable to form a continuous line. Each float shall be Competitor type, injection molded of ultra violet stabilized polyethylene with four (4) turbo-reactive vanes integrally molded on each side of central diaphragm at right angle to the center cable sleeve and with a peripheral ring wide joining the central diaphragm to the turbo-reactive vanes. The vanes should be curved into peripheral ring to catch and absorb the energy in the wave as it strikes the vane. Each float segment itself shall be buoyant and shall rotate freely about the cable. Lines shall be assembled at the pool to insure proper fit. Aircraft type coated stainless steel cable, one stainless steel extension draw bar spring, one stainless steel tension toggle, two stainless steel cable clamps, two cable thimbles, two stainless steel "S" hooks.

1. Racing lane marker lines shall be 15' at each end in a solid color for the 25 yard course
2. Solid extensions of 5 meters for the 50 meter course.
3. The break for the extensions shall be at the 5 meter marks or the end of the lane markers.
4. Three (3) discs of a separate color for each direction shall be installed designating the 15 Meter length for each course 25 yard and 50 meter courses and in each direction.
5. Install anchors pinned into the reinforcing steel as described in another section.
6. Furnish and install Competitor part No. 200384 converts 50 Meter lane lines to (2) 25 yard lane lines.

B. Furnish and install all anchors embedded into the pool shell for connection to the racing lane lines and life lines. All metallic bodies shall be cast bronze with heavy chrome plate on all surfaces. Spectrum SS Cup, coordinate bond with electrical contractor as required.

C. Each connection shall be custom made stainless steel rods with hooks shall be rubber coated and set in white PVC sleeves where the lane lines touch the top of the pool rim so cables and or fittings do not contact the tile surface. The connection to the wall anchor, S hooks and turnbuckel shall be over the gutter.

D. Twelve (12) lifeline floats shall be provided for each life line. Lifeline shall be blue and white polyethylene rope. Lifeline rope hook terminals shall be connected to the lifeline by a fusion of the polyethylene rope in the conical shaped anchor terminal

2.48 BACKSTROKE MARKER POST AND RECALL POSTS AND CABLES:

A. The backstroke marker post shall be Powder Coated Pentair U-Bend 8’-0” U Bend 2 post stanchion post with U-Hook. Item No. S14395C7, 7’-6” in length and fabricated from T316L Stainless Steel with 1.90 O.D. X .145 wall thickness. The post shall have a No. 320 grit finish or equal finish. The top shall be closed with an eye formed over the capped end. The eye shall be fabricated from 1/4 stainless steel rod. Anchors to be stainless steel (non-threaded cap). Set anchors 15' from end walls for the 25 yard course and 5 meters for the 50 Meter course.

B. Furnish and install stainless steel plastic coated cable to secure the backstroke flags for each of the courses and shall be connected with a stainless steel S hook to the posts. Backstroke flags across all areas shall have plastic coated stainless steel cable, stainless steel spring secured to the building wall with Hilti threaded stainless steel anchors and hooks for attachment.

C. Backstroke marker posts shall include adjustable sliding collars.

D. The Powder Coated Pentair recall post shall be 4'6" in length and fabricated from low carbon type 304 stainless steel with 1.09 O.D. X .145" wall thickness. The post shall have a No. 3 finish or equal. The top shall be closed with an eye formed over the capped end. The eye shall be fabricated from 1/4 stainless steel rod. There shall be supplied a stanchion anchor with removable cap (non-threaded cap). Line shall be constructed of 1/2" polypropylene red or yellow rope attached with a stainless steel S hook to the post. Recreonics Model #92-967. All bonding by Electrical Contractor

2.49 BACKSTROKE PENNANT LINE:

A. Backstroke pennant line shall be Nylon 12" X 18" triangular pennants with alternating colors. And individual numbers and letters spelling the school name or team name in the middle section of the pool. Colors by owner. The pennant line shall be Recreonics 92-306 and 92-307.

2.50 MISCELLANEOUS EQUIPMENT:

A. The pool brush and holder shall be permanently attached. The pool brush shall be 18" long with nylon bristles and rigid back. Holder bracket shall be of cast aluminum and shall be designed for easy attachment to standard 1-1/4" aluminum handle. Recreonics Model #10-135

B. Skimmer head shall consist of dual edge metal and plastic with fiberglass screen. Integral handle bracket suitable for quick attachment to a standard 1-1/4" diameter handle using bolts and wing nuts. The standard nylon net shall be attached to the groove and spline method. Net is 20" X 6" X 12" depth. Recreonics Model #10-118

C. There shall be 1 white life ring buoy furnished. Ring buoy shall be 24 inches in diameter and shall be made of foam styrene covered with heavy canvas duck, manufactured under codes and supervision of the U.S. Coast Guard. Ring buoys shall have 90' of 3" throw rope attached. Recreonics Model #12-252 White in color

D. Provide (4) four rescue tubes 2 made of closed cell Ensolite with heavy duty orange vinyl skin, quick release buckel and 6' tow line. Recreonics model #12-291. Provide 16’ rescue pole with blunt ends and life hook. Recreonics model # 12-239

E. There shall be one large first aid kit ARC approved. Recreonics Model No. 12-048 with minimum of 100 units of adhesive bandages, 2 units of 2” bandages, 100 unit of 3” bandages,

1 unit of 4” bandages, 2 units gauze pads 3’x3”, 1 unit of gauze compress 18”x36”, 2 units of gauze compress 24” x 72”, 2 units of 4” gauze roller bandages, 2 units of triangular bandages, 1 scissors, 1 tweezer, 2 ice packs, 2 latex disposable gloves, 1 plaster tape, clean up kit for blood spills Model No. 12-041. whistle Model No. 12-357, two each (4 total) resuscitation masks Model No. 12-438, 12-444.

F. Furnish Blood borne Pathogens Kit with gown, gloves, face mask with eye shield, plus body fluid clean up supplies. Recreonics Model No. 12-041

G. CJ Spineboard with nylon straps, head immobilizer, body straps, side roll ups, body straps, head straps, adhesive strips and staples. Spineboard shall be 76” X 20" and constructed of 5/8” marine plywood with capped wood runners. Capped foot and head bumpers. Handholds shall be cut into the board around the perimeter in 14 locations. Runners shall be installed on the underside of the board to raise the board 1/2" when placed flat. Recreonics Model #12-325

H. Furnish 12’ safety pole constructed of fiberglass with blunt ends and shepards hook. Recreonics Model No. 10-371 and 12-239.

I. (1) Lifeguard Chairs Furnish and install Tall Lifeguard chair side step with a platform height of 47” and a seat height of 64” includes umbrella guide and cup holder Recreonics Model No. 42-626.

J. Furnish spectator stanchions with intermediate chain. Mr. Chain heavy-duty model stanchions shall be substantial round posts with a 32" overall height and 2" in diameter. Compliment the post with a 3" diameter large ball top. Base shall be 16" in diameter. Furnish 18 (@6' apart) stanchions and 110' of plastic chain. Color by architect.

K Furnish 12’ safety pole constructed of fiberglass with blunt ends and shepards hook. Recreonics Model No. 10-371 and 12-239.

L. Furnish (3) Equipment Totemaster Model No. Recreonics 92-310.

2.51 POOL LIFT:

A. Install lift in the shallow area of the Competition Pool with in deck anchor for (2) Motion Trek BP 350 Deluxe handicap lifts on each side of the pool. Lift shall be furnished complete 24 volt rechargeable battery. Furnish lift with battery recharger and spare battery. All controls shall be waterproof with all operations being controlled by the push of a button. Lift shall provide 350 pound lifting capacity.

2.52 DECK DRAINS:

A. Pool Contractor shall furnish slot drain as indicated around the perimeter of the pool deck and grouted into place by the Tile deck contractor. Slot drain shall be as manufactured by NDS nominal 4" x 3" Channel Drain. Form trench with additional furring of trench into concrete deck to allow for minor adjustment for non-cut tile to the edge of the trench drain. Drain to have 2" dropouts connect to pipe below. Pool Contractor shall furnish all necessary couplings, cleanouts and dropouts required to complete the installation. Furnish and install 3” and 4” pipe below pitched at 1% to 2% to deck drain overflow sump in pool equipment room. Deck drain trench drain to be grouted into place. Deck drain connections shall be sealed with 100% silicone before grouting into place.

B. As with the control joints in the Pool Deck the tile Contractor shall caulk around both sides of the trench drain using a ¼” X ¼” Deck-O–Seal caulking. Tile contractor shall grout Drain into place and verifying proper height and straight run for the slot drain to achieve a clean straight

line of uncut tile. Cleanouts and vents shall be provided as indicated on the drawings around the perimeter of the deck. Deck shall pitch 1 to 2% to slot drain and no puddling shall occur.

1. Furnish and install Deck-O-Seal Gun Grade #785 two-part sealant at the edge of trench drain and tile with ¼" X ¼" seal with Deck O Seal to match flush with drain and tile. Deck-O-Seal is a flexible sealing compound. Material conforms with Federal Specifications A-A-1556A, Type M Grade NS Class 25 NT, CRD-C-506 Type II Classes A&B, ASTM C920 Type M Grade NS Class 25NT. Color by architect. Deck-OSeal is a Division of W.R.Meadows Hampshire, Illinois.

C. Tile Contractor shall grout slot drain into place and verify height and straight run for slot drain to achieve a clean straight line of uncut tile. Cleanouts and vents shall be furnished and installed as indicated on the drawings around the perimeter of the deck. Furnished to the equipment room concrete contractor in the equipment room. Piping into deck drain/ overflow sump by the Pool Contractor. Deck and deck slabs shall pitch 1 to 2% to slot drain and no puddling shall occur.

2.53 POOL EXCHANGER PIPING AND THERMOMETERS:

A. Furnish and Install CPVC piping with a valve in and out of each heat exchanger

B. Pool contractor shall connect pool piping in and out of exchanger with a Minimum of 5' of CPVC in and out of exchangers. All connections shall be flanged with stainless steel hardware. Thermometers shall be installed on the influent and effluent of the exchangers between the bypass valve and the exchanger influent and effluent valves. A third thermometer shall be installed downstream from the mixed effluent water. Set thermometers so they can be read straight on at eye level or below. Stainless steel case and stem thermometers shall be set in stainless steel wells. Readings shall be 40 degrees to 130 degrees. Thermometers shall be Trerice or Weksler. Pool contractor shall furnish and install all "T's" in pool piping for installation of all controls and sensors by Division 26 contractor.

C. Division 23 contractor to furnish and install all source/heat piping, pump, gauges, electrical, controls and High Limit.

2.54 UV SYSTEM:

A. Commercial UV System shall be installed for the Competition Pool and the Therapy Pool with a **full strainer and stainless steel basket on the effluent of each UV chamber.**

1. Furnish and install Titan Flow Control, Lumberton NC, or accepted equal in line epoxy coated flange to flange cast iron with 316 stainless steel basket strainer on the effluent side of each UV unit. Strainer shall be full rated ANSI Class 125 WOG non shock 200 psi@150F with ASTM body A126 Gr.B, epoxy coated large strainer capacity. Minimum loss, with bolt down cover. Basket size shall be per UV manufacturer

UV shall consisting of a treating swimming pool water be routinely monitored and treated by UV sterilization in the range of 220nm to 400nm to kill bacteria, viruses, molds and their spores and to continuously remove chloramines. BioShield Vertical UV Sterilization System, Jandy, Hanovia and ETS are acceptable Manufacturers. The concentration of free chlorine residual shall at all times meet the requirements of the Department authority having jurisdiction over the Pools. The method of monitoring and treatment specified and shown on the drawings is intended as the basis for receiving bids. It is not the intent of these specifications to limit competition. The base proposal must be on furnishing equipment as specified. UV system has UL listing on the complete system, and is listed under NSF Standard 50. Any substitute system shall have Health Department approval for this project prior to being offered. Bather safety shall not be compromised and attention to the safety features is mandatory.

B. The UV system is a model CLP 610A16-12N (install horizontal), capable of providing disinfection UVT per 60 mJ/cm². The UV systems includes UV reactor(s), control panel(s), UV intensity monitoring system(s), and all accessories herein specified. To be acceptable, the UV system must operate in enclosed vessels and use amalgam UV lamps. The UV system must be designed to fit within the piping configuration shown on the Drawings, without compromise of clearances or hydraulic performance criteria. Flow through the system shall not be disrupted while changing of UV lamps is being carried out. The UV system shall be NSF-50 listed, and have its power supply assembly UL listed to UL standard 508A.

C. All components in contact with the process water shall be UV resistant PVC plastic; no metal shall be used in the construction of the pressure vessel. The UV reactor shall be manufactured from UV resistant grey PVC plastic in sch-80 thicknesses or greater. All material exposed to UV light shall be UV resistant PVC plastic, Type 219 quartz or a suitably UV resistant material. The system shall be designed for complete immersion of the UV lamps including electrode with the full length of the lamp in the water. All lamp electrical connections shall be at one end of the UV lamp. The major axis of the UV lamps shall be parallel to the direction of flow in the reactor. The UV reactor shall be of commercially proven chemical solvent welded socket/spigot joint construction and shall not have or rely on any plastic welds to bond pressure bearing surfaces. The UV reactor shall accept its respective UV lamps and quartz sleeves through only one end of the vessel. This end of the UV reactor shall allow for complete reactor entry so internal inspection and/or service can be accomplished.

D. The service side of the UV reactor and the UV lamp sleeve seals shall be made using suitable O-ring materials i.e. EPDM or FVMQ. UV reactor shall be capable of operating at 50 psi and tested to 75 psi. The Lamp filament shall be made significantly rugged to withstand shock and vibration. Lamp bases shall be ceramic to resist UV and ozone. All electrical connections to the UV lamp shall be terminated at one end. UV lamps shall have a lamp stepped base design that prevents arcing between electrical pins. UV lamps shall have a monochromatic spectral output, with the emissions peaking at 254 nanometers and be non-ozone producing. The type of quartz used for lamp manufacture shall be compatible with wavelength emission. The mercury contained in the lamps shall be mixed with a base metal and fixed to the inside wall of the UV lamp quartz. Clear fused quartz tubing, closed at one end. Type 219 quartz shall be used for disinfection and ozone destruction applications. 12,000 Hours continuous lamp life

E. Jandy Units are 6” – Jandy Model JUVMP800 for the Competition Pool 230V/60Hz/1ph. 4” – Jandy Model JUVMP120 for the Training Pool 230V/60Hz/1ph. UV Chamber shall be pressure rated for continuous operation at 150psi tested to 225psi and constructed of type 316L stainless steel. It shall be designed for an internal pressure drop not to exceed 2 psi at maximum flow. The chamber shall incorporate: Ultra Violet Lamp shall be high intensity, medium-pressure UV arc tube modified to emit a continuous UV spectrum from 220nm to 400nm into the water. The lamp shall be designed to have a spectral output at 245nm (Monochloramine), 297nm (Dichloramine) and both 260nm and 336nm for Trichloramine. Full output must be available from 0 to 200 degrees. The lamp shall be UL approved with one electrical lead at each end. Lamps with metal frames to permit a single electrical connection diminish operational life and shall not be permitted, as the frame can obscure the UV and metal from the frame can be transferred onto the inside of the quartz sleeve, thus inhibiting the UV action. A spectral certificate shall be provided with each lamp to demonstrate spectral accuracy. Each lamp shall be individually numbered and the manufacturing process shall permit full audit and traceability of assembly. In addition to an individual serial number, the part number shall be displayed on the lamp.

F. UV System Control cabinet shall be epoxy-coated steel, NEMA 12 fan cooled with louvers and replaceable filters. The control system shall be de-energized when the cabinet door(s) are open. All wiring shall be harnessed in DIN channels. The power supply to the UV arc tubes shall be from a constant wattage transformer. High frequency ballast systems shall not be used. The entire system shall be UL listed and there shall be a UL decal clearly showing this

listing displayed in the cabinet. The control cabinet shall display via a back lit liquid-plasma display the following information:

a. Power on
b. UV intensity (% and nW/cm2)
c. UV dose (mJ/cm2)
d. Flow rate in GPM
e. Arc tube ready indicator
f. Any alarm condition
g. Wiper status and alarm
h. Consumable spare parts list with part numbers
i. Local/remote operation switch, door mounted
j. Data Logging of UV Dose, lamp hours, lamp intensity for regulatory audit.

E. The control panel shall contain an Earth Leakage detector, which shall provide fail-safe protection for bathers and those working on the equipment within the pool environment. This requirement is mandatory, as the voltages used within UV systems can pose risk of death.

F. Manufacturer (supplier) shall prepare complete drawings for the installation and printed instructions for the operation of the UV system herein specified and shown on the drawings. A qualified factory trained representative of the manufacturer shall install this equipment, put it into operation and instruct the owner's representative in the operation and maintenance of all such equipment.

G. The equipment shall be warranted in writing that when operated and maintained according to the manufacturers operating instructions provided and accepted, it will perform in complete accord with these specifications. All components (excluding the UV arc tube) have a limited warranty to be free from defects in workmanship and materials for a period of 12 months from date of start-up. UV arc tubes are warranted to operate for 4000 hours when operated continuously. A continuously operated UV arc tube that fails prior to 4000 hours of operation shall be replaced free of charge. Intermittently operated UV arc tubes (>1 on/off cycle per day) will be replaced free of charge should failure occur prior to 2000 hours and prorated between 2000 and 4000 hours. All warranty replacements are FOB truck job site. Any claims under this warranty must be made on a timely basis, in writing, to the manufacturer.

H. Contractor will provide a complete and operational system with specified Ultra Violet Dechloramination and disinfections system. Installing contractor shall be factory trained and install equipment according to the manufacture's recommendations and specifications. Verification of qualification of the contractor shall be provided upon request. Supply and install specified ultra violet dechloramination and disinfections system as provided in specifications. Verify all materials, hangers, and equipment required for completion of installation. Supply and install all required piping for installation. Coordinate electrical hook-up with Electrical Contractor. Provide three training sessions first session will be at initial start-up and will include owner, certified technician, and installing contractor. Second session will be after 48 hours of continuous operation, at which time the light intensity will be recalibrated. Third session will be 11 months after startup. During this session, operation will be reviewed and contractor will instruct the owner on replacing the UV bulb. Provide operating manuals and as-built drawings. Unit shall be located downstream from the filter. Electrical service/connection shall be 240VAC, 60Hz.

2.55 DIVE STAND AND DIVING BOARD WITH DIVING SPRAYS:

A. (1) One Three and (2) Two One meter diving stands **CUSTOM PAINTED** shall be Durafirm one meter stand and Durafirm Arcadian anchors. One meter diving stands shall be Durafirm Arcadian Catalog #70-231-400 one meter and Arcadian Catalog #70-231-300 three meter stand shall be designed for a deck to water elevation as indicated on the drawings. The diving

stand shall consist of heavy aluminum castings dipped in iridite chromic acid solution followed by a 20 mil coat of baked epoxy. The roller tube and tracks shall be heat treated extruded aluminum processed by Alcoa durannodic hard anodizing process. The bearings for the roller tube and slide shall be nylon with grease fittings, adjustable and field replaceable. The diving board anchor hinges and pins shall be heat treated aluminum forgings with a design tensile strength of 35,000 P.S.I. and shall receive Alcoa duranodic hard anodizing. Hinges shall be designed to allow 180 degree rotation of the diving board to the rear of the stand. Hinges shall be mounted on a transverse casting machined to allow 7 leveling positions in one inch increments. The diving board anchor bolts shall be 5/8" diameter x 3-1/2" long silicone bronze. The diving stand shall be supplied with top and intermediate guard rails on both sides. Guard rails shall be stainless steel band fasteners. The rails shall extend to the edge of the swimming pool and rail ends shall be equipped with rubber safety tips.

B. The rails shall extend on both sides of each board to the edge of the swimming pool with rail ends being turned back to line the return up with the intermediate rail around the platform. Stand shall be designed for mounting on the concrete base using 8 Durafirm Arcadia catalog #70-231-900 bronze deck anchors which shall be furnished and installed.

C. Diving boards shall be Arcadia Air Products, Maxiflex B Catalog #66-231-330 aluminum extrusion type spring board. Diving board shall be 16’ long and 19-5/8” wide. Diving board shall be constructed of basic ribbed one piece extrusion, heat treated for minimum tensile strength of 50,000 psi of aluminum alloy #6076-T6. It shall have a torsion box extrusion, anchor end cap extension and tip end cap extrusion riveted to basic section.

D. Furnish and install diving spray as indicated on the drawings centered under diving board. The sprays shall be controlled from a control valve located under each diving board. Valve box shall be custom made of 6” PVC with cap on the bottom and a 2” drain to the deck drain line. The valve cover shall be 7 ¾” in diameter Recreonics Model No. 34506.

2.56 EYEWASH SHOWER:

A. Furnish and install Haws Model 8336 epoxy coated, corrosion resistant with 9201E mixing valve and combination shower and eye/face wash including Axion MSR hydronamic designed ABS plastic showerhead with self-regulating 20 gpm flow control, green ABS bowl, ABS plastic Omni-flow wrap around eye/face wash with integral dust cover, chrome-plated brass in-line 50x50 mesh water strainer and chrome plated brass stay open shower and eyewash ball valves equipped with stainless steel ball and stem. Unit shall also include powder coated cast-iron 9" diameter floor flange, universal sign, 21" self-adhesive high visibility safety green and bright yellow stripe and 1 1/4" IPS supply. Verify location as indicated on the drawings with the owner/operator.

B. Mechanical contractor shall provide hot and cold water with the Pool contractor installing 1 1/4" tempering valve for tempered water to the chemical storage area.

2.57 FIBERGLASS BULKHEADS:

A. Furnish and install (2) Two, One Piece 4’ and 6’ wide fiberglass Movable Bulkheads with stainless steel pin rails. The pool shall be divided with all accessory items. Bulkhead shall be designed to permit judges and other officials to move freely with undue deflection or movement of the bulkhead.

1. Stainless steel Lane line anchors shall be welded and installed into the bulkhead at each lane line location.
2. The elevation of the anchors shall match the anchor level in the pool wall.
3. Stops at each course location.

B. Bulkhead shall be designed with a 1¼" stainless steel anchoring pin on each end to secure its position. Socket anchors shall be provided per project drawings. Anchoring pins shall be accessible via a stainless steel hatch located directly above pins on top of bulkhead.

1. At each location the Pool Contractor shall furnish and install a resting plate of 316L stainless steel flat with 1/8" radius edges, pinned and bonded into the pool wall to secure the bulkhead at each location on both sides of the pool.
2. Drill anchoring pins into the stainless steel resting plate Anchor points shall be installed into the bulkhead to allow the owner to pull the bulkhead with a body harness and removable stainless steel post fitted into a stainless steel anchor with flush cap.

C. Bulkhead shall be designed to move easily on solid PVC rollers, a minimum of two at each end with flanges a maximum of 5 inches in diameter and contoured to fit profile of lip of perimeter overflow system. Wheels shall each be independently mounted on stainless steel axles with sealed bearings.

D. A stainless steel box beam assembly with protective ½" thick polyethylene pads affixed to each end shall be provided to allow bulkhead to rest on perimeter lip when locked in position. Four (4) 2" x 6" diameter guide wheels, two on each end, shall be provided for ease of movement along pool wall.

E. Face of bulkhead at and above water line shall form a fully-recessed opening with handhold in each lane, creating a contour similar to end walls of swimming pool to entrap and prevent waves from rebounding into lane. Opening shall be fitted with extruded PVC grating spaced to prevent fingers from being caught.

F. Grating used in bulkhead shall be formed of extruded PVC sections. Top surface of ribbed "I" beam section shall be 5/8" wide and depth shall be 1". Targets shall be provided on both sides of bulkhead in each racing lane matching the targets in the pool wall. Grating forming targets shall be black on a field of white. Top surface and targets shall be serrated to create a non-skid surface. Space between extruded sections shall not exceed 9/32".

G. Bulkhead shall be fitted with fixed internal floatation to reduce weight when immersed in water, and with variable flotation to facilitate movement. A buoyancy chamber shall be installed to allow 100% of total weight of bulkhead to be displaced for easy movement. Filling vents and relief valves shall be installed to vary weight of bulkhead. A portable ¾ HP air compressor shall be supplied to service bulkhead from pool deck.

H. Integrated into the bulkhead at each starting platform location shall be a starting platform anchor to match the Model number of the starting platforms. Under each starting platform shall a 4" X 4" X 6" deep PVC timing box flush installed flush with the grating. Each box shall be interconnected with 2" Rigid PVC Schedule 40 conduit and terminating to a 12" X 12" X 6" deep PVC hinged door with gasket set flush with the grating and for connecting into the timing system. All data wiring, terminal ends, plug boxes and finish cover plates shall be furnished and installed by the Timing Company.

I. Bulkhead furnished under this section of specifications shall be warranted to meet load and deflection requirements of these specifications and, under normal use and service, to be free of defects in workmanship or materials for a period of one (1) year from date of installation. Bulkhead should be inspected annually by end user to ensure all gratings, hatches, anchor points and accessories are working properly.

PART 3 EXECUTION

3.01 CONDITIONS AND RELATED:

A. Verify that all work stated in other related divisions to this section. Areas directly related to this section:

B.

1. Section 02 00 00 – Backfill
2. Section 03 10 00 – Concrete Forming
3. Section 03 20 00 – Concrete Reinforcing
4. Section 03 30 00 - Cast-In-Place Concrete: Concrete systems.
5. Section 04 20 00 - Unit Masonry Assemblies: Cavity wall construction.
6. Division 05 - Metals - Structural steel, metal deck, and cold-formed metal framing, as applicable.
7. Division 07 - Thermal and Moisture Protection
8. Section 09 30 00 - Tiling: Wall tile and misc. tile in pool areas
9. Division 22 - Plumbing: Fixtures and piping, as applicable.
10. Division 23 - Heating, Ventilating and Air Conditioning: Mechanical systems, as applicable.
11. Division 26 - Electrical: Electrical systems and components, as applicable.

3.02 LAYOUT OF POOL:

A. All work under this section shall comply with Division 3 Requirements.

1. Place all forms to prevent sagging of the material during or after placement.
2. Under the supervision of the contractor or site engineer batter boards and/or form boards shall be placed locating the perimeter of the pool structure.
3. The beam at the top of the pool wall, which is a monolithic portion of the pool shell, shall be formed to the dimensions as shown on the drawing. The deck side of the pool shell must be constructed 1” min. above water level.
4. A header shall be installed completely around the pool; the inside shall be securely anchored to insure dimensional stability. A taut cutting wire shall be anchored to ensure the dimensional integrity of the shotcrete structure.
5. Cutting wires shall be placed at all intersections of pool radius and vertical walls and on floor place elevation pins to ensure dimensional accuracy of the structure.

B. The elevation tolerance of the pool shell especially the rim of the gutter shall be +/- 1/8". The horizontal and vertical surfaces shall be +/- 1/4". The 3'-6" planar surface around the entire perimeter shall be true vertical.

C. The length and width tolerance shall be + 1/4".

D. Thickness for floor and wall shall be + 1/4".

E. Advise Electrical contractor prior to pouring or shooting in the event he may need to bond any embedded items as required.

F. At pool layout the pool contractor shall verify in writing the relationship of adjacent areas to the square-ness of the pool with any discrepancies which could affect the layout of finish pool, deck or surrounding areas.

3.03 EXCAVATION:

A. The machine excavation and hand trim shall be carried on as one operation. Contractor is cautioned to maintain all required safety guidelines as indicated in MIOSHA guidelines. Any minor voids, which may occur due to over-excavation shall be filled with a rich mix of sand and cement to stabilize the soils in the area and not have an adverse effect on the building footing and or foundations. All excavation material is to be hauled off site. Additional backfill material shall comply with MDOT Class ll and be installed in accordance with Section 02225.

3.04 SUB BASE AND PIPING:

A. Stone fill to be coarse washed Limestone aggregate in accordance with State Department of Transportation, ASTM D1557, INDOT No. 53 crushed limestone with less than 5% fines. Additional depths of stone must be installed to project any adjacent areas that could be affected by the excavation of the pool. Testing shall be performed under the pool base slab for minimum bearing capacity of 2,500 psf in accordance with the soils report and the documents. (See structural)

B. Furnish and install non woven filter fabric below bottom excavation of pool(s). Fabric shall be product as manufactured by Terratex NO4 or Terratex SD soil drainage.

C. Underdrain piping to be PVC pipe to be placed at the deepest point of the excavation. Furnish and install 3", 4” and 6” Sch.40 PVC perforated underdrain without filter fabric at the deepest point of the excavation as indicated on the drawings.

D. Solid PVC Underdrain shall be installed to the manhole adjacent to the pool. Pool contractor shall connect to the 6" PVC Schedule 80 solid underdrain line under the pool and into the underdrain manhole.

E. Contractor shall furnish and install all piping in accordance with the documents. Piping is diagrammatic with conditions of installation based on the function of each piece of equipment and the overall performance of the systems. The piping crosses and does need to be offset based on performance and function. This contractor has control in methods of piping and installation requiring coordination with his shop drawings and staff. No pipe runs shall be supported off of any fitting and shall be fully supported by the sand fill below the pipe. No materials for pipe ends shall be allowed to enter any of the piping at any time. The installation shall be viewed as though the contractor is going to be installing piping systems at his or her own home and the expectation of such are an important aspect of this installation.

3.05 STEEL REINFORCEMENT:

A. See Structural. Pool contractor shall submit with his shop drawings to the Structural Engineer in accordance with the details contained within the documents and as provided by the Structural Engineer. Pool contractor shall submit with his shop drawings typical reinforcing details and schedule for the complete pool and deck. Shell shall maintain structural integrity now and through the warranty period as stated herein.

1. All bars shall be standard size deformed bars equal to the requirements of the "Standard Specifications for Billet Steel, Concrete Reinforcement," intermediate grade, serial designation A615 steel reinforcing bars equal in the requirement of serial design A615 adopted by the ASTM.
2. Maintain continuity in reinforcing steel around all cutouts and pool shell penetrations.
3. All wall penetrations, steps, benches and drop outs shall be reinforced to maintain the continuity of the reinforcing steel.
4. Deck is part of the pool structure.

3.06 POOL FLOOR AND DECK CONCRETE WORK:

A. The pool are designed as a monolithic unit and shall have a poured concrete floor/slab and footing area and concrete sidewalls. See structural drawings for all details related to pool.

B. Where wall joins the poured surface (at the pool floor) and at the shallow area of the pool, the steel reinforcing shall pass through the joints.

1. The minimum PSI on concrete pool floor and deck is to be 4000 PSI in 28 days. Pool deck shall vary in thickness from 12" to 5" minimum encasing anchors and deck drains in concrete. Prior to pour, Pool Contractor is to place pins or screed to insure proper thickness of concrete. The final finishing shall be floated to a texture, which will allow proper adhesion of the true base. Concrete shall be water cured for 7 days starting within 24 hours of completion of the pour.

3.07 CONCRETE POOL SIDEWALLS:

A. Concrete shall be used for constructing the walls of the pool.

1. Concrete shall comply with the requirements of ACI 504R and 506.2
2. Testing will be performed by the owner in accordance with Section 01400.
4. Prior to concrete verify that all waterstops are in place before placing any material.
5. Contractor shall note dimensional tolerances of true, vertical, square and level.

B. Concrete shall be a combination of Portland cement, aggregates, sharp sand and water in a plastic state (low slump).

1. Do pour any concrete over areas that are wet, spongy or where water exists.
2. Use only potable water. In the event a high iron condition exists water must be trucked in so final finish is not caused to stain. Protect all adjacent areas and remove all splatter.
3. Dampen all dry areas.
4. Test cylinders shall be taken as stated in the concrete section of these specifications. A proven mix design shall be used.
5. Maintain a temperature of all surfaces of 40 degrees until maximum curing has been achieved.
6. Final placement shall be free of cracks.
7. Should conditions dictate remove or replace areas of repair with Sikadur Hi Mod or Sikastix.
8. No calcium-based accelerators shall be used.
9. Make sure all reinforcing has been properly placed prior to wall construction.
10. Mix design shall be submitted with shop drawings and prior to application.
11. Cement used shall comply with ASTM C150 Type l.
12. The total volumetric air content before placement shall be 5% (+/- 1%) as determined by ASTM C173 or ASTM C231.
13. Air entraining agents shall meet the requirements of ASTM C260, C231 and C457.

C. Concrete walls shall achieve strength of 5000 p.s.i. at 28 days.

1. The foreman shall have had at least five (5) years experience with this Pool Contractor and have constructed at least one pool per year the size of this project or larger. Experience on ditch construction does not qualify.
2. The equipment must be capable of discharging mixed material to deliver a smooth stream of uniformly mixed material at the proper velocity.
4. Provide all proper alignment wires to assure true tight lines.
6. Start pouring from the bottom.
7. Those areas left for more than one hour or where material has hardened must be removed and free of loose particles.
8. Pour as perpendicular to the surface as work will permit to secure maximum compaction
9. Completely encase reinforcement using maximum layer thickness while avoiding sagging or cave-ins.
10. Cut all voids and replace. Concrete may be applied in cold weather provided the surfaces are not frozen and surfaces are not allowed to freeze for 28 days.

D. Pool contractor must fit the criteria under the qualifications. Water cure walls for 7 days starting within 24 hours of placement.

E. For concrete wall construction construct form work for exposed surfaces with plywood, metal, metal framed plywood or other acceptable panel type materials to provide continuous straight, smooth surfaces.

1. Finish in largest practicable sizes to minimize the number of joints and to conform to joint system.
2. Provide form material with sufficient thickness to withstand pressure of concrete without bow or deflect.
3. Treat surface to be finished to provide adhesion of finish.
4. Walls to be formed to the deck surface with a continuous pour to the bottom of the deck.
5. No horizontal wall joints are permitted.

F. Criteria for strengths to apply to concrete wall and floor construction.

1. Slump limits at point of placement to be not less than 1" nor more than 3".
2. Ready mix concrete shall comply with ASTM C 94.
3. When air temperature is between 85 and 90 degrees reduce mixing and delivery to 60 minutes.
4. Backup all butt joints to eliminate cement paste.
5. Provide crush plates where stripping may damage cast concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and for easy removal.
6. Provide temporary openings where interiors are of formwork is inaccessible for cleanout for inspection before concrete placement.
7. Provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.
8. Fill/cover all tie holes with non-shrink grout.

G. Comply with Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars".

1. Locate and install construction joints with a keyway at least 1 ½” deep.
2. Caulk with manufacturer approved material for submerged surfaces 1” X 1” deep in construction joint walls, slabs and footings. Manufacturers such as deck-o-seal or approved equal.
3. Apply non shrink grout in tooled joint.
4. Apply pool finish over the remainder of the joint.
5. Place construction joint perpendicular to main reinforcement.
6. Continue reinforcement across construction joint.
7. Provide waterstops as described in construction joints to form continuous diaphragm in each joint.
8. Make provisions to support and protect exposed waterstop during work.
9. Fabricate field joints in accordance with manufacturers printed instructions.

H. Do not use form oil, curing compounds or sealant on concrete to receive finish. Rusted steel forms will not be accepted.

I Deposit concrete continuous or in layers that will allow the concrete which has hardened to cause the formation of seams or planes of weakness. If a section cannot be placed continuously provide construction joints. Avoid segregation of concrete.

1. Do not use vibrators to transport concrete inside forms.

2. Insert and place vibrators vertically at uniform spacing not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into the proceeding layer. Do not vibrate lower layers that have begun to set.
3. Place concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joint. Where placement consists of several layers place each layer while proceeding layer is still plastic to avoid cold joints.
4. Strike off all areas to receive the adjoining section. Cut and patch as required with non-shrinking non-metallic grout.

J. For hot weather placement comply with ACI 305. Use chilled water if necessary to cool concrete being careful to not jeopardize the slump of the material. If necessary water cool reinforcing prior to installation of concrete.

K. A water test is to be performed upon completion of the shell.

1. Plug all openings and slowly fill the pool with water flooding the gutter. Allow the water to stand for 3 days.
2. Check the level every 8 hours. In the event of water loss repair or replace areas. Water loss greater than ¼” of water 24 hours after initial fill will be considered water loss.
3. Water cure all shell surfaces for 30 days commencing 24 hours after installation of the pool floor.

L. Upon installation of pool walls the pool contractor shall verify in writing the length, width and corner to corner dimensions of the Pool. If the tolerances with the finish require modifications to the structure the Pool Contractor shall present to the Structural Engineer and the Architect a letter indicating the procedure to follow to rectify any inconsistency.

M. Crack repair. Repair any cracks including hair line shrinkage cracks in floor, walls or gutter. Chip out 2” wide X 2” deep around crack and coat with Sikadur 32 Hi-Mod epoxy bonding agent. Install In-Pakt a Division of Intrusion Prepakt non-shrink grout over chipped out area.

3.08 RECESSED STEPS AND TRANSITION:

A. Recessed Pool steps shall be incorporated into the pool wall as indicated. All benches and ramp shall be incorporated into the Therapy Pool. Minimum 4” wide Contrasting tile shall be installed across the floor and up the side wall 12" on the shallow side of the lifeline at the transition to the deep end of the pool. All junctures at vertical and horizontal surfaces to have cove tile. Note: install deck anchors to allow for drainage through the bottom of the anchor (except any rails underwater). The finish deck surface is to be tile. Electrical contractor to leave pool contractor #8 solid wire for connection to rail anchors.

3.09 GUTTER AND TRENCH DRAINS:

A. It is the intent of the specifications that the swimming pool perimeter overflow system channel and trench drain flow and surface cleaning be maintained under all conditions of normal operation and that no water be discharged to waste except when cleaning the filters or emptying the pool.

1. Water shall flow by hydraulic gradient to the outlet converter(s) by gravity to the balancing point.
2. The system specified provides "in pool" surge capacity of one gallon per sq. ft. of surface pool area.
3. All dropouts including pipe ends around the step area shall be covered with a PVC grate as indicated on the drawings.
4. Furnish and install grate over gutter.

5. Grate shall be as manufactured by Grate Technologies with all end and tile finish pieces as required.
6. Set all grate with grating support PVC channels. GRATE MUST HAVE PLASTIC L ANGLES AT BOTH EDGES OF GRATE INSTALLED WITHOUT GAPS TO ADJACENT SURFACES. Set angle with Deck-O-Seal to match angle and or adjacent surfaces. +/- 3" of ceramic tile shall be installed behind the finger grip to the grate.
7. Secure and install grate as per all manufacturers recommendations. Color by Architect.
8. The grate shall be supported continuously or on 6" centers and in accordance with the manufacturers recommendations (whichever is closer).
9. The edges of the concrete below shall be covered with the angles as furnished by the manufacturer so the structure below lines up with the edge of the angle.
10. Angle may be grouted into place with non-shrink grout and feathered into place in accordance with the specifications as stated under the gutter section herein.
11. No shims shall be installed to level or support the grate.
12. The grate and angle must line up with the back edge of the tile.
13. All anchorages shall be with stainless steel hardware.

B. The overflow channel shall be constructed of concrete.

1. Interior finish shall be steel troweled to achieve a smooth plaster type finish.
2. Any rough interior surfaces shall be ground and true coated with epoxy in accordance with the manufacturer to achieve a smooth finish.
3. The interior of the gutter upon completion shall be as smooth as new plaster, with the absence of voids, waves, irregularities, angles not shown, form marks or any other roughness or irregularities.
4. Paint interior black with 3 coats of Series 66 Hi-build Epoxoline 2 epoxy paint as Manufactured by TNEMEC.

C. Leave finished gutter free of any loose debris. Interior surfaces shall be thoroughly cleaned with Trisodium phosphate free of dust, oil, paint, and other loose material or foreign matter before application of finish. The gutter shall be finished with Tnemec Series N69 Color Hi-Build Epoxoline Polyamidoamine Epoxy. Follow all procedures as directed by the manufacturer.

D. Clean all surfaces as stated above and in accordance with the manufacturer. Abrasive blast or sand referencing SSPC-SP13/NACE 6 surface preparation and Tnemecs surface preparation and application guide. Surfaces may be blasted or sanded with a disc sander making sure all areas have been properly prepared.

E. Prior to starting this process walk the pool with the manufacturers representative, owner and the architect. Each coat shall be lighter than the previous coat to assure the proper mil thickness and coverage.

1. First Coat: Primer shall be Series N69 Hi-build Epoxoline sprayed and rolled to a consistent coverage. Primer coat may be thinned in accordance with the manufacturer. Cure as directed by the manufactured.
2. Second Coat: Spray Apply and roll all surfaces with as full coat of Tnemec N69 Color Hi Build Epoxoline Polyamidoamine Epoxy. Allow to cure as per manufacturer before applying finish coat.
3. Final Coat: Spray and roll on all surfaces Tnemec Series 69 Color Hi Build Epoxoline Polyamidoamine. Additives may be added, Series 44-700, to Series 69 to accelerate cure. If added follow all procedures in accordance with the manufacturers recommendations.

F. Color to be black but all colors must be submitted and confirmed.

G. Furnish and install American Olean Tile finger grip 2” wide.

3.10 POOL AND DECK FINISH:

A. Tile used in this section is based on Dal Tile. Approved Manufacturers are Dal Tile and American Olean. See Architects finish schedule for tile schedule. The finish for the step treads, shall be stretcher trim tiles. Top of common walls and all other areas shall be 2" X 2". Rim of gutter shall be Dal Tile Finger Grip. (all colors by architect) No cut tiles will be accepted, all transitions shall be made with manufacturer furnished pieces. Edge of all steps, edge of deck, common walls, step corners, step sides, bench corners, pool corners, wall to floor junction, benches edges with all step and bench edges being contrasting tile. No surface bullnose shall be used.

1. Furnish and install custom Graphics and or signage such as lane numbers 7” tall in accordance with the drawings.
2. Pool Deck is thin set
3. Pool is thick set

B. Leave finished tile area clean and free of cracked, chipped, broken or loose tile. Protect tile from all foot and wheel traffic for at least three (3) days after installation. Interior surfaces of the pool shall be thoroughly cleaned of dust, oil, paint, and other loose material or foreign matter before application of setting bed. Tile lanes, targets and other markings shall be as indicated by the Architect in the project finish schedule. Tile contractor shall walk the pool with the Owner or his representative prior to filling the pool. Any corrections shall be made prior to filling of the pool. Due to the method of fill for the pool the tile contractor is cautioned to make sure the owner or his representative has approved the work due to the Owners expense in filling the pool. Should the tile be rejected in areas the tile contractor shall immediately repair or replace those areas to the satisfaction of the owner prior to filling the pool.

1. Align all joints to be parallel and/or perpendicular with all other surfaces. All joints shall be straight and uniform. See Dimensional tolerances in another section. Gutter and Waterline tile shall have a maximum finish tolerance of 1/16”.
2. All materials shall be furnished and installed in accordance with all manufacturers recommendations.
3. No cut tiles shall be installed at any transition on the pool floor. If any non-manufactured edge is exposed it shall be protected by the adjacent tile and edge shall be ground to eliminate the sharp edge.
4. All surfaces to receive the final finish and or base coats shall have a rough to medium rough texture. Sandblast as required all walls and floor to achieve proper bonding to surfaces.
5. Furnish and install all tiles in accordance with the drawings and as listed in the Architects finish schedule and as stated herein. Supply 5% extra tile for all colors and trim.
6. Submit shop drawings for all tile work indicating Manufacturer, type of tile, elevations and where it will be used.
7. All tile shall be delivered in Manufacturers unopened, dry containers with unbroken labels. Seconds shall not be used at any time.
8. Maintain 70 degrees during all tile work using only potable water. Water shall not contain high iron content. If a high Iron content exists the contractor shall use water trucked onto site for the duration of the tile or finish work.

C. Pool(s) Finishes:

1. The finish for the Pool shall be all tile. Use unglazed tile for all floors, steps, step treads, and transitions. All edges, recessed steps, toe ledge and bench edges shall be contrasting stretcher pieces with contrasting tile.

2. Use unglazed tile for top of all steps and benches. Trim for all vertical to horizontal transitions shall be stretcher S-812, cove C-813 and SC-813. No Surface bullnose use S-813 for all transitions unless specified otherwise.
3. Submit all Tile Colors and layouts to architect including a mock up labeled with tile and colors to be used. Field colors for pool is white with all marking being Group 5 and custom colors. Deck tile Field is Group 3 and Group 5 color accents.
4. Use unglazed tile. Tile shall be in accordance with the Architects finish schedule.
5. Transition tile indicating a change in floor slope shall be uncut across the pool floor and up the side walls. Use Dale Tile 2" X 2".
6. Furnish and install unglazed stretcher pieces at the deck and steps around the pool.
7. Tile shall be set over a mortar bed shall be a consistent one part Portland cement to Four (4) parts damp sharp sand with additive TEC Xtra Flex additive to the mortar bed for increased strength, water resistance and flexibility. Minimum setting bed shall be 2". Prepare all surfaces to receive setting bed as stated above.
8. Seal all cracks or shrinkage cracks with Vandex Uni Mortar. Prewater several times so concrete is saturated surface dry (SSD) with no standing water. Any surface water must be removed. Follow all manufacturers recommendations for mixing and or installing. Coat all existing areas to a uniform appearance prior to installing bond coat or setting bed.
9. For markings use 5" to 7" tall Dal-Tile unglazed deck tile with depth markers with warning bench below and all no diving shall be International 8" symbol with written No Diving in between each marker. Non-skid symbol with no diving wording shall be as manufactured by Inlays.
10. All benches shall have a 5" to 7" tall sign stating "bench 1'-8 below water" and no diving signage in between each depth marker for water depths 5' and less. Depth markers with signage in the pool deck, shall be furnished and installed by the pool contractor. Behind each starting block in the pool deck shall be a number @7" tall indicating lane number.

E. Setting and Grouting Materials is based on TEC Lifetime System with waterproofing and Alternate for 25 year warranty with waterproofing: Installers shall follow the strict requirements of the manufacturer. A representative of the manufacturer must be on site prior to and during the installation to go over all details as required for the installation.

1. All deck tile shall be thin set and grouted with Epoxy, caulked control joints with Pool being thick set and grouted with modified Polymer as specified herein.
2. Prior to placing any setting materials on pool floor lightly sandblast all surfaces and clean with a solution of muriatic acid. Final cleaning shall be Trisodium phosphate to remove all existing oils. The pool shall be thoroughly cleaned of dust, oil, paint, and other loose material or foreign matter before application of bond coat or setting bed. Match edges of all tile to adjacent tiles.
3. Furnish and install over all surfaces prior to setting bed HydraFlex Waterproofing crack isolation membrane. Substrate shall be finished with a fine broom finish at least 3 days prior. The concrete may have a maximum vapor emission rate of 12 pounds per 1000 square feet per 24 hours when evaluated by ASTM F!869 or 90% relative humidity per ASTM F2170. Where necessary existing concrete shall be prepared by mechanical methods such as scarifying, grinding, sand blasting or shot blasting. After preparation remove all dust by vacuuming. Apply a continuous membrane without voids of at least 46-50 mils wet film thickness is required over the entire surface. Pre-fill all concrete cracks. Apply membrane to entire surface using a 1/4" to 1/2" nap roller or V notched trowel. Membrane must be applied in two coats measuring the first coat periodically with a wet film thickness gauge to ensure a 25 mil thickness with a combined thickness of 50 mils wet curing to a dry film of 30 mils.
4. Flashing with TEC brand waterproofing Mesh is required at all substrate joints, field seams inside corners, outside corners, anywhere vertical surfaces meet horizontal surfaces such as benches, steps, ect. Flashing is also required at drains and or control joints. Flashing involves pre-coat of substrate intersections 4" either side then fully

embedded wide waterproofing mesh in both directions into pre coated areas with 3" overlap on each side. Allow to dry for 30 to 45 minutes before full application.

5. Follow guidelines for curing. All cured surfaces shall be visually checked to make sure there are no bubbles or breaks in the membrane.

F. Super Flex - Premium Latex Modified Thin Set Mortar. Examine the conditions in accordance with Section 01710. Install work in accordance with the manufacturers approved product installation procedures.

1. Maximum variation from required plane for floor and wall surfaces is 1/4" in 10 feet.
2. Notify the architect of any unsatisfactory conditions.
3. All surfaces shall be structurally sound, dry, and free from grease, oil, paint, sealers, or curing compounds.
4. All surfaces must be free of hydrostatic water or moisture wicking.
5. Verify any expansions joints cold joints or cracks and that they have been properly addressed as indicated in the previous section under Hydra Flex Waterproofing and Crack Isolation Membrane.
6. Concrete shall have cured a minimum of 28 days. Any fines, laitenance, projections, and honeycombing must be removed.
7. Surface protrusions and tile glazes must be removed.
8. Cutback all adhesive residue to appropriate substrate.
9. Prime the surface as required with Primer and patch additive 861 following TEC brand product installation procedures.
10. Install Versa Patch Latex modified floor patch and leveler in accordance with TEC installation procedures.
11. Install EZ Level Self Leveling Underlayments in accordance with TEC technical procedures.

G. Crack Isolation Mortar:

1. Install 1Flex Crack Isolation Mortar in accordance with the technical procedures.
2. Install 1Flex Fast Set Accelerated Crack Isolation Mortar in accordance with TEC installation procedures.

H. Tile Work:

1. Install tile in accordance with the drawings and information as stated herein.
2. Tile should be straight and have edges aligned with adjacent materials. Grind all edges of cut tile.
3. Terminate tile as required including aligning of all joints.

I. Grout Installation:

1. Install TEC Power Grout in strict accordance with TEC brand products installation.
2. Install Power Grout 550 in strict accordance with TEC brand products installation procedures.
3. Seal grout with Guard All Invisible penetrating sealer in accordance with the manufacturer.
4. Completely clean all grout haze and residue from the surface.
5. Grout joints must be clean and free of standing water, dust or foreign material.
6. Protect from foot traffic, freezing and do not fill pool for 7 to 21 days in accordance with the manufacturers strict recommendations.
7. Check condition of potable water to make sure water is not high in metals causing staining of the grout to occur. If water is high in metals use only trucked in water for all setting and grout materials.

8. For markings use 5” tall Dal-Tile unglazed deck tile with depth markers with warning bench below and all no diving shall be International 8” symbol No Diving in between each marker. Non-skid symbol with no diving wording shall be as manufactured by Inlays.
9. All benches shall have a 5” tall sign stating “BENCH BELOW WATER" and NO DIVING signage in between each depth marker for water depths 5’ and less. Depth markers with signage in the pool deck, shall be furnished and installed by the pool contractor.

J. Pool Deck:

1. Seal all deck joints with Deck-O-Seal Caulking color to match tile. Follow all manufacturers recommendations for mixing and or installing. Coat all existing areas to a uniform appearance.

K. In the pool deck starting at the corners of the pool and any change in direction of pool shape. Furnish and install soft joints ¼” X ¼” at @15’ to 20’ intervals around the pool deck. Fill joint with Deck-O-Seal as described in another section and in accordance with all manufacturers recommendations.

L. Tile deck is to be installed with space temperatures of 80 degrees or greater.

M. Pool Contractor is responsible for filling the pool with the owners water. Filling shall take place at a rate of @1" per hour so as not to shock the final finish.

3.11 DECK DRAIN TRENCH DRAIN

A. Deck drains shall be encased in concrete and as with the control joints in the Pool Deck the tile Contractor shall caulk around both sides of the trench drain using a ¼” X ¼” Deck-O–Seal caulking. Tile contractor shall grout Drain into place using TEC products and procedures, as for the setting bed on the deck and in the pool verifying proper height and straight run for the slot drain to achieve a clean straight line of uncut tile. Deck shall pitch 1% to 2%, and no more than 2% in any given area to slot drain and no puddling shall occur. If puddles do occur you will be required to remove them. Boxed out plumbing connections shall be grouted into place while working with the deck drain piping contractor to connect the trench drain to the line below.

1. Furnish and install Deck-O-Seal Gun Grade #785 two-part sealant at the edge of trench drain and tile with ¼” X ¼” seal with Deck O Seal to match flush with drain and tile. Deck-O-Seal is a flexible sealing compound.

   a. Material conforms with Federal Specifications A-A-1556A, Type M Grade NS Class 25 NT, CRD-C-506 Type II Classes A&B, ASTM C920 Type M Grade NS Class 25NT.
   b. Color by architect.
   c. Deck-OSeal is a Division of W.R.Meadows Hampshire, Illinois.

B. Tile Contractor shall grout slot drain into place and verify height and straight run for slot drain to achieve a clean straight line of uncut tile.

3.12 BALANCE TANK AND SUMP WATERPROOFING:

A. Sandblast in accordance with the manufacturers technical bulletin all surfaces of the backwash tank and sump.

1. Waterproof the Backwash sump and Surge tank including the bottom side of the top with (2) two coats of Aquafin 1K which is a cementatious ready mixed powder mixed with water to form a dense waterproofed surface barrier with a smooth finish. Product consists of Portland cement well graded quartz sand and polymer enhanced special chemical

ingredients. Coat all areas with Super Aquafin (866 278 2346) a cementatious protective coating and waterproof barrier, resistant to moisture and abrasion. Clean all existing surfaces in accordance with the manufacturers technical specifications including bottom of deck and all sides of existing tank to bare concrete in accordance with the manufacturers technical information. All surfaces must be clean, sound and have an open capillary system.

2. Repair all cracks in concrete walls as described in another section.
3. Seal all joints several times so concrete is saturated surface dry (SSD) with no standing water.
4. Any surface water must be removed. Follow all manufacturers recommendations for mixing and or installing.
5. Coat all existing areas to a uniform appearance.
6. Prior to installation of waterproofing a factory representative must be on site to meet with the contractor to approve the structure for installation of waterproofing and go over any last minute procedures to install the finished product.

3.13 CERTIFICATION OF COURSE LENGTH:

A. Upon completion of the pool certify with a record drawing with Engineers Stamp and under form USA Swimming Measurement Certification of Permanent Racing Course for each lane and each course in accordance with USA Swimming in conjunction with Part 4 of USA Swimming Rules and Regulations certifying in conjunction with Article 103 Facility Standards and NHSAA course length. Furnish to the owner certified by an Engineer licensed in the State a sealed detailed drawing of course length for each lane. At all of both end walls in a vertical plane extending 0.3 meters (12”) above and 0.8 meters 2’-71/2” below the surface of the water. Length shall be measured and if touch pads are not in place it shall be so noted by the Engineer with reference to appropriate thickness of pad. Measure each lane width from rope anchor to rope anchor at both ends using a still wide metal retracting tape. Report the width of each lane to the nearest 0.1ft (1 ¼”). Measure all starting blocks from water surface to top front edge of each block. Report platform heights to nearest 0.02ft (1/4”) noting any platforms that are deficient. Maximum height is 2’-5 ½”. Measure backstroke flag locations, 15 meter marks, midpoint rope and all required information.

END OF SECTION 13 15 00