THE WARREN GROUP ARCHITECTS INC.

1801 South 2nd Street, Ste. 330 McAllen, TX 78503

Addendum No. 5

DATE: Wednesday, July 10, 2019

PROJECT: City of Pharr/PSJA Aquatic Facility

PROJECT NO: 971805/ 1819-35-510-C011-051

LOCATION: 3001 N. Cage Blvd., Pharr, Texas 78577

FROM: Laura N. Warren, The Warren Group Architects, Inc.

The following revisions and clarifications shall be considered part of the record contract documents dated June 7, 2019 for the above referenced project and included in the contract amount. All general notes and specifications shall apply to this addendum. Where provisions of the following supplementary data differ from those of the original Contract Documents, this Addendum shall govern and take precedence.

The following scope adjustments have been made. Please adjust bids with the following noted changes:

Specifications

Item No. 1: *Refer to Project Manual dated June 7, 2019.* **Geotechnical Engineering Study dated March 6, 2019 has been provided. Insert this section.**

Item No. 2: *Refer to Project Manual dated June 7, 2019.* **Spec Section 08 71 00 Door Hardware dated 06/7/2019 has been revised. Sets 29 and 30 have been modified to include flush bolts and dustproof strikes. Replace with Spec Section 08 71 00 Door Hardware ADD5 dated 07/10/2019. Insert this section.**

Item No. 3: *Refer to Project Manual dated June 7, 2019.* **Spec Section 13 11 00 Swimming Pools dated 06/7/2019 has been revised. Paddock Southwest, LLC has been added as a pre-approved bidder. Replace with Spec Section 13 11 00 Swimming Pools ADD5 dated 07/10/2019. Insert this section.**

Item No. 4: *Refer to Project Manual dated June 7, 2019.* **Spec Section 13 11 06 Swimming Pools Timing System dated 06/7/2019 has been revised. Scoreboard Hangers to be galvanized steel in lieu of stainless steel. Replace with Spec Section 13 11 06 Swimming Pools Timing System ADD5 dated 07/10/2019. Insert this section.**

Substitution Requests

Item No. 5: *Substitution Request for Solid Plastic Lockers dated 06/26/2019.* ***Columbia Lockers approved as manufacturer for Solid Plastic Lockers. See attached CSI Form from Columbia Lockers/PSiSC.***

Item No. 6: *Substitution Request for Fluid Applied Weather Barriers dated 07/08/2019.* ***This Fluid Applied Weather Barrier is found acceptable under the following conditions stipulated in the Project Manual:***

A. Qualifications:

1. Installer shall have experience with installation of commercial fluid-applied weather barrier assemblies under similar conditions.
2. Installer shall be trained and certified for installation by manufacturer.

B. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

C. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

See attached CSI Form from TK Products.

Item No. 7: *Substitution Request for Vapor Barrier dated 07/08/2019.* ***This Vapor Barrier is found acceptable under the following conditions stipulated in the Project Manual:***

A. Qualifications:

1. Installer shall have experience with installation of commercial vapo rbarrier assemblies under similar conditions.
2. Installer shall be trained and certified for installation by manufacturer.

B. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

C. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

See attached CSI Form from Tex-Trude.

Item No. 8: *Substitution Request for Coiling Service Door and Coiling Counter door dated 07/08/2019.* ***Cornell Cookson approved as manufacturer for Coiling Service Door and Coiling Counter door. See attached CSI Form from DH Pace.***

Drawings

Item No. 9: *Refer to Construction Documents Structural drawing set dated June 7, 2019.* **Notes for Steel Trusses Over Pool and Diving Pool and Open Web Steel Joists have been modified. Refer to 8.5x11 sheet ADD-4-01.**

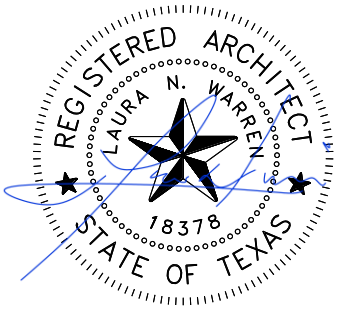
Item No. 10: *Refer to Construction Documents sheet G0.01 dated June 7, 2019.* **Sheet Index has been modified to reflect sheets in Addendums 1-5. Refer to 30x42 sheet G0.01 ADD 5 dated 7/10/2019. Insert this sheet.**

Item No. 11: *Refer to Construction Documents sheet A1.01 dated June 7, 2019.* **Entrance on East side has been modified and center island has been removed. Refer to 30x42 sheet A1.01 ADD 5 dated 7/10/2019. Insert this sheet.**

Item No. 12: Refer to Construction Documents MEP drawing set dated June 7, 2019**. Refer to MEP Addendum #5 dated 7/10/2019.**

ISSUED BY:

Laura N. Warren, AIA/Principal
The Warren Group Architects, Inc.



Attachments:

PDF Format – 8.5"x11" Geotechnical Engineering Study dated 3/6/2019
PDF Format – 8.5"x11" Section 08 71 00 Door Hardware ADD5 dated 07/10/2019
PDF Format – 8.5"x11" Section 13 11 00 Swimming Pools ADD5 dated 07/10/2019
PDF Format – 8.5"x11" Section 13 11 00 Swimming Pools Timing System ADD5 dated 07/10/2019
PDF Format – 8.5"x11" CSI Form-Solid Plastic Lockers dated 6/26/2019
PDF Format – 8.5"x11" CSI Form-Fluid Applied Weather Barriers dated 07/08/2019
PDF Format – 8.5"x11" CSI Form-*Vapor Barrier dated 07/08/2019*
PDF Format – 8.5"x11" CSI Form-*Coiling Service Door and Coiling Counter door dated 07/08/2019*
PDF Format – 8.5"x11" ADD-4-01
PDF Format – 30"x42" G0.01 ADD 5 dated 07/10/2019
PDF Format – 30"x42" A1.01 ADD 5 dated 07/10/2019

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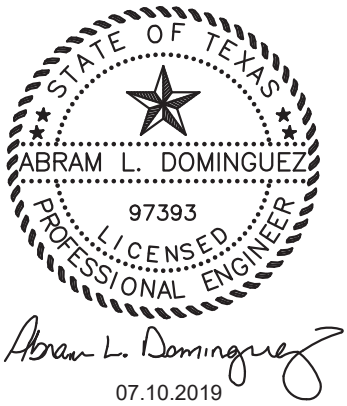
ADDENDUM #5
CITY OF PHARR/PSJA AQUATIC FACILITY
7.10.2019

The following items shall become a part of the contract documents. Refer to full or partial sheets referenced and make changes noted. Bidders are responsible for reading all sections of the addendum. The Addendum consists of the following:

ELECTRICAL

Item 1 Sheet E3.01, Electrical Lighting Fixture Schedule, revised fixture schedule. Refer to attached drawing.



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SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
5. Division 08 Section “Automatic Door Operators”.
6. Division 08 Section “Access Control Hardware”.
7. Division 28 Section “Access Control”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Proof of Compliance: (California located Projects): Provide a list of product(s) containing chemicals known to cause cancer or reproductive toxicity as defined by the Office of Environmental Health Hazard Assessment (OEHHA) under Proposition 65 (CA Code of Regulations, Title 27, Section 27001). The list includes the specific chemical(s), if the chemical will be exposed to consumers, the means of warning, and an illustration of the label.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Five years for standard duty cylindrical (bored) locks and latches.
   2. Five years for exit hardware.
   3. Ten years for manual surface door closer bodies.
   4. Twenty five years for manual surface door closer bodies.
   5. Five years for motorized electric latch retraction exit devices.
   6. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

   1. Quantity: Provide the following hinge quantity:

      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.

d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - MacPro Series.
b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
    a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.

2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

5. Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.

1. Manufacturers:

    a. Medeco (MC) - X4 Series.

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Commercial Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Locks are to be non-handed and fully field reversible.

2. Manufacturers:

a. Yale Locks and Hardware (YA) 4700LN Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.

C. Security Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified rim panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be constructed of high grade, heat treated, corrosion resistant nickel steel alloy, and have a full 3/4" throw projection with slide action positive deadlocking.

1. Static Load Force Resistance: Minimum 3000 lbs certified independent tested.

2. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000S / ED5000S Series.

D. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.

1. Provide keyed removable feature where specified in the Hardware Sets.

2. Provide stabilizers and mounting brackets as required.

3. Provide electrical quick connection wiring options as specified in the hardware sets.

4. Manufacturers:

a. Yale Locks and Hardware (YA) - M200 Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 281 Series.

C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

a. Yale Locks and Hardware (YA) - 4400 Series.

2.10 ELECTROHYDRAULIC DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Standard: Certified ANSI/BHMA A156.19.

C. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.

F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Norton Door Controls (NO) - 6000 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width

and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.14 ELECTRONIC ACCESSORIES

A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

1. Manufacturers:

a. Securitron (SU) - XMS Series.

B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Securitron (SU) - DPS Series.

C. Switching Power Supplies: Provide switching power supplies that are dual voltage, UL listed, supervised units. Units shall be field selectable with a dedicated battery charging circuit that provide 4 Amp at 12VDC or 24VDC continuous, with up to 16 independently controlled power limited outputs. Units shall tolerate brownout or overvoltage input ± 15% of nominal voltage and have thermal shutdown protection with auto restart. Circuit breaker shall protect against overcurrent and reverse battery faults and units shall be available with a single relay fire trigger or individually triggered relayed outputs. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

    a. Securitron (SU) - AQ Series.

2.15 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.

D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to

operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Materials to be furnished in accordance to Premier/ASSA ABLOY GPO Contract #PP-FA-663.

D. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. YA - Yale
5. RF - Rixson
6. SA - SARGENT
7. NO - Norton

8. SU - Securitron
9. OT - OTHER

Hardware Sets

Set: 1.0

Doors: 101A
Description: Exterior Pair, Vestibule Entrance, AO

2	Continuous Hinge	CFM85SLI-HD1 PT		PE	087100	
1	Exit Device (CVR, exit only)	7120 EO ECK1	630	YA	087100	
1	Exit Device (nightlatch)	7120 603F P ECK1 K600		YA		
2	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100	
1	Conc Overhead Stop	6ADJ-X36	630	RF	087100	
1	Surface Closer (CPS)	4430	689	YA	087100	
1	Door Operator (Single)	6061	689	NO	087100	⚡
1	Threshold	253x3AFG		PE	087100	
1	Rain Guard	346C TKSP		PE	087100	
2	Sweep	345APK TKSP		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Switch Post	500		NO	087100	⚡
1	Door Switch	501		NO	087100	⚡

Notes: Perimeter seal and astragal by door/frame provider.

Set: 1.1

Doors: 101B
Description: Exterior Pair, Vestibule Entrance

2	Continuous Hinge	CFM85SLI-HD1 PT		PE	087100
1	Exit Device (nightlatch)	7120 603F ECK1 K600		YA	
1	Exit Device (CVR, exit only)	7120 EO ECK1	630	YA	087100
2	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
2	Surface Closer (CPS)	4430	689	YA	087100
1	Threshold	253x3AFG		PE	087100
1	Rain Guard	346C TKSP		PE	087100
2	Sweep	345APK TKSP		PE	087100

Notes: Perimeter seal and astragal by door/frame provider.

Set: 2.0

Doors: 106B, 117B, 130A, 130B, 160A, 160B, 161A, 161B

Description: Exterior Pair, Corridor Exit

2	Continuous Hinge	CFM_SLI-HD1 (size as required)		PE	087100
1	Removable Mullion	KRM200	600	YA	087100
2	Exit Device (rim, exit only)	7150 EO ECK1	630	YA	087100
1	Cylinder	K6 Series	626	YA	087100
2	Surface Closer (CPS)	4430	689	YA	087100
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO	
1	Threshold	253x3AFG		PE	087100
1	Gasketing	2891APK		PE	087100
1	Rain Guard	346C TKSP		PE	087100
2	Sweep	345APK TKSP		PE	087100
2	Astragal	29310CP TKSP		PE	087100

Notes: Template closer and exit device for weatherstrip mounting. Install weatherstrip on frame prior to installing closer or exit device strike to provide a continuous seal.

Set: 3.0

Doors: 157A, 157B, 164

Description: Exterior Pair, Mech/Elect, Exit

6	Hinge (stainless heavy weight)	T4A3386 NRP (size as required)	US26D	MK	087100
1	Removable Mullion	KRM200	600	YA	087100
1	Exit Device (rim, exit only)	7150 EO ECK1	630	YA	087100
1	Exit Device (rim, nightlatch)	7150F MO627F K600 ECK1	630	YA	087100
1	Cylinder	K6 Series	626	YA	087100
2	Surface Closer (CPS)	4430	689	YA	087100
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO	
1	Threshold	253x3AFG		PE	087100
1	Gasketing	2891APK		PE	087100
1	Rain Guard	346C TKSP		PE	087100
2	Sweep	345APK TKSP		PE	087100
2	Astragal	29310CP TKSP		PE	087100

Notes: Template closer and exit device for weatherstrip mounting. Install weatherstrip on frame prior to installing closer or exit device strike to provide a continuous seal.

Set: 3.1

Doors: 163B

Description: Exterior Pair, Mech/Elect, Exit - CR

6	Hinge (stainless heavy weight)	T4A3386 NRP (size as required)	US26D	MK	087100	
1	Removable Mullion	KRM200	600	YA	087100	
1	Electric Exit Device (rim, fail secure)	7150 B S MO691F K620 ECK1	630	YA	087100	⚡
1	Exit Device (rim, exit only)	7150 EO ECK1	630	YA	087100	
2	Cylinder	K6 Series	626	YA	087100	
2	Surface Closer (CPS)	4430	689	YA	087100	
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO		
1	Threshold	253x3AFG		PE	087100	
1	Gasketing	2891APK		PE	087100	
1	Rain Guard	346C TKSP		PE	087100	
2	Sweep	345APK TKSP		PE	087100	
1	Astragal	29310CP TKSP		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Card Reader	Card Reader by Security		OT		
2	Position Switch	DPS-M-BK		SU	087100	⚡
1	Power Supply	AQD		SU	087100	⚡

Notes: Template closer and exit device for weatherstrip mounting. Install weatherstrip on frame prior to installing closer or exit device strike to provide a continuous seal.
Operation:
1. Door normally closed and locked. Access is obtained by valid credential or key override. Locksets mechanically lock during power failure.
2. Free egress from inside by depressing inside lever.
3. Request to exit switch in lever to signal authorized egress to the access control system.
4. Door position switch to signal door open/closed to the access control system.

Set: 4.0

Doors: 143

Description: Exterior Single, Riser

3	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Surface Closer (CPS)	4430	689	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100

1	Threshold	253x3AFG		PE	087100
1	Gasketing	2891APK		PE	087100
1	Rain Guard	346C TKSP		PE	087100
1	Sweep	345APK TKSP		PE	087100

Notes: Template closer for weatherstrip mounting. Install weatherstrip on frame prior to installing closer to provide a continuous seal.

Set: 5.0

Doors: 166

Description: Exterior Single, Acid Room, SRI - CR

3	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100	
1	Fail Secure Lock	MO 4791LN 497 K600	626	YA	087100	⚡
1	Cylinder	K6 Series	626	YA	087100	
1	Door Closer	SRI 281 CPS	EN	SA	087100	
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO		
1	Threshold	253x3AFG		PE	087100	
1	Gasketing	2891APK		PE	087100	
1	Rain Guard	346C TKSP		PE	087100	
1	Sweep	345APK TKSP		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Card Reader	Card Reader by Security		OT		
1	Position Switch	DPS-M-BK		SU	087100	⚡
1	Power Supply	AQD		SU	087100	⚡

Notes: Template closer and for weatherstrip mounting. Install weatherstrip on frame prior to installing closer to provide a continuous seal.

Set: 6.0

Doors: 102B, 103A, 103B

Description: Interior Pair, Vestibule

2	Continuous Hinge	CFM_SLI-HD1 (size as required)		PE	087100
2	Door Pull	RM3300-24 Mtg-Type 12XHD	US32D	RO	087100
2	Push Bar	RM3102 Mtg-Type 12XHD	US32D	RO	087100
2	Surface Closer (CPS)	4430	689	YA	087100

Set: 6.1

Doors: 102A
Description: Interior Pair, Vestibule

2	Continuous Hinge	CFM_SLI-HD1 (size as required)		PE	087100	
2	Door Pull	RM3300-24 Mtg-Type 12XHD	US32D	RO	087100	
2	Push Bar	RM3102 Mtg-Type 12XHD	US32D	RO	087100	
1	Conc Overhead Stop	6ADJ-X36	630	RF	087100	
2	Surface Closer (CPS)	4430	689	YA	087100	
1	Door Operator (Single)	6061	689	NO	087100	⚡
1	Door Switch	501		NO	087100	⚡
1	Door Switch (vestibule)	504		NO	087100	⚡

Set: 7.0

Doors: 103 D, 103C
Description: Interior Pair, Vestibule, SRI

2	Continuous Hinge	CFM_SLI-HD1 (size as required)		PE	087100	
2	Door Pull	RM3300-24 Mtg-Type 12XHD	US32D	RO	087100	
2	Push Bar	RM3102 Mtg-Type 12XHD	US32D	RO	087100	
2	Door Closer	SRI 281 CPS	EN	SA	087100	

Set: 8.0

Doors: 106A, 117A, 117C
Description: Interior Pair, Corridor, CR HO

6	Hinge (heavy weight)	T4A3786 NRP (size as required)	US26D	MK	087100	
1	Removable Mullion	KRM200	600	YA	087100	
1	Electric Exit Device (rim, fail secure)	7150 B S MO691F K620 ECK1	630	YA	087100	⚡
1	Exit Device (rim, exit only)	7150 EO ECK1	630	YA	087100	
2	Surface Closer (CPSH)	4430T	689	YA	087100	
2	Kick Plate	K1050 10" high x 1" LDW CSK BEV	US32D	RO	087100	
2	Wall Stop	406	US26D	RO	087100	
1	Gasketing	S88BL		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Card Reader	Card Reader by Security		OT		
2	Position Switch	DPS-M-BK		SU	087100	⚡
1	Power Supply	AQD		SU	087100	⚡

Notes: Operation:
1. Door normally closed, latched and locked. Access is obtained from the secure side by valid credential or key override. In the event of power failure door mechanically locks.
2. Free egress from the interior by depressing inside push pad.
3. Request to exit switch in push pad signals authorized egress to the access control system.
4. Door position switch signals door/open closed to access control system.
5. Contact switch in latch mechanism ensures positive strike.

Set: 9.0

Doors: 105, 116, 132A, 132B, 137A

Description: Interior Single, Admin/Concession, CR

3	Hinge	TA2714 (size as required)	US26D	MK	087100	
1	Fail Secure Lock	MO 4791LN 497 K600	626	YA	087100	⚡
1	Surface Closer	R4400	689	YA	087100	
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100	
1	Wall Stop	406	US26D	RO	087100	
1	Gasketing	S88BL		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Card Reader	Card Reader by Security		OT		
1	Position Switch	DPS-M-BK		SU	087100	⚡
1	Motion Sensor	XMS		SU	087100	⚡
1	Power Supply	AQD		SU	087100	⚡

Notes: Operation:
1. Door normally closed and locked. Access is obtained by valid credential or key override. Locksets mechanically lock during power failure.
2. Free egress from inside by depressing inside lever.
3. Door position switch to signal door open/closed to the access control system.
4. Motion sensor to signal authorized egress to the access control system.

Set: 10.0

Doors: 144, 159A, 168

Description: Interior Single, Pool, CR SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100	
1	Fail Secure Lock	MO 4791LN 497 K600	626	YA	087100	⚡

1 Door Closer	SRI 281 O	EN	SA	087100	
1 Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO		
1 Wall Stop	406	US26D	RO	087100	
3 Silencer	608-RKW		RO	087100	
1 ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1 ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1 Electric Power Transfer	EL-CEPT		SU	087100	⚡
1 Card Reader	Card Reader by Security		OT		
1 Position Switch	DPS-M-BK		SU	087100	⚡
1 Motion Sensor	XMS		SU	087100	⚡
1 Power Supply	AQD		SU	087100	⚡

Notes: Operation:
1. Door normally closed and locked. Access is obtained by valid credential or key override. Locksets mechanically lock during power failure.
2. Free egress from inside by depressing inside lever.
3. Door position switch to signal door open/closed to the access control system.
4. Motion sensor to signal authorized egress to the access control system.

Set: 11.0

Doors: 142

Description: Interior Pair, Storage

6 Hinge	TA2714 NRP (size as required)	US26D	MK	087100
2 Flush Bolt	555	US26D	RO	087100
1 Dust Proof Strike	570	US26D	RO	087100
1 Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1 Surface Closer	PR4400	689	YA	087100
2 Kick Plate	K1050 10" high x 1" LDW CSK BEV	US32D	RO	087100
2 Wall Stop	406	US26D	RO	087100
2 Astragal	29310CP TKSP		PE	087100
2 Silencer	608-RKW		RO	087100

Set: 12.0

Doors: 162

Description: Exterior Pair, Mech

6 Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100
2 Flush Bolt	555	US26D	RO	087100
1 Dust Proof Strike	570	US26D	RO	087100
1 Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100

1	Surface Closer (CPS)	4430	689	YA	087100	
2	Kick Plate	K1050 10" high x 1" LDW CSK BEV	US32D	RO	087100	
2	Wall Stop	406	US26D	RO	087100	
1	Threshold	253x3AFG		PE	087100	
1	Gasketing	2891APK		PE	087100	
1	Rain Guard	346C TKSP		PE	087100	
2	Sweep	345APK TKSP		PE	087100	
2	Astragal	29310CP TKSP		PE	087100	

Notes: Template closer for weatherstrip mounting. Install weatherstrip on frame prior to installing closer to provide a continuous seal.

Set: 13.0

Doors: 165

Description: Exterior Pair, Calcium Hypo, SRI - CR

6	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100	
2	Flush Bolt	555	US26D	RO	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
1	Fail Secure Lock	MO 4791LN 497 K600	626	YA	087100	⚡
1	Cylinder	K6 Series	626	YA	087100	
1	Door Closer	SRI 281 CPS	EN	SA	087100	
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO		
1	Threshold	253x3AFG		PE	087100	
1	Gasketing	2891APK		PE	087100	
1	Rain Guard	346C TKSP		PE	087100	
2	Sweep	345APK TKSP		PE	087100	
2	Astragal	29310CP TKSP		PE	087100	
1	ElectroLynx Harness (frame)	QC-C_ (size as required)		MK	087100	⚡
1	ElectroLynx Harness (door)	QC-C_ (size as required)		MK	087100	⚡
1	Electric Power Transfer	EL-CEPT		SU	087100	⚡
1	Card Reader	Card Reader by Security		OT		
1	Position Switch	DPS-M-BK		SU	087100	⚡
1	Power Supply	AQD		SU	087100	⚡

Notes: Template closer for weatherstrip mounting. Install weatherstrip on frame prior to installing closer to provide a continuous seal.

Set: 14.0

Doors: 167

Description: Interior Pair, Storage, SRI

6	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
2	Flush Bolt	555	US26D	RO	087100
1	Dust Proof Strike	570	US26D	RO	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Door Closer	SRI 281 O	EN	SA	087100
2	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
2	Wall Stop	406	US26D	RO	087100
1	Threshold	1665A		PE	087100
2	Astragal	29310CP TKSP		PE	087100
2	Silencer	608-RKW		RO	087100

Set: 15.0

Doors: 133
Description: Interior Single, Storage

3	Hinge	TA2714 (size as required)	US26D	MK	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Surface Closer	R4400	689	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	406	US26D	RO	087100
3	Silencer	608-RKW		RO	087100

Set: 16.0

Doors: 129
Description: Interior Single, Elevator SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Door Closer	SRI 281 O	EN	SA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
3	Silencer	608-RKW		RO	087100

Set: 17.0

Doors: 114, 125, 126
Description: Single Interior, Elect/IT

3	Hinge	TA2714 (size as required)	US26D	MK	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Surface Closer	R4400	689	YA	087100

1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 18.0

Doors: 145, 163A, 163C
Description: Interior Single, Storage/Yard, SRI

3	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100
1	Storeroom or Closet Lock	MO 4705LN 497 K600	626	YA	087100
1	Door Closer	SRI 281 CPS	EN	SA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
3	Silencer	608-RKW		RO	087100

Set: 19.0

Doors: 108, 109, 11 0, 111, 112, 119, 120, 121, 122, 124
Description: Interior Single, Coach/Conference

3	Hinge	TA2714 (size as required)	US26D	MK	087100
1	Entry Lock	MO 4707LN 497 K600	626	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 20.0

Doors: 147, 151
Description: Interior Single, Coach, SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
1	Entry Lock	MO 4707LN 497 K600	626	YA	087100
1	Wall Stop	406	US26D	RO	087100
3	Silencer	608-RKW		RO	087100

Set: 21.0

Doors: 158
Description: Interior Single, First Aid, SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
1	Privacy Lock	MO 4702LN 497	626	YA	087100
1	Door Closer	DA SRI 281 O	EN	SA	087100
1	Armor Plate	K1050 34" high x 2" LDW SA BEV	US32D	RO	

1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 22.0

Doors: 135A, 135B
Description: Interior Single, Conditioning

3	Hinge (heavy weight)	T4A3786 (size as required)	US26D	MK	087100
1	Deadbolt (classroom)	D261 K600	626	YA	087100
1	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
1	Push Plate	70C-RKW	US32D	RO	087100
1	Surface Closer	R4400	689	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 23.0

Doors: 205
Description: Interior Single, Private Viewing

3	Hinge	TA2714 (size as required)	US26D	MK	087100
1	Classroom Lock	MO 4708LN 497 K600	626	YA	087100
1	Surface Closer	R4400	689	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 24.0

Doors: 137B
Description: Interior Single, Corridor, SRI

3	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100
1	Classroom Lock	MO 4708LN 497 K600	626	YA	087100
1	Door Closer	SRI 281 CPS	EN	SA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
3	Silencer	608-RKW		RO	087100

Set: 25.0

Doors: 113, 123, 134, 206
Description: Interior Single, Restroom

3	Hinge	TA2714 (size as required)	US26D	MK	087100
1	Privacy Lock	MO 4702LN 497	626	YA	087100
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 26.0

Doors: 149, 153
Description: Interior Single, Changing Room, SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
1	Privacy Lock	MO 4702LN 497	626	YA	087100
1	Wall Stop	406	US26D	RO	087100
3	Silencer	608-RKW		RO	087100

Set: 27.0

Doors: 159B
Description: Interior Single, Trainer, SRI

3	Hinge (stainless)	TA2314 NRP (size as required)	US26D	MK	087100
1	Entry Lock	MO 4707LN 497 K600	626	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
1	Wall Stop	406	US26D	RO	087100
3	Silencer	608-RKW		RO	087100

Set: 28.0

Doors: 155, 156
Description: Interior Single, Lifeguard Restroom, SRI

3	Hinge (stainless)	TA2314 (size as required)	US26D	MK	087100
1	Privacy Lock	MO 4702LN 497	626	YA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
1	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100

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Set: 29.0

Doors: 140
Description: Interior Pair, Classroom

6	Hinge (heavy weight)	T4A3786 NRP (size as required)	US26D	MK	087100
2	Flush Bolt	555	US26D	RO	087100
1	Dust Proof Strike	570	US26D	RO	087100

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1	Deadbolt (classroom)	D261 K600	626	YA	087100
2	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
2	Push Plate	70C-RKW	US32D	RO	087100
2	Surface Closer	PR4400	689	YA	087100
2	Kick Plate	K1050 10" high x 2" LDW CSK BEV	US32D	RO	087100
2	Wall Stop	406	US26D	RO	087100
1	Gasketing	S88BL		PE	087100
1	Astragal	29310CP TKSP		PE	087100

Set: 30.0

Doors: 154
Description: Interior Pair, Break, SRI

6	Hinge (stainless heavy weight)	T4A3386 NRP (size as required)	US26D	MK	087100
2	Flush Bolt	555	US26D	RO	087100
1	Dust Proof Strike	570	US26D	RO	087100
1	Deadbolt (classroom)	D261 K600	626	YA	087100
2	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
2	Push Plate	70C-RKW	US32D	RO	087100
2	Door Closer	SRI 281 O	EN	SA	087100
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO	
2	Wall Stop	406	US26D	RO	087100
2	Astragal	29310CP TKSP		PE	087100
2	Silencer	608-RKW		RO	087100

Set: 31.0

Doors: 146, 150
Description: Interior Single, Women/Men, SRI

3	Hinge (stainless heavy weight)	T4A3386 NRP (size as required)	US26D	MK	087100
1	Deadbolt (classroom)	D261 K600	626	YA	087100
1	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
1	Push Plate	70C-RKW	US32D	RO	087100
1	Door Closer	SRI 281 CPS	EN	SA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
3	Silencer	608-RKW		RO	087100

Set: 32.0

Doors: 127
Description: Interior Pair, Corridor, SRI HO

6	Hinge (stainless heavy weight)	T4A3386 NRP (size as required)	US26D	MK	087100
1	Deadbolt (classroom)	D261 K600	626	YA	087100
2	Offset Door Pull	RM3310-24 Mtg-Type 12XHD	US32D	RO	087100
2	Push Plate	70C-RKW	US32D	RO	087100
2	Door Closer	SRI 281 CPSH	EN	SA	087100
2	Kick Plate	K1050 10" high x 1" LDW SA BEV	US32D	RO	
2	Astragal	29310CP TKSP		PE	087100
2	Silencer	608-RKW		RO	087100

Set: 33.0

Doors: 148, 152
Description: Interior Single, Women/Men, SRI

3	Hinge (stainless heavy weight)	T4A3386 (size as required)	US26D	MK	087100
1	Door Pull	RM3300-24 Mtg-Type 12XHD	US32D	RO	087100
1	Push Plate	70C-RKW	US32D	RO	087100
1	Door Closer	SRI 281 CPS	EN	SA	087100
1	Kick Plate	K1050 10" high x 2" LDW SA BEV	US32D	RO	
3	Silencer	608-RKW		RO	087100

END OF SECTION 087100

SECTION 131100
SWIMMING POOLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

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

A. Introduction

1. Provide all labor, materials, equipment and services necessary to construct the following: (1) a competition pool, (2) a dive pool, and (3) a prefabricated Endless Pool on deck (Alternate #2). This work shall include the structure(s) and installation of pool finishes as well as all products listed in Part 2 of Section 131100.

B. Work included in this section

1. It is the intent of this section to place the entire responsibility for the construction of the pool(s) (including the construction of the pool shell(s)) under one vested CONTRACTOR. Under this section the Swimming Pool Contractor will provide but is not necessarily limited to the following:

a. Provide all equipment and services required for erection and delivery onto the premises of any equipment or apparatus provided. Remove equipment from premises when no longer required.

b. Layout, excavate, remove from the construction site, replace and grade materials as required beyond the limits of excavation of the pool shell(s) to complete the work described in this section. Reference Division 31 - Earthwork.

c. Grade and replace load bearing or high plasticity index soil, pump and dewater as necessary to keep excavations free from water during construction. Reference Division 31 - Earthwork.

d. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for related excavations. Reference Division 31 - Earthwork.

e. Provide all electrical conduit, wiring, junction boxes etc. to all low voltage pool equipment within pool filter/chemical rooms per Division 26 - Electrical. (Low voltage is considered less than 110 V.)

f. Coordinate for all required bonding and grounding of the pool shell, fittings, and equipment.

g. Provide all necessary piping and valving as shown on the drawings and specified herein.

h. Provide individually sized housekeeping pads for each pool pump.

i. Provide the main drain hydrostatic relief system and a sight sump as shown on the drawings. Reference Division 31 - Earthwork.

j. Construct the cast-in-place concrete pool shell(s) and surge tank(s) as described in these specifications and detailed on the drawings, including reinforcement steel, inserts, fittings, main drain sumps and all embedded items (piping, anchors, spargers, etc.) for the pool(s). Reference Division 3 - Concrete and Structural. Before commencing the placement of concrete, verify electrical bonding of the pool embedded items and reinforcing steel. Also, coordinate and arrange any required electrical,

plumbing and or building inspections. Backfill and compact fill around the pool structure, piping trenches and excavations required by this work. Reference Division 31 - Earthwork.

k. Provide a proprietary aggregate cementitious finish in the pool(s) with a vertical tile band. Provide specialty tile for the perimeter tile deck band, end wall parapet, gutter nosing, wall targets, recessed steps, floor lane markings, depth markings and warning signs, water polo markings, stanchion and water polo identification, construction joint installation bands and all other tile installation within the pool structures. Reference Section 131103 - Swimming Pool Tile - including the tolerance requirements for the concrete substrate.

l. Install springboard diving apparatus complete and in compliance with the requirements of FINA/USA Diving/NCAA/NFHS. Install slip-resistant platform surfacing material for dive tower platforms and springboard pedestal surfaces.

m. Assemble and install the cleaning and maintenance equipment for the pool(s) as specified herein.

n. Provide for the storage of all pool related equipment, materials and systems. All items are the responsibility of the CONTRACTOR until accepted by owner.

o. Obtain final acceptance by jurisdictional health department(s).

p. Start, test, calibrate and adjust all mechanical equipment, electrical equipment, recirculation, chemical, and other supplied systems including deck, loose, maintenance, and safety equipment. Instruct the Owner's representative in the systems operation and maintenance as described herein.

q. Provide a one-year license and basic startup training for aquatic facility management application.

r. Provide the auxiliary gas-fired heaters for the pool(s). Include all piping, heaters, heat exchangers, booster pumps, controls, gauges, thermostats, control valves and wiring required to draw water from the recirculation line, heat the water and return it back to the recirculation line and interlock with pool recirculation pumps.

C. Related work specified in other sections

1. Section 131103 – Swimming Pool Tile

2. Section 131104 – Swimming Pool Cementitious Finish

3. Section 131106 – Swimming Pool Timing System

4. The following work related to the swimming pools shall be completed by other trades.

a. The concrete construction of the complete platform dive tower, concrete springboard pedestals, associated stair systems, railing systems, and foundations shall be by the General Contractor with coordination of the strict dimensional requirements as indicated in the swimming pool drawings to meet the governing standards of USA Swimming and NCAA. Installation of the slip resistant surfacing materials on the platforms and springboard pedestals shall be by Swimming Pool Contractor or qualified flooring installation contractor. Refer to specification paragraph 2.24, this section. Installation of springboard short stands shall be by Swimming Pool Contractor.

b. Provide, erect and maintain all necessary barricades, signs, lights and flares for pool construction to protect workers and the public.

c. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for swimming pool related excavations. Reference Division 31 - Earthwork.

d. Provide sub-surface drainage as needed or required in the project geotechnical report. Reference Division 31 - Earthwork.

e. Construct pump pit and backwash pit including reinforcement, inserts, wall sleeves, anchors, access hatches, and fittings. Reference Division 3 - Concrete.

f. Layout, excavate, remove from the construction site, replace and grade materials as required beyond the limits of excavation of the pool shell(s) to complete the work described in this section. Reference Division 31 - Earthwork.

g. Prior to concrete pours, verify electrical bonding of the pool embedded items. Coordinate and arrange any required electrical, plumbing and or building inspections to be performed on embedded items. Reference Division 26 - Electrical.

h. Provide sanitary sewer and storm drain connections. Reference Division 22 - Plumbing.

i. Provide deck finish beyond perimeter tile band. Reference Division 32 - Exterior Improvements.

j. Provide rules and regulations signage as required by code. Reference Division 1 - General Requirements.

k. Provide chlorine resistant caulking (sealant) and backer rod on pool decks. Reference Division 7 - Thermal and Moisture Protection.

D. Related work specified in Plumbing section. Reference Division 22 - Plumbing. Work to be completed by other contractors.

1. Provide trench drains and area drains on pool deck.

2. Provide sanitary sewer piping from the filter room including floor drains, and /or any required sumps and sump pumps.

3. Provide water service to all hose bibbs, flush hydrant boxes and auto-fill bypass to air gap above fill funnel(s). Install the slow closing solenoid valve(s) in the bypass auto-fill piping.

4. Install Plumbing Contractor supplied water meter on the fresh water supply line upstream of the manual fill valve and the slow closing solenoid valve.

E. Related work specified in Mechanical section. Reference Division 23 – HVAC. Work to be completed by other contractors.

1. Provide the primary (HVAC dehumidification rejected heat) heating system for the pool(s). Work to include all piping from the installed pool dehumidification loop tees, dehumidification units, booster pumps, controls, gauges, thermostats, control valves and wiring required to draw water from the recirculation line, heat the water and return it back to the recirculation line and interlock with pool recirculation pumps. Coordinate control sequencing for auxiliary pool heaters with that of primary heat source.

2. Provide air recirculation systems for pool related spaces.

F. Related work specified in Electrical sections. Reference Division 26 – Electrical. Work to be completed by other contractors.

1. Provide power to the exhaust fans for the chemical rooms.

2. Provide motor starters, auxiliary contacts, magnetic relays and other electrical control devices necessary for the complete operation of the pool systems. Install power to Variable Frequency Drive pool pump starters and power from VFD to the pool pump motor.

3. Ground and bond all pool structures, fittings and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.

4. Obtain permits, inspections, and approvals of all wiring including grounding and bonding of all metal components associated with the pool in accordance with Local, State and National Electrical Codes.

5. Install power, conduits, electrical boxes, and wiring for the Contractor furnished electronic timing and scoreboard system with multi-sport capability for race swimming, diving, water polo, pace clock, and synchronized swimming.

6. Install power, conduits, electrical boxes, and wiring for the Contractor furnished underwater lights and junction boxes.

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

1.3 QUALITY ASSURANCE

A. The specifications and drawings illustrate and detail three (3) swimming pool systems that shall be utilized for competitive and instructional use. Certain technical aspects of the design are common only to pool systems planned for public use. Understanding these aspects, their functions and interaction through experience is vital to completing a successful operating system. It is a mandatory requirement that all bidders will have achieved such experience as a prerequisite for bidding this project.

1. CONTRACTOR to refer to section 002113 – INSTRUCTIONS TO BIDDERS for bonding requirements.

2. If the Contractor has not received prior written approval for this project or has not been included in the pre-approved list of Contractors, they must submit a list of projects meeting the aforementioned qualifications, including contact information of the General Contractor shall be submitted for review and approval at least 15 days prior to bidding of the project. The Contractor must have completed at least five (5) public-use competition pools with individual water surface areas in excess of 13,000 square feet and a depth of 13'-0" or more within the past 10 years.

3. The Contractor must submit prior to the start of construction the name of the on-site Project Superintendent including their relevant experience. The Contractor's on-site Project Superintendent must have completed at least five (5) public-use competition pools with individual water surface areas in excess of 13,000 square feet and a depth of 13'-0" or more within the past 10 years. A list of projects meeting the aforementioned qualifications, including contact information of the General Contractor as well as Owner shall be included with the experience submittal. Project Superintendent must not change on the project unless written authorization has been provided by the Architect and Owner.

4. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligation of the contract and to complete the work described or if the bidder does not have the qualifications stated herein. Subject to compliance with item 2 above on this specification.

5. The following bidders have been pre-approved. All bidders shall meet the requirements listed above.

Acapulco Pools
Bernie Gall, Teresa Palubeskie
1550 Victoria Street North
Kitchener, Ontario
N2B 3E2 Canada
p: 519.743.6357
f: 519.743.9698
e: bernie@acapulcopools.com

Atlantis Aquatic Group
Terry Smith, Dennis Watson
7700 Hwy 71 West
Austin, TX 78735
p: 512.243.6877
f: 210.579.7308
e: terry@atlantisaquaticgroup.com

Progressive Commercial Aquatics
Tim Phelps, Steve Davis

Sunbelt Pools
Rob Morgan
10555 Plano Rd

2510 Farrell Road
Houston, TX 77073
p: 512.848.4677
f: 281.443.1524
e: tim.phelps62@gmail.com

Weller Pool Constructors, Inc
Nils Erickson, Jack Oren
1821 South Orange Blossom Trail
P.O. Box 16008
Apopka, FL 32703
p: 407.880.8800
f: 407.884.7306
e: jack@wellerpools.com

Dallas, TX 75238-1305
p: 214.343.1133
f: 214.343.1201
e: robm@sunbeltpools.com

Wescon Construction, Inc
Steve Kraft
4815 Hawkins St NE # C6
Albuquerque, NM 87109
PO Box 90337
Albuquerque, NM 87199
p: 505.345.2511
f: 505.345.2512
e: wescon1@comcast.net

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Paddock Southwest, LLC
Curtis Morgan
PO Box 1616
Pasadena, TX 77501
p: 713.477.3896
f: 713.477.3897
e: curtis@paddocksw.com

1.4 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

A. The system shall comply with all necessary pre-construction approvals obtained by the Owner and Owner's Consultants from local regulatory agencies governing the design and construction of public swimming pools.

B. The Contractor shall give all necessary notices, obtain all permits and pay all government fees, and other costs in connection with his work, including the filing of all necessary as-built drawings, prepare all documents and obtain all necessary approvals of governmental departments having jurisdiction over their work. The Contractor shall also be responsible for obtaining all required certificates of inspection for his work and deliver same to the Owner and Owner's Consultants before requesting acceptance and final payment for the work.

C. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus or drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on drawings and/or specified.

1.5 COORDINATION AND CLARIFICATION

A. Coordinate with other contractors or subcontractors all work relating to this section.

B. The Contractor must establish with other contractors or subcontractors, having related work in this section, that all work necessary to complete the pool(s) as shown on the drawings and in the specifications is included in the base bid and alternates to the Owner.

C. If in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, the Contractor shall notify the Architect through channels established by the specifications and request a clarification ten (10) days prior to the bid date.

1.6 ALTERNATES

A. Review the description of the alternates in Division 1 and on the drawings for possible effect upon work in this section. Alternates related to the work in this section are described in this division and on the bid proposal form.

B. Pool Alternates

1. Alternate #2: Provide Elite Endless Pool System complete with equipment system, chemical system, UV, filtration, pumps and all necessary piping connections to provide a completely operable pool system. Reference client #2561428. Contact John Satir with Endless Pools, 800.732.8669 ext 292.

1.7 CONTRACTOR'S ALTERNATE PROPOSAL

A. Contractor shall submit his bid to the owner based on materials, equipment and methods as specified in this Section. No substitutions of material will be allowed.

B. It is the intent of the contract documents to encourage competition. The base proposal must be on providing the construction methods and equipment as specified and detailed. Any proposed system substitution must have prior written approval by the Architect.

C. If there is any deviation from the basis of design equipment it is the responsibility of the contractor to confirm that all engineering criteria are appropriate for the substituted equipment.

D. All proposed substitutions of specified construction methods and equipment shall include a complete submittal as required by these specifications and drawings of appropriate scale incorporating all required changes. The Contractor shall provide a list of at least ten (10) satisfactory installations comparable to this project that have been manufactured and installed under the manufacturer's current legal name. Submit a list of such projects with the name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect on the bid date.

E. Any changes or modifications to the Contract Documents that are not authorized by the architect shall be the sole responsibility of the Contractor.

1.8 SUBMITTALS

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

B. One (1) set of shop drawings and engineering data shall be tabbed, indexed, and referenced to the specifications, compiled into an electronic submittal, and submitted in two stages. The first stage shall include all items for the pool shell(s), reference swimming pool structural specifications. The second stage shall be for all remaining items. Each section of items shall be prefaced by a cover sheet listing the items submitted within the section. All electronic submittals shall be organized, numbered, and submitted in the same format and order as the project specifications. Only complete sets will be reviewed.

1. Engineering data covering 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; the external connections, anchorage and supports required; performance characteristics; fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification, in writing, shall be provided indicating that all equipment will fit in the space allotted and as shown on the drawings.

2. All submittals regardless of origin shall be stamped with the approval of the CONTRACTOR and identified with the name and number of this contract, CONTRACTOR'S name, and references to applicable specification paragraphs and contract drawings. Each submittal shall indicate the intended use of the item in the work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

3. The submittals will not be accepted from anyone but the CONTRACTOR. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

4. The CONTRACTOR'S stamp of approval is a representation that the CONTRACTOR accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, and that he has reviewed or coordinated each submittal with the requirements of the work and the contract documents.

5. Each submittal shall include a statement prepared by the originator of the drawings and data, certifying compliance with the contract documents except for deviations, which are specifically identified.

6. All deviations from the contract documents shall be identified on each submittal and shall be tabulated in the CONTRACTOR'S letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by the CONTRACTOR (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

7. The 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.

8. Any need for more than one resubmission, or any other delay in obtaining review of submittals, will not entitle the CONTRACTOR to an extension of the contract time unless delay of the work is directly caused by a change in the work authorized by a change order.

9. Review of drawings and data submitted by CONTRACTOR will cover only general conformity to the drawings and specifications, external connections and dimensions that affect the layout. Review does not indicate a thorough review of 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.

10. When the drawings and data are returned marked REJECTED, REVISE AND RESUBMIT or 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) resubmitted.

11. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal. All resubmittals shall be indexed, tabbed, referenced to the specifications and bound in a three-ring binder and submitted at one time.

12. When corrected copies are resubmitted, the CONTRACTOR shall, in writing, direct specific attention to all revisions and shall list separately any revisions made other than those called for on previous submissions.

13. When the drawings and data are returned marked NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED, no additional copies need to be furnished unless specifically requested to do so for record.

C. Permits, Receipts and Test Reports

1. Provide the Architect with copies of all permits and receipts for fee payments.

2. Submit a sample format for each test report intended for use. Submit test reports required herein only on approved forms.

D. Include complete product data indexed, tabbed, and referenced to specifications with 8 ½" x 11" cover sheet covering:

1. Paragraph 2.01 - Overflow System

2. Paragraph 2.02 - Pumping Equipment

3. Paragraph 2.03 - Filtration Equipment

4. Paragraph 2.04 - Recirculation Fittings

5. Paragraph 2.05 - Piping Systems

6. Paragraph 2.06 - Chemical Treatment Systems
7. Paragraph 2.07 - Chemistry Monitoring and Control Systems
8. Paragraph 2.08 - Flow Meters
9. Paragraph 2.09 - Water Level Controllers
10. Paragraph 2.10 - Inserts and Anchor Sockets
11. Paragraph 2.11 - Deck Equipment
12. Paragraph 2.12 - Loose Equipment
13. Paragraph 2.13 - Maintenance Equipment
14. Paragraph 2.14 - Safety Equipment
15. Paragraph 2.15 - Thermometers
16. Paragraph 2.16 – Swimming Pool Finishes
17. Paragraph 2.17 - Waterproofing
18. Paragraph 2.18 – Sealants
19. Paragraph 2.19 – Aquatic Facility Management Application
20. Paragraph 2.20 - Underwater Lights
21. Paragraph 2.21 - Movable Bulkhead
22. Paragraph 2.22 - Pool Compressed Air Bubbling System – Sparger
23. Paragraph 2.23 - Pool Heaters
24. Paragraph 2.24 - Dive Platform Surfacing

E. Include engineering/construction drawings for the pool structure.

1. Reference Division 3 - Concrete.

F. Include engineering construction drawings for all pool piping.

G. Reference Section 131103 – Swimming Pool Tile

H. Reference Section 131104 – Swimming Pool Cementitious Finish

I. Reference Section 131106 – Swimming Pool Timing System

1.9 OPERATION AND MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

A. Detailed operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The equipment supplier and/or CONTRACTOR shall prepare an operation and maintenance manual for all equipment. Parts lists and operating and maintenance instructions shall be provided.

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

1. Equipment function and calibration, normal operating characteristics, and limiting conditions.

2. Assembly, installation, alignment, adjustment and checking instructions.

3. Operating instructions for start up, routine and normal operation, regulation and control, shut down and emergency conditions.

4. One (1) copy of all instructional videos.

5. Operating cycles shall be specifically described in outline format and in referenced detail. A wall-mounted color-coded piping flow diagram shall be provided in the pool equipment room. The diagram shall be engraved on laminated plastic with color-coded piping to match color of coding on piping, and including valves identified with number on tags. The minimum size shall be 11 inch x 17 inch.

6. Include manufacturer recommended maintenance schedule, parts lists, piping diagram (to agree with wall mounted diagram) and trouble-shooting information for all pool mechanical equipment.

7. Using reference to keyed valves and wall diagram, include specific written instructions for procedures to be followed for the following:

   a. Emptying and refilling the pool(s) including de-watering during the period that the pool(s) will be empty;

   b. Water level control adjustment and chemical control operation;

   c. Normal surge tank operation and balancing;

   d. Filter operation and backwashing; and

   e. Super chlorination.

8. Lubrication and maintenance instructions.

9. Guide to “trouble-shooting”.

10. Parts list and predicted life of parts subject to wear.

11. Outline, cross section, and assembly drawings; engineering data and wiring diagrams.

12. Test data and performance curves, where applicable.

13. Specific written instructions for procedure for emptying and refilling the pool(s) including de-watering during any period that the pool will be empty. Include furnishing and installing a yellow warning sign 8-1/2 in. x 11 in., to be mounted in the filter room, that reads:

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

    Add another sign shall read:

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

14. One set of applicable submittals shall be included in each manual.

C. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by the CONTRACTOR.

D. Manuals and other data shall be printed on heavy, first quality paper, 8-1/2 x 11 inch size with standard 3-hole punching and inserted in plastic covers. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practical, larger drawings shall be folded separately and placed in envelopes that are bound into the manuals. Each envelope shall bear suitable identification on the outside.

E. Six (6) bound volumes of each manual shall be submitted. All parts lists and information shall be assembled in substantial manuals and permanent, three-ring or three-post binders. Material shall be assembled and bound in the same order as specified, and each volume shall have a table of contents and suitable index tabs.

F. All material shall be marked with project identification. Non-applicable information shall be marked out or deleted.

G. Shipment of equipment will not be considered complete until all required manuals and data have been received.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturer's original, unopened containers and crates with all labels intact and legible.

B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.

C. Handle materials in a manner to prevent damage.

D. Store all materials on clean raised platforms with weather protective coverings. Provide continuous protection of materials against damage or deterioration.

E. Remove damaged materials from site.

1.11 WARRANTIES

A. The CONTRACTOR warrants to the Owner and Architect that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted, and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements, including substitutions not properly approved and authorized will be considered defective. The CONTRACTOR'S warranty will exclude remedies for damage or defect caused by abuse, improper or insufficient maintenance, improper operations, modifications not executed by the CONTRACTOR or improper wear and tear under normal use. If required by the Architect, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment. All warranties shall be for a period of one year from the date of substantial completion or the owner begins using the pool unless otherwise specified.

B. The CONTRACTOR shall agree to repair or replace any defective or non-complying work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

C. Submit all warranties covering, but not limited to the following:

1. All pool deck equipment and accessories against defects in material, manufacturer and installation for a period of one (1) year.

2. Defects in material, manufacture or installation of the recirculating overflow system and interior coating of the trench for a period of one (1) year.

3. Defects in material, manufacture and installation of the filtration, backwash, chlorination, pH adjustments and cleaning systems, including controls for a period of one (1) year.

4. Defects in material or workmanship of the pool structure causing a loss of water for a period of three (3) years.

5. Defects in material, workmanship, and installation of the pool piping system for a period of three (3) years.

6. Defects in material, workmanship, and installation of the pool pumps for a period of one (1) year.

7. Manufacturer's minimum five (5) year warranty against defective materials, components and workmanship in the pool chemical controller. ORP, pH, flow and temperature sensors shall be covered by a standard two (2) year warranty. All other sensors and flow cell components shall be covered by a standard one (1) year warranty.

8. Manufacturer's minimum eighteen (18) month warranty against defective materials, components and workmanship in the Variable Frequency Drive system effective the date of supply

9. Defects in material, workmanship, and installation of the pool cementitious finish against cracking and delamination for a period of three (3) years.

10. Defects in material, workmanship, and installation of the pool painted finish against delamination for a period of one (1) year.

11. Defects in material, workmanship, and installation of the tile finish against cracking and delamination for a period of five (5) years.

12. Manufacturer's minimum fifteen (15) year warranty on the filter tank against defective materials or workmanship of the tank and components. (Additional warranty time may be purchased from the manufacturer.) Prorated warranties are not acceptable.

13. Manufacturer's minimum one (1) year warranty against defective materials, components and workmanship in the sanitizing feed system.

14. Manufacturer's minimum one (1) year warranty against defective materials, components and workmanship in the pH buffer feed system.

15. Manufacturer's minimum three (3) year warranty against defective materials, components and workmanship in the movable bulkhead. The entire bulkhead shall be guaranteed against delamination or structural defect for a period of twenty-five (25) years.

16. Manufacturer's minimum three (3) year warranty against defective materials, components and workmanship in the pool compressed air bubbling system - sparger.

17. Manufacturer's minimum fifteen (15) year systems warranty against defective materials, components and workmanship in the pool tile setting materials.

18. Manufacturer's minimum five (5) year warranty on the complete heat exchanger assembly.

19. Manufacturer's minimum one (1) year warranty against defective materials, components and workmanship in the ultraviolet sanitizing system (excluding the UV arc tube). 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 if failure occur prior to 2000 hours and prorated between 2000 and 4000 hours.

1.12 SYSTEM TRAINING

A. A qualified representative of the CONTRACTOR performing work under this section shall put the equipment into operation and instruct the Owner's representatives in the operation of this equipment to the Owner's satisfaction immediately after project's substantial completion.

B. The CONTRACTOR'S training representative shall have completed the equipment/system's manufacturer's training requirements and be certified, by the manufacturer, to provide and teach system training.

C. The representative from the CONTRACTOR shall be either a CPO (Certified Pool Operator) or have an AFO (Aquatic Facility Operator) certification.

D. Training periods shall consist of 32 hours of on-site training and scheduled as follows:

1. 16 hours of initial training on the complete swimming pool system. The 16 hours of initial training is to be comprised of at least 4 hours of training on water chemistry analysis and adjustment. The water chemistry training will include in depth review of the use of the Langlier index and its computation.

2. The initial 16 hours of training shall include information on the care, operation, adjustment, and maintenance of all items provided by the CONTRACTOR under the "Part 2 – Products" section of this specification.

3. 16 hours of training after the Owner's staff has had experience operating the system. This time may be requested any time after the pool has been placed in operation within a period of one (1) year from the time the pool was accepted by the Owner. The additional training shall contain at least 2 hours of review of water chemistry.

4. The CONTRACTOR shall provide a project specific video recording instruction manual in addition to the training sessions. The video instructions shall be project specific and shall include information on the care, operation, adjustment, and maintenance of all items provided by the CONTRACTOR under the "Part 2 – Products" section of this specification. This video recording shall be done separate from the Owner training.

5. The CONTRACTOR shall include one (1) copy of all video recording instructions in each Operations and Maintenance Manual.

1.13 POOL FILL WATER QUALITY

A. The Owner shall bear the cost of the water required for two (2) complete fillings of the pool (the initial water tightness test and the final filling). Removal of iron or copper (if in excess of .3 ppm) will be required for the final fill to avoid staining of the pool finish. Any subsequent fillings or partial fillings (more than 25%) of the pool shall be by the CONTRACTOR, at its own expense.

B. The CONTRACTOR shall provide the necessary plant equipment so that the temperature of fill water will be within plus or minus 10 degrees of the ambient air and/or the pool structure at the time of filling. Extreme caution is urged if the temperature variance is greater than 10 degree F.

C. The CONTRACTOR shall provide the necessary chemicals and to adjust and balance the water chemistry in the pools to the following levels:

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

1.14 START-UP CHEMICALS

A. The CONTRACTOR shall maintain the chemical balance of the pool water (including the cost of all chemicals required) until the pool and mechanical system(s) are fully operational and accepted by the Architect and the Owner.

B. Provide the Owner with sufficient quantities of the necessary chemicals to maintain the pool operation for a minimum of thirty (30) days from substantial completion or the owner begins using the pool.

C. Chemicals to be provided to the Owner shall include those required by the chemical feed systems installed.

1.15 RECORD DRAWINGS

A. Provide a complete set of record drawings of the entire pool system(s) including all sub-systems. All record drawings shall be prepared in accordance with the requirements of Section 017839 and shall be a complete, stand-alone set. The CONTRACTOR shall be permitted to obtain original documents and copy them for this purpose only. Provide the record set on compact disk (AutoCAD Release 2010 or compatible software).

PART 2 - PRODUCTS

2.1 OVERFLOW SYSTEM

A. It is the intent of the specifications that the perimeter overflow system 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.

B. Concrete Perimeter Overflow System

1. A perimeter overflow system consisting of a continuous concrete and tile overflow channel as detailed and shown on the drawings shall be installed on the pool(s). The bottom of the trough shall be level throughout.

2. The complete gutter trough interior, including the underside of the parapet, shall be coated with epoxy paint. Refer to section 2.16. Areas not meeting the manufacturer's recommended thickness will be recoated without additional cost to the Owner.

3. All grating corner installations shall be prefabricated thermo-welded corner sections provided by the grating manufacturer and installed with adequate support per manufacturer recommendations. Butting grating sections together at corners shall not be permitted.

4. The grating shall be formed of molded PVC sections. Modular, interlocking pieces of UV stabilized PVC grating. The top surface shall have a raised, diamond ridge design to create good friction, wet or dry and be 11/16” wide with an outside depth of 1.0” and a middle depth of 1-3/8” for extra strength. The space between pieces shall not exceed 3/8”. Each piece of grate shall have a slotted hole at the ends for insertion of a stainless steel fastener clip and anchor screws every 5 feet and shall be easily removable. Grating surface bars shall run parallel to the pool wall and with the gap, provide at least 35% open space per foot for unrestricted water flow. The color of the grate shall be selected by the Architect. The width of the grating shall allow the insertion of the touchpad holding brackets between the grating and the gutter lip.

   a. Basis of Design: Grating shall be manufactured by Lawson Aquatics supplied by Neptune-Benson, Daldorado, or approved equal.

5. Contractor’s Voluntary Alternate Option – NATARE GPM GRATING: Grating shall be a high density stabilized polymer grating. The grating openings shall run parallel/perpendicular to the pool wall. The open area of the grating shall be no less than 35%. Bracing shall be provided in the gutter trough between grating sections to prevent deflection. The grating shall be machined from a solid block of material; no fasteners, adhesives, joining or other assembly methods shall be used to fabricate or assemble the grating sections. The grating shall be colorfast and easy to clean with a permanent slip-resistant surface, providing no greater than .315-inch (8-mm) opening and shall have a minimum cross-sectional thickness of 1-in. (25.4-mm). The grating must be guaranteed not to crack, flake, separate, rot, swell, splinter, discolor or delaminate, regardless of pool water chemistry. Repeated blows from a heavy hammer shall not cause the grating to crack, chip or shatter. Grating shall be made entirely from FDA and USDA approved materials. Grating color shall be white. Provide a ten (10) year warranty for

workmanship and performance with a fifteen (15) year warranty against cracking or breaking. The top surface of the grating shall be a permanent bi-directional slip-resistant surface consisting of integrally machined groves and shall have cross groves running perpendicular. The grating shall be certified as slip-resistant, non-hazardous walk surface under ASTM 1028 C and shall have the capacity to sustain a uniform load of 100 pounds per square foot.

a. Basis of Design: Grating shall be manufactured by Natare Corporation, or approved equal.

6. All materials, anchors and fasteners shall be 316L stainless steel.

2.2 PUMPING EQUIPMENT

A. Any proposed substitutions shall include a mechanical drawing incorporating all required changes in layout, piping and valves. The cost of such changes shall be included in the price of the substitute. CONTRACTOR to confirm voltage prior to ordering pump. All motors shall be capable of continuously running without overloading at any point on the characteristic curve of the pump without overload or harm. CONTRACTOR shall confirm by 1/4 inch scale shop drawing that the pumps and filters to be provided will fit in the available space and can be removed for servicing.

1. Pumps shall be certified by the National Sanitation Foundation (NSF) and bear the certification mark.

2. Pump casing shall be cast iron fitted with a replaceable bronze case wear ring. Mechanical seals shall be provided specific for a clear, mildly chlorinated water application. Pump impeller shall be enclosed type of cast bronze, statically and dynamically balanced, and trimmed for the specified design conditions. If a VFD is to be used in conjunction with a pump, the impellor shall be trimmed to the maximum diameter based on the rated motor horse power. All bronze materials shall be suitable for use in a chlorinated environment. Suction and discharge flanges shall be provided and tapped for gauge connections. Provide steel or cast iron bases.

3. If the pump is powered with a VFD, the impeller to be trimmed to a maximum diameter based on the most limiting condition of either the diameter of the maximum non-overloading rated motor horse power at the design point or a diameter resulting in 10% greater head than the specified head.

4. Pump motor shall be totally enclosed, fan cooled (TEFC) and premium efficiency of the horsepower and speed specified. A pump requiring larger horsepower shall not be acceptable.

5. Provide a hair and lint strainer, for each pump, of fiberglass or epoxy coated stainless steel construction with a clear observation top in the sizes (or pipe sizes) indicated on the drawings. Verify and coordinate pipe and pump suction sizes in the field. Strainer to be of a low pressure drop full-open or a tapered eccentric reducing type. Straight reducing type strainers will not be acceptable without the addition of an approved tapered eccentric reducer between the strainer and the pump (in which case, sufficient space in the pump pit must be verified). Provide a stainless steel basket with at least 4 times the free open area as the inlet pipe, and one spare basket with each strainer.

a. Basis of Design: As manufactured by MerMade Filter Inc., or Neptune/Benson Inc., or Fluidtrol Process Technologies, Inc.

6. Provide a fusion-bonded epoxy coating on all wetted parts to protect pump internals from corrosion, including pump volute interior and complete pump impeller. Sandblast to bare, white metal. Thickness shall be 8 to 12 mils (heavy film). Verify thickness by non-destructive testing. Coat parts as recommended by manufacturer, including preheating parts to 400 degrees and electrostatic deposition or fluidized bed technique. Provide primers if required to resist chlorinated water <10 ppm. Coating shall be Scotchkote 134 manufactured by Fusecote or approved equal.

7. Entire pumping unit shall be mounted on a base using cap screws to preserve the back pull-out feature of the pump. Pumps shall not be secured with floor studs. The pump base shall be coated with the same epoxy coating as the pump. An OSHA approved guard shall protect coupling and exposed rotating components of the pump and motor where required.

8. Recirculating Pumps and Motors

    a. Competition Pool (PP1 & PP2)

        1) Provide two (2) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,150 GPM against 78 ft. TDH with an efficiency of no less than 80% and a required net positive suction head (NPSHr) no greater than 10 ft. It shall be provided with a 30 HP, 1780 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications.

            a) Basis of Design: The system design is based upon Paco. Pumps manufactured by Paco, ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

    b. Dive Pool (PP3 & PP4)

        1) Provide two (2) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,000 GPM against 82 ft. TDH with an efficiency of no less than 80% and a required net positive suction head (NPSHr) no greater than 10 ft. It shall be provided with a 30 HP, 1760 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications.

            a) Basis of Design: The system design is based upon Paco. Pumps manufactured by Paco, ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

    c. All recirculation pumps shall be provided by the same manufacturer. Confirm voltages prior to ordering pumps.

    d. Endless Pool (PP6) (Alternate #2)

        1) Provide one (1) self-priming pump for Endless Pool recirculation as shown on the drawings. The pump shall be 2 HP, 3450 RPM, 230 VAC, 60 Hz, 3200 Watts Maximum, 1 phase, 60 cycle unit capable of 28 GPM at 70 ft. TDH.

        2) Basis of Design: Pump to be a Pentair Intelliflo i1 or approved equal.

9. Feature Pumps and Motors

    a. Agitator Pump (PP5)

        1) Provide one (1) self-priming pump for water surface agitation and pool draining as shown on the drawings. The pump shall be 3 HP, 3450 RPM, 230 VAC, 60 Hz, 3200 Watts Maximum, 1 phase, 60 cycle unit capable of 120 GPM at 80 ft. TDH.

        2) Basis of Design: Pump to be a Pentair Intelliflo i1 or approved equal.

        3) Provide with remote start/stop function for on/off operation from control office. Coordinate conduit routing with electrical.

    b. Hydrotherapy Pump - Endless Pool (PP7) (Alternate #2)

        1) Provide one (1) self-priming pump for hydrotherapy water jets as shown on the drawings. The pump shall be 1/2 HP, 3450 RPM, 230 VAC, 60 Hz, 3200 Watts Maximum, 1 phase, 60 cycle unit capable of 32 GPM at 45ft. TDH.

        2) Basis of Design: Pump to be a Pentair Whisperflo or approved equal.

10. Other System Pumps and Motors

    a. Provide one (1) portable utility pump(s). The pump(s) shall be a 1 HP, 3600 RPM, 230 volt, 1 phase, 60 cycle unit capable of 60 GPM at 25 ft. TDH.

        1) Basis of Design: Pump to be a Godwin GSP10 or approved equal.

B. Variable Frequency Drive Starters

1. Provide VFD starters for all pool pumps. VFDs shall be a product of H2Flow Controls, Pentair AcuDrive, Neptune Benson, or approved equal.

    a. Basis of Design: Eco-Flo-C by H2 Flow Controls.

2. It is the contractor's responsibility to ensure that all equipment is provided with the correct operating voltage and that all interconnected electrical and electronic equipment shall adequately communicate and operate the specified pumping equipment. All equipment installations shall meet or exceed the requirements of the National Electric Code and all other local and state regulations.

3. Specified equipment in this section shall be mounted in accordance with manufacturer's requirements and in a suitable location where indicated on the plans or approved by the Architect/Engineer. All electronic equipment installed where a corrosive atmosphere may exist shall be enclosed in NEMA 4 stainless steel or NEMA 4X nonmetallic enclosures. In other locations NEMA 12 enclosures are acceptable. The programmable and display features of all electronic equipment shall be accomplished via NEMA 4X enclosed key pads and operator backlit LCD Graphical/Alpha/Numerical Displays. VFD's installed within a supplementary panel shall not be vented or cooled from ambient external air. With the exception of the VFD's heatsink and water-resistant heatsink fan, the VFD's electronics shall be fully sealed within the NEMA 12 or higher enclosure. So called 'NEMA 12 or NEMA 4 Vented' enclosures are not permitted.

4. The VFD shall convert incoming fixed frequency three phase AC power into a variable voltage and variable frequency three phase output utilizing pulse width modulation. Advanced Space Vector Control will be utilized to reduce motor heating and provide precise control of the AC motor.

5. The VFD shall be capable of adjusting the pump motor speed based upon specific flow requirements. A 4-20 milliamp output signal from a Programmable Aquatic Controller, PLC, electronic flow meter transmitter or other electronic device shall supply the required flow information to the VFD to regulate motor speed. The VFD shall be capable of interfacing to this analog output signal be commissioned to achieve a 'constant flow' condition. The VFD shall also be provided with a manually operated potentiometer to adjust the pump speed in the case of an electronic communication failure.

6. Electronic equipment shall be supplied with a phase rotational check capability. The contractor shall also be required to assure that a phase rotational check is accomplished with the bypass switch, herein specified, in the across the line position to assure correct rotation when connected to all motor power sources.

7. The VFD shall include a built-in Line Filter to mitigate harmonic distortions being transmitted back through the supply lines.

8. The VFD shall utilize DC link reactors to filter out bus ripple and provide smooth DC power to the transistor section.

9. The VFD shall utilize IGBT transistors to produce a pulse width modulated output. SCR output stages are not acceptable.

10. The VFD shall have a full load amp rating which exceeds or meets NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, and shall be able to provide 110% of its variable torque rating and 150% of its constant torque rating for one minute.

11. The VFD shall utilize space vector control to reduce motor harmonics and torque ripple.

12. The VFD shall include the ability to reliably protect the pump from any of the following abnormal pump conditions: Run Dry/Loss of Prime; Cavitation; Dead head/Closed Valve; Worn impeller; Blocked Filter; Bearing Failure/Wear Detection. Protection using measured current (Amps), as a method for these protective features shall not be acceptable.

13. The VFD shall provide a display with selectable readout of parameters, including: Speed; Torque; Electrical Power; Current; Output Voltage; Frequency; Heatsink Temperature; Motor Temperature; Run Time; Energy Consumed; Mains Time.

14. The VFD shall include the capability for copying of settings when multiple similar pumps are involved. Settings established in one VFD shall be transferred to the others via a removable keypad.

15. All VFDs shall be provided with a bypass function to allow for pump motor operation by bypassing the variable frequency drive. Bypass mechanism may be internal to the VFD cabinet or provided in a separate enclosure with NEMA rating equivalent to the specified drive enclosure. NEMA 12 'vented' panels are not acceptable. The bypass shall be UL listed as a motor disconnect device.

16. Three Motor Contactors shall be included. Contactor A is required to be in series with the Line Power supply and the VFD, Contactor C is required to be in series with the VFD and the motor and Contactor B is required to bypass the VFD. In 'VFD' operation, contactors A and C are engaged and contactor B is open. When in 'Bypass' mode, contactors A and C are open and contactor B is engaged.

    a. All contactors shall be appropriately rated for the supply voltage and pump motor specified and shall be in accordance with NEC standards.

    b. Contactor B shall include an appropriately rated Motor Overload.

    c. Resettable pump motor overload protection shall be provided for both the VFD and across the line sources of power to all motors.

17. A Control Power Transformer shall be included so as to provide the necessary control voltage required to operate the Motor Contactors. The VFD panel or separate Bypass panel, shall include a door mounted 3-position lockable selector switch. The switch shall be labeled: VFD-OFF-BYPASS. The switch is to require a key to move from one position to another. Two keys shall be provided to the customer. The Bypass panel shall be manufactured in accordance with and approved to UL508.

18. All applications shall require the inclusion of an appropriately rated Line Reactor to reduce harmonic distortion. The Line Reactor shall be housed in an enclosure according to the manufacturer's instructions, taking careful note of the device radiated heat and the chemical environment in which it may be installed. Pentair Acu-Drive includes as standard a built in DC Link Reactor (equivalent to 5% Line Reactor). Where this is insufficient, a separate larger Line Reactor shall be provided.

19. All applications that will have a cable length between the VFD and the Pump Motor which exceeds 300 feet shall require the inclusion of an appropriately rated Motor Protection Filter (dV/dt filter). When included, the Motor Protection Filter shall be housed in an enclosure according to the manufacturer's instructions, taking careful note of the device radiated heat and the chemical environment in which it may be installed.

20. The VFD shall include additional contacts for interface with a remote start/stop panel and/or emergency stop function. When the VFD is supplied for a spa hydrotherapy pump, the drive shall also interface with a remote timer switch to control pump operation via a preset timed duration (15 minute timer switch).

21. Installations in locations where a Power Disconnect is not within 'line of sight' of the VFD Control Panel, or where deemed necessary by local electrical codes, shall require the installer to provide a suitably rated Circuit Breaker Disconnect.

22. The VFD shall be UL listed to accept a supply voltage of -15% / + 10% of its stated supply rating.

23. The VFD shall be electronically lockable in order to prevent unauthorized or unintended program changes.

24. Motors to which the VFD is to be installed shall have a minimum insulation of “Class F”.

25. Parallel operation of recirculation pumps: When specified in the project’s scope, the VFD will be required to operate two identically sized pumps simultaneously. In this configuration, the VFD must be rated to simultaneously operate all pumps at full load. Bypass Control must be included. Bypass Control must include an Overload Relay for each pump motor and the Overloads must be configured in such a way as to protect their respective motor when in either VFD control or Bypass control. Under no circumstances should the VFD’s motor overload protection be used to protect multiple motors. If ‘constant flow’ via analog flow transducer signal is enabled for multiple pumps, it must be disabled when one of the pumps is taken out of service.

26. User Interface for initial programming and day to day operation.

    a. The VFD shall include a programmable Controller with an operator backlit LCD Graphical / Alpha / Numerical Display. The Controller shall comprise the following features:

    b. Real Time Clock

    c. Password protection

    d. Hard-wired tamper protection feature

    e. Custom software to control the VFD via a Modbus communication network.

    f. Automatic Flow Control. The Controller and VFD are to automatically adjust the pump’s speed in order to compensate for a filter becoming dirty. The system is to maintain a minimum flow (GPM) required to meet State mandated turnover rates.

    g. Programmable speeds for daytime and nighttime turnover rates.

    h. Non-volatile memory. All programmed parameters as well as the real time clock settings shall be maintained in the event of a power outage.

    i. The Controller shall be capable of interfacing to an analog output signal from a Flow Transducer and displaying measured flow in GPM

    j. Automatic reset of alarms caused by power brown outs/power loss

    k. External input for seasonal/unoccupied speed

27. Equipment specified in this section shall be programmed and tested under power after connection to the required motor by a factory trained technician. All low voltage control wiring connections to the respective pool systems shall be provided by the Swimming Pool Contractor. Line voltage and/or high voltage connections and interlocks shall be provided by the Electrical Contractor.

C. Pump Gauges

1. Pressure gauges shall be installed on the discharge of the pumps.

2. Compound gauges shall be provided at the intake port of the pumps, after the hair and lint strainer.

3. Gauges shall be liquid filled, 316L stainless steel bourdon tube type with a minimum 2-1/2 inch diameter dial, high impact polypropylene or stainless steel case, corrosion resistant white scale with black divisions and numerals, 300 Series stainless steel heavy duty rotary bushed movement, , black enameled balanced Micrometer pointer.

a. Basis of Design: Gauges shall be as manufactured by Weksler Instrument Corporation or approved equal.

4. Scale ranges shall be selected to indicate the normal system operating pressure of each system or location within the system. Pressure ranges shall be calibrated in psig (0-60 psi) and compound gauge shall be calibrated in inches of mercury (0-30 in Hg / 0-60 psi).

5. A stainless steel filter type pressure snubber shall be provided for each pressure gauge installed consisting of a 3/8 inch diameter by 1/8 inch thick micro metallic stainless steel filter and placed in the line just before the pressure gauge. Provide isolation brass valves or brass gauge cocks at each gauge for easy replacement and maintenance.

D. Provide link seals for all pipe penetrations as indicated on the drawings. Locations will include the pump pit and foundation wall penetrations *(if expansive soils are present)* and other locations as noted. Link seals shall be provided in the sizes and quantities shown on the drawings and installed to provide a flexible watertight penetration. Metal parts shall be made of 316L stainless steel. Links shall form a continuous rubber seal that is tightened with a series of stainless steel bolts to form a watertight seal. Link seals shall be manufactured by Thunderline Corporation, Calpico Inc. or approved equal. Xypex Patch'n Plug or approved equal shall be used to seal pipe penetration. The CONTRACTOR is to provide factory plastic wall sleeves of the appropriate sizes designed for the specific application and seal size and type. Each sleeve is to have an integrated water stop.

2.3 FILTRATION EQUIPMENT

A. The filter system shall consist of high rate pressure sand filter tanks as shown on the drawings. Every aspect and component of the filter system must be certified by the National Sanitation Foundation (NSF) and bear the certification mark. The filter must have an engraved metal data plate permanently affixed on the face of the system that describes operational data and instructions and indicates start up date.

B. It is the intent of these specifications to describe a filtration system complete in every respect with all accessory items and supplied and warranted by one manufacturer.

C. Horizontally Oriented Fiberglass Tanks

1. The filter tanks shall be horizontally oriented single cell fiberglass tanks, minimum 60 inches in diameter. The filter system must be listed as approved by National Sanitation Foundation prior to bid date.

a. Basis of Design: Fiberglass filters shall be the product of Paragon Aquatics / Stark, Waterco, or Neptune Benson provided they meet the specifications and layout. System design based upon Neptune Benson. Valves must be provided to backwash one filter at a time.

2. Filter tanks must incorporate all components and feature as described in this section.

3. Two (2) saddle style bases shall be provided for tank support. Systems that incorporate stacked tanks shall include similar bases and mounting saddles for the upper vessel. Tank supports and connections shall be seismic rated to support the filter tank(s) for the appropriate seismic zone where the project is located. Access to the tank shall be provided by a 14" x 18" manhole with two (2) curved yokes. Manhole seal shall be complete with a one piece 1/4" neoprene gasket and positioned so that internal pressure from the filter will augment the seal. No additional hardware or through bolts will be allowed.

4. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping. Connections shall be comprised of fiberglass flanges and schedule 80 PVC flanges.

5. All tank connections 2 inches and smaller shall be 150 lb. Type 316L stainless steel threaded full couplings. All tank connections 3 inches and larger shall be heavy steel bosses drilled and tapped both sides to receive standard flanged fittings or Sch. 40 Type 316L stainless steel nipples.

6. The discharge from the automatic air release valve shall be hard piped to waste. Each filter tank shall have a means of releasing air. Each coupling or orifice is to be provided with a slotted PVC sand retainer or stainless steel strainer. An automatic air release system shall be provided for each tank.

7. The drain system shall consist of a 3/4 inch 316L stainless steel coupling mounted at the lowest point in the bottom head. This drain shall be valved and piped to the nearest floor drain or backwash pit.

D. Filter Piping - Internal

1. The lower internal distribution system shall be a horizontal header/lateral arrangement. The header shall be Schedule 80 PVC construction, capped on one end and flanged or threaded at the other end for field connection. Lateral connections shall be spaced no more than 6 inches on centers, and shall be 1-1/2 inch FPT connections. All attachments to header shall be solvent welded and thermo-welded to insure integrity of connection.

2. Under drain system shall be factory installed and constructed of extra heavy Schedule 80 high impact PVC. Multiple PVC main headers to be tapped and threaded to receive laterals.

3. Laterals shall consist of 1-1/2 inch Schedule 80 PVC pipe with openings as required. Each lateral shall be fabricated complete with socket cap on one end and male adapter on the other end. Both fittings to be solvent welded to the slotted pipe. Laterals shall be designed and sized at the factory so as to be installed in the field and over the entire cross sections area of the filter.

4. The upper distributor shall consist of PVC piping Schedule 80 and/or deflector plate per manufacturer standard design.

5. Each filter shall be supplied with a pressure equalizing upper internal distribution system consisting of a horizontal header/lateral arrangement. The header piping shall be constructed of Schedule 80 PVC. The header/lateral piping and all connections shall be designed and sized to provide uniform distribution and unrestricted flow during the filtration and backwash cycles.

6. Upper laterals shall be constructed of Schedule 80 PVC pipe with machine slotted openings or orifices. All machined slots or orifices shall be clean, de-burred and free of any obstructions that would not permit the free flow of water through the opening. Details of the lateral attachment to the header shall be submitted for review and approval.

7. The lower and upper distribution systems shall be properly supported and anchored. All hardware in wetted areas shall be Type 316L stainless steel or non-metallic. Tank interiors must be inspected prior to the media being placed in the filters.

E. Filter Piping - External (Face)

1. 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 solvent cemented.

2. Piping shall be drilled and tapped where necessary to accommodate gauge tubing connectors.

3. All valves 3" and larger shall be constructed with cast aluminum S12A alloy (as defined by ASTM B275) housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and 316L stainless steel shaft. Valves shall be rated for 150 psi bubble tight shutoff. Unless otherwise specified, all nuts and bolts shall be stainless steel with stainless steel washers to be used when secured to PVC flanges. Systems incorporating solenoid, pneumatic, pressure amplified, hydraulic or multi-directional valves shall not be acceptable.

4. Standard accessory items shall include sight glass rated for 50 psi with polycarbonate glass, remote mounted gauge panel with two 4½" diameter pressure gauges, ¼" petcocks, ¼" poly vent tubing with PVC compression adapters.

F. Backwash Control

1. The filter manifold face piping shall be designed to allow for one (1) filter tank to be backwashed at a time while the recirculation system is operating. A manual backwashing system shall be provided with the filter system.

2. Manual Backwash System

a. The manual backwash system shall be equipped with a face piping configuration such that the operator shall be manually control and operator both the time and sequencing of the backwash cycle. Valving on the filter face piping shall be a mechanical linkage device allowing the operator to simultaneously move two (2) valves at once. All mechanical linkage components shall be PVC or Type 316L Stainless Steel.

G. Automatic Air Relief Valve

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

H. Filter Media

1. Filter media shall be a carefully selected grade of hard uniformly graded silica material. Media shall be milled angular shaped particles of silica quartz. The filter sand shall have a particle size between 0.45 mm and 0.55 mm and have a uniformity coefficient not to exceed 1.53. Specific gravity shall not be less than 2.5 with a pH of 7.0.

2. All media (sand) shall be cleaned and free from any clay or limestone deposits. Bottom layer of support media shall be placed by hand to avoid damage to the under drain system and leveled before the addition of the upper layer of filter media.

3. All media shall be delivered after approval by the manufacturer of the filter and stored in 100 pound bags for ease of handling and elimination of possible contamination.

4. Media to be supplied by the filter manufacturer and approved by the filter manufacturer prior to shipping.

I. Filter Size

1. Filters have been sized based on a maximum allowable filtration rate of 13.0 GPM/SF:

	Units	Competition Pool	Dive Pool	Endless Pool (Alternate #2)
Volume	Gallons	697,393	596,346	3,028
Flow Rate	GPM	2,300	2,000	28
Filter Model		(4) SHFFG 60-84	(4) SHFFG 60-72	Waterway PCCF-075
Filter Size	Sq. Ft.	176.9	153.8	75
Turnover Rate	Hours	5.05	4.97	1.8
Filtration Rate	GPM/Sq.Ft.	12.55	12.25	0.37

2.4 RECIRCULATION FITTINGS

A. Main outlets (main drains) shall be concrete sumps with 12 gauge PVC frame and PVC grating/ PVC or prefabricated fiberglass sumps with integral frame and PVC grating and sized as shown on the plan. Grate openings shall not exceed 11/32 inch in width, providing an open flow area to allow water velocity

not to exceed 1.0 fps. The grate shall be PVC and fit closely and flush with top surface of frame and secured to frame with vandal proof fasteners. All exposed edges of main outlets shall be rounded and smooth, free of burrs and sharp edges. All main drain covers shall comply with the Virginia Graeme Baker Act and ANSI/APSP-16 2011.

B. Provide hydrostatic relief valves consisting of a 2" cycolac relief valve connected to a FPT commercial style Schedule 80 PVC collector tube. The collection tube shall have seepage holes, 3/8 inch in diameter, and shall be screwed securely to the valve body. The hydrostatic relief valve shall be designed to seal with minimum pressure and shall have a non-plugging, self-cleaning raised valve seat. Hydrostatic relief valve to be Hayward Number SP1056 with collector tube model Hayward Number SP1055, or approved equal.

C. Concrete drop out boxes (converters) shall be concrete sumps with 12 gauge 316L stainless steel frame and PVC grating and sized as shown on the plans. Grate openings shall not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.0 fps. The grate shall be PVC and fit closely and flush with top surface of frame, and secured to frame with vandal proof fasteners. Provide no-leak seal flange at the midpoint of the boxes.

D. Adjustable floor inlet fittings shall be Lawson Aquatics MLD-FW-02-WT, or Hayward SP-1425 floor return fitting with adjustable flow orifice, or approved equal with equivalent flow capacity. Color shall be black for all inlets located in tile lane markings.

E. Sight sump frame(s) and cover(s) shall be size appropriately to provide access to the vertical sight sump standpipe as indicated in the plans. Frame and cover shall be 15" x 17" CDR style Quazite polymer concrete enclosure model number B10151712G, with cover model number C10151702A. Cover shall be provided with stainless steel vandal-resistant fasteners. Quazite cover color shall be selected by Architect – standard color is concrete grey.

F. Valve box covers and frames that are not specified on the drawings or specifically identified as another size or material shall be Zurn model #ZANB-1461-12-VP, nickel bronze with polished scored top, vandal proof screws or approved equal.

G. Water surface agitators shall be as detailed on the plans and connected to the PP5 pump discharge piping. Construction shall be machined or cast bronze/brass. Face plates shall be removable for alignment or cleaning by using security key part #WMF082. The water inlet connection shall be 1". The unit shall be the Stream Jet (WMD105) for deck level (horizontal surface) mount, by Crystal Fountains (905) 660-6674.

H. Anti-vortex plates shall be provided at the suction points of the main recirculation pump(s) and the agitator/drain down pump in the surge tank(s). Each plate shall be connected to the suction pipe via a PVC flange and shall be ½ in. thick with minimum dimension of at least 2.5 times the connecting pipe diameter. The plate shall be located 4 inches above the finished floor of the surge tank. Four (4) 3/4 in. stainless steel threaded rods, nuts, anchor bolts and washers shall be used to fix the offset distance and provide a secure base for the suction pipe. Manufactured fiberglass or PVC anti-vortex plates by Daldorado, Neptune-Benson, or approved equal, shall also be acceptable.

2.5 PIPING SYSTEMS

A. General

1. Provide all recirculating piping between the pool(s) and the filter room, fill receptor and all interconnecting piping to and from the chemical feed systems and chemical controller.

2. Provide all necessary pipe supports and support systems required to support all associated piping and valves.

3. Provide all other tubing, conduit, or piping associated with equipment specified herein. Coordinate with other trades.

B. Pipes

1. Pipe routing as shown and detailed on the contract drawings is diagrammatic only and is not intended to show minor details or exact locations of piping systems. Installation is required to be adjusted to accommodate interference and adjustments anticipated and encountered. Pipe sizes on plans refer to nominal inside diameter of the pipe.

2. All PVC swimming pool piping shall be NSF approved and conform to the requirements of ASTM D-1785.

3. All PVC pipes shall be the product of one manufacturer. Approved manufacturers of PVC piping are Eslon, Harvel, and Chemtrol or approved equal.

4. Swimming pool piping above the floor or deck in the filter room shall be Schedule 80 PVC.

5. Swimming pool piping below the filter room floor or deck shall be NSF approved, Schedule 80 PVC.

6. All swimming pool piping under the pool floor shall be NSF approved, Schedule 40 PVC and concrete encased. All transitions between Schedule 40 and Schedule 80 shall be encased in concrete.

7. All below grade swimming pool piping not located beneath the pool floor can be backfilled with native granular material free of ice, clay, debris, organic matter, and rocks larger than 4" across their greatest dimension, and per recommendations indicated in the project geotechnical report.

8. The influent and effluent lines to the heat exchanger unit shall be CPVC. Connections between metallic piping and/or equipment and PVC shall be flanged.

9. All PVC and CPVC fittings shall be the product of one manufacturer. Molded fittings shall be as manufactured by Asahi, Eslon, Chemtrol, Harvel, Spear, Lasco or acceptable substitute. Fabricated fittings shall be as manufactured by Harrison Machine, Plastinetics, or acceptable substitute.

10. Vertical sight sump piping shall be NSF approved, Schedule 40 PVC. Horizontal sight sump piping shall be NSF approved, Schedule 40 PVC that is perforated and wrapped with fabric and have 3/8” diameter holes located top and bottom on 4 ft centers. Horizontal sight sump piping shall extend 1 ft minimum beyond the main drain.

11. Chemical feed lines from chemical feeders to recirculation piping shall be Schedule 80 PVC piping. Piping shall be hard piped into the recirculation plumbing. All required valves shall be of all PVC construction.

12. Splash collar(s) for the fill funnel(s) shall be clear Schedule 80 PVC and manufactured from a Type I, Grade I PVC compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in compliance to ASTM D1785.

13. All flanged plumbing connection hardware shall be stainless steel.

14. All materials shall be installed by workmen thoroughly skilled in their trades and all work shall present a neat and mechanical appearance when complete. The CONTRACTOR, at no additional expense to the Owner, shall replace or correct any work not judged acceptable by the Architect, Owner‘s testing agency, or their consultants.

15. All support hardware, brackets, fasteners, hangers, etc. installed in the surge tank shall be 316L stainless steel.

16. No installation shall be made that will provide a cross-connection or interconnection between a distributing supply for drinking purposes and the swimming pool, or between the pool and a sanitary or storm water sewer system that will permit a backflow of water into the pool water system.

17. All piping shall be hydrostatically (water) pressure tested for leaks before and after backfilling to guarantee water tightness. Pneumatic (air) pressure test not allowed.

18. The CONTRACTOR shall provide 1/4" PVC water stops for this work for watertight penetration of concrete walls. Water stops shall be round and the O.D. shall be sized to 150% of the O.D. of the pipe. The water stops shall be thermo-welded to the pipe from both sides and shall be located at the centerline of the wall being penetrated prior to placing the concrete to assure a watertight seal. Manufactured fiberglass and PVC water stop fittings by Daldorado, A.S.A. Manufacturing, or approved equal shall also be acceptable.

19. CONTRACTOR must adhere to all the applicable provisions in Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.

20. All mechanical equipment to be connected into the recirculation piping system shall be done so using flanged or union connections.

21. Provisions shall be made to purge all pipes in the system.

22. Concentric reducers shall be fiberglass by MerMade Filter, Inc., or equivalent reducers of schedule 80 PVC construction.

C. Pipe Hangers and Supports

1. Manufacturer

a. Subject to compliance with these specifications, pipe hanger and support systems shall be manufactured by Cooper B-line (basis of design), Inc, TOLCO, and Anvil International or approved equal.

2. Hangers

a. Pipes 2 inches and smaller

1) Adjustable steel clevis hanger, B-Line models B3100 or B3104.

2) Adjustable steel swivel ring (band type) hanger, B-Line model B3170.

b. Pipes 2-1/2 inches and larger

1) Adjustable steel clevis hanger, B-Line model B3100.

2) Adjustable steel yoke pipe roll, B-Line model B3114.

3. Multiple or Trapeze Hangers

a. Trapeze hangers shall be constructed from 12 gauge roll formed ASTM A1011 SS, Grade 33 structural steel channel, 1-5/8 by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.

b. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B-2000 series.

4. Wall Supports

a. Pipes 2-1/2 inches and smaller

1) Steel offset "J" hook hanger, B-Line model B3600.

b. Pipes 3 inches and larger

1) Welded strut bracket and pipe straps, B-Line models B3064 and B2000 series.

2) Welded steel bracket B-Line model B3066 or B3067 with roller chair or adjustable steel yoke pipe roll. B-Line model B3120 or B3110.

5. Floor Supports

a. Electroplated carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line model B3093 and B3088T or B3090 and B8088. Pipe saddle shall be screwed or welded to appropriate base stand.

6. Vertical Supports

a. Steel riser clamp sized to outside diameter of pipe, B-Line model B3373.

7. Plastic Pipe Supports

a. V-Bottom clevis hangers with galvanized 18-gauge continuous support channel, B-Line models B3106 and B3106V, to form a continuous support system for all plastic pipes smaller than 1 inch or flexible tubing.

b. A vented and sloped continuous PVC Schedule 40 pipe no smaller than 1-1/2 inch outside diameter will be used to route flexible tubing with the appropriate pipe supports.

8. Supplementary Structural Supports - Design and fabricate supports using structural quality steel bolted framing materials. Channels shall be roll formed, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch or greater as required by loading conditions. Submit design for pipe tunnels, pipe galleries etc. for approval. Use clamps and fittings designed for use with the strut system.

D. Hanger Attachments

1. Upper Attachments

a. Beam Clamps

1) Beam clamps shall be used where piping is to be suspended from building steel. Clamp type shall be selected on the basis of load to be supported, and load configuration.

2) C-Clamps shall be locknuts and cup point set screws similar to B-Line model B351L or B3036L. Top flange c-clamps shall be used when attaching a hanger rod to the flange of structural steel, B-Line model B3034 or B3033 or approved equal. Refer to manufacturers recommendations for set screw torque. Retaining straps shall be used to maintain the clamp position on the beam where required.

3) Center load beam clamps shall be used where specified. Steel clamps shall be B-Line models B3050 or B3055. Forged steel beam clamps with cross bolt shall be B-Line B3291-B3297 series or approved equal as required to fit beams.

b. Concrete Inserts

1) Cast in place spot concrete inserts shall be used applicable, either steel or malleable iron body, B-line B2500 or B3014 or approved equal. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Select inserts to suit threaded hanger rods sizes, B-line models N2500 or B3014N series.

2) Continuous concrete inserts shall be used where applicable. Channels shall be 12 gauge, ASTM A1011 Grade 33 structural quality carbon steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of 2,000 lbs/ft. in concrete, B-Line models B22I, 32I, or 52I or approved equal. Select channel nuts suitable for strut and rod sizes.

E. Hanger Accessories

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

F. Hanger Finish

1. Indoor Finishes

a. Hangers shall be zinc plated in accordance with ASTM B633 OR shall have an electro-deposited green epoxy finish.

b. Strut channels shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 OR shall have an electro-deposited green epoxy finish.

c. Zinc Plated hardware is not acceptable for use in chemical rooms.

G. Valves

1. Valves 3 inches and larger shall be butterfly type valves, with PVC body, 150# SWP with stainless steel shaft, polypropylene disc and replaceable resilient seat bonded to a rigid shaft and guaranteed for bubble tight shutoff from 27 inch vacuum to 150 PSI. Extended neck 2 inch beyond flanges for any insulated piping shall be provided with handle for manual operation. All valve components shall be suitable for swimming pool chlorinated water service. Butterfly valves shall be Georg Fischer Type 563, Asahi/America Type SP Pool-Pro, Chemtrol Model-B, Simtech VP series, Colonial Valve 411 Series, or approved equal.

2. Valves smaller than 3 inches shall be PVC true union ball valves, full port, three-piece construction, blowout-proof stem, Viton seal with socket end connectors.

3. Check valves shall be a quick closing non-slam type, either self-aligning wafer or flanged type, of corrosion resistant materials suitable for use in a swimming pool environment. Install check valves in accordance with the manufacturer's recommendations. Locate check valves at least 5 pipe diameters from pumps and fittings. Provide check valves as indicated, where two pumps are used in parallel. Check valves shall be either by Technocheck Corp., model 5050, with epoxy coated cast iron body and bronze swing plates on a stainless steel spring; or approved equal, for installation between 150 lb flanges.

4. Modulating float valve in the surge tank(s) shall have PVC body and stainless steel wafer disc. All hardware shall be non-corrodible. The float-operated valves shall be provided horizontally on the main drain lines in the surge tank(s). Valve shall consist of all non-corrosion components including shaft, float arm, pins and floats. Valve shall be suitable for mounting on a 125E class standard PVC flange. The float arm leverage weight and pivot lengths shall be adjustable to obtain desired ratio of surge tank level change to pool gutter overflow level change. Two floats and stabilizer required. Valve shall be Model FV-D XWB (Extra Weight Ball) as manufactured by MerMade Filter, Inc. or approved equal manufactured by EPD, or Fluidtrol Process Technologies, Inc.

5. Submerged valves up to 3 inches shall be PVC true union ball valves. Submerged valves over 3 inches shall be PVC bodied, wafer type, butterfly valves with stainless steel handle extensions as required. Valves shall be by approved manufacturers listed above. Submerged valves must be provided with all stainless steel connectors. The stem housing extensions shall be properly supported and braced.

6. All butterfly type valves 8 inches and larger shall be fitted with a water tight gear operator.

7. All valves located 7 feet or greater off the floor shall be fitted with a chain operator.

8. All submerged valves, valves buried below grade, or valves not readily accessible, shall be provided with a stainless steel reach rod and handle.

H. Pipe and valve identification

1. All exposed pool piping shall be equipped with color coded flow directional arrows at thirty (30) inch intervals per local and state swimming pool health code. The Contractor shall verify that all pool piping identification is in accordance with all local and state health regulations.

2. All valves shall be identified with minimum 1-1/2 inch diameter brass tags stamped with minimum 1/2-inch high numbers and attached to valves with #16 brass jack chain. (Plastic laminate engraved tags with nylon attachment acceptable.) Valves shall be described as to their function and referenced in the operating instruction manual and wall mounted piping diagram to be prepared by the CONTRACTOR.

2.6 CHEMICAL TREATMENT SYSTEMS

A. Calcium Hypochlorite (Chlorinator Briquettes)

1. Shop drawings complete with a piping diagram depicting the location in which the dry chlorination feeder is to be connected to the system shall be provided and approved prior to installation. Installation of the system shall be as specified in the manufacturer's directions and no exceptions shall be taken.

2. A factory-authorized representative shall provide training to the owner and the training shall be video recorded per 131100, Section 1.12 of the project contract documents.

3. Accu-Tab PowerBase

a. General Description

1) The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for pool applications. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator, electrical box, centrifugal pump, and solution tank for ease of installation and operation. The system shall be the Accu-Tab PowerBase. Only Accu-Tab Blue SI calcium hypochlorite tablets shall be used, the patented blue colorant added for safety (to help prevent accidental mixing with other chemicals).

2) The base proposal requires providing equipment as specified herein, though substitutions will be considered. The bidder is cautioned that substitutions must meet the quality and operational requirements of each feature specified in Section 2 below. Batch systems with pressure mixing components producing chlorine concentrations exceeding the limits of the specifications will not be considered.

3) Any system offered shall use an NSF 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.

4) Basis of Design:

a) Competition Pool: Model 3070AT

b) Dive Pool: Model 3070AT

c) Endless Pool (Alternate #2): Model 3012 inline system

b. System Features

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 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 centrifugal 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. System Components

1) Tablet Chlorinator. Accu-Tab PowerBase chlorinators are designed exclusively for Accu-Tab Blue SI calcium hypochlorite tablets. 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.

2) Inlet Water Supply Connection.

a) Model 3012 - 1" FNPT (water supply of 10 GPM required).

b) Model 3070AT - 1-1/2" FNPT (water supply of 30 GPM required).

3) Inlet Solenoid Valve. Opens and closes on command when the system receives a signal. 110 VAC required from chemical controller. Applicable to models 3140AT and 3500.

4) Inlet Water Strainer. A strainer to protect chlorinator components from start-up debris and sand from broken filter laterals.

5) Flow Meter. A rotameter flow meter, measuring the flow of the water-eroding stream to the chlorinator.

6) Inlet Control Valve. PVC gate valve mounted in line with the flow meter allows operator to adjust flow of water-dissolving stream. Applicable to models 3140AT and 3500.

7) Solution Tank. PowerBase 3500 made of HDPE, all others made of PVC. Capacities:

a) Model 3012 7.5 gallon

b) Model 3070AT 22 gallon

8) Float Valve. Made from Schedule 80 PVC and 316L stainless steel, this float valve maintains the solution tank level.

9) High Level Switch. Prevents the solution tank from overflowing. High level: when activated, a switch opens the circuit to the solenoid valve, causing the solenoid valve to close. Applicable to models 3140AT and 3500.

10) Solution Delivery 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.)

11) Discharge Check Valve. A PVC swing check valve prevents reverse flow of water into the system.

12) Discharge Control Valve (manual). Used to balance system output water flow with system input water flow.

13) Outlet Connection

a) Model 3012 1" NPT

b) Model 3070AT 1.5" NPT

14) Aluminum Frame. Type 6061-T.

15) Nema 4X Electrical Enclosure

d. Optional Equipment

1) High Pressure Pump. On systems requiring unit discharge pressures greater than 20 PSIG.

2) High-High-Low (HHL) Level Switch. A second high level switch (Hi-Hi) is installed above the high level switch that will run the solution delivery pump in case of an upset condition in the solution tank. A low level switch will protects the pump by preventing it from running dry.

e. Electrical Requirements

1) Two electrical circuits are required for operation: (1) 110v 15 amp power, and (1) 110v control circuit from a pool controller.

B. pH Buffering System (Muriatic Acid)

1. Chemical feeders for muriatic acid shall be peristaltic type pumps. Chemical feed pump(s) shall be provided and connected to the filtered water return lines to the pool(s) as shown on the pool plans. The pump(s) shall be capable of feeding a solution to the pool(s) to maintain pH level against the back pressure involved and shall be fully adjustable while in operation.

2. The pump(s) shall be provided complete with fractional horsepower motor for 120V 60 Hz current, plastic feed lines, and fitting necessary for connections to pool system piping.

3. The chemical pump(s) shall be electrically connected to and operated by the water chemistry controllers.

4. The acid pump(s) shall be affixed with a metallic stamped label indicating the chemical being pumped and the pool to which it is connected.

5. Provide non-metallic wall mounted shelf support for the chemical feeder(s).

6. Provide six (6) fifteen (15) gallon acid drums.

7. Provide two (2) two drum modular spill platform. Platform shall be molded high-density polyethylene with removable polyethylene grating. Platform shall be 26.25" x 51.5" x 6.5" with a spill capacity of 30 gallons and a load capacity of 5,000 pounds. Platform shall be an Eagle two drum modular spill platform model 1632, or approved equal.

8. Provide one (1) low profile ramp. Ramp shall be molded high-density polyethylene. Ramp shall be an Eagle low profile ramp model 1689, or approved equal.

9. Provide "Vapor Shield" vent check valve for the acid drum/tank which seals container while allowing the liquid to be removed via pump. The Vapor-Shield shall prevent an internal vacuum and collapse of a sealed container. It will also prevent the pump from developing a vacuum-lock while attempting to remove the liquid from the sealed container. The Vapor-Shield shall prevent the release of any acid

vapors. The Vapor-Shield body shall be constructed entirely from schedule 80 PVC with polypropylene tube fittings and factory-installed acid resistant viton sealant on all threaded connections. The diaphragm and o-rings shall be constructed of acid resistant viton. No metallic or materials not rated appropriate for use with acid shall be used. The Vapor-Shield shall be fitted with a ¾" male NPT threaded fitting to allow for the installation onto any common: five (5) through fifty-two (52) gallon acid shipping container caps and lids. The unit shall be supplied with no less than fifteen (15) feet of 3/8" polyethylene tubing. Recreonics catalog no. 52-095. An Acid Fume Scrubber, part #7747090, with refill reagent kit, #7747091, manufactured by ProMinent shall be considered an equal.

10. Chemical feeders to be manufactured by G. H. Stenner & Co.,or approved equal.

    a. Competition Pool Acid Pump (one required): Model 45M3 22 GPD

    b. Dive Pool Acid Pump (one required): Model 45M3 22 GPD

    c. Endless Pool Acid Pump (one required)(Alternate #2):Model 45M1 3 GPD

C. Ultraviolet Dechloramination and Disinfection System

1. Ultraviolet Disinfection Equipment: Shall operate within the UVC electromagnetic spectrum emitting wavelengths in the range of 200nm to 400nm. This required wavelength will provide constant disinfection/inactivation of bacteria, algae, molds, viruses and destruction of Monochloramines, Trichloramines, and Dichloramines. Ultraviolet Lamp/Chamber and Spectra Touch Control Panel by Engineered Treatment Systems or Architect/Engineer approved equal. Any deviation/exception must be provided in writing to and approved by the designer prior to the bid date.

    a. Ultraviolet disinfection equipment by Aquionics and Prominent are approved equals.

2. The UV System shall have an MET or equivalent (ETL, CSA, or UL) listing, be NSF-50 2014 certified including Section 14.18 (crypto inactivation) or 3rd party validated to the USEPA UVDGM 2006 Guidelines.

    a. Equipment General Description: The Ultraviolet System shall be provided in a complete package to include: 316L Schedule 10 Stainless Steel Chamber, Spectra Touch Control System located in a NEMA 12 (IP52) rated panel, Medium Pressure Bulb(s) designed to emit wavelengths within the UVC electromagnetic spectrum, UV EZ Clean strainer, automatic wiper system, and Project Commissioning by a Certified ETS Ultraviolet Technician.

3. ECP Units: Ultraviolet manufacturer to offer unit capability of a horizontal OR vertical installation application using state of art design and direct flow through characteristics. Direct flow will be required in order to reduce total head loss through the system. Unit shall be a Single Lamp medium pressure system with a bulb of 1.3 kW power range. ANSI/DIN (as specified) flange of 3"/80mm and flow pattern of up to 260 GPM/1145 m3 /hr @ 94% UVT, Any systems validated or designed for flows based on 98% UVT are not acceptable. Chamber and Control Cabinet shall be as indicated on the drawings. The electrical requirements include either 208/220/230 volt single-phase 50/60 Hz power (as specified) with a 20 amp external breaker. All required electrical work to be performed by licensed electrician.

4. ECF Units: Ultraviolet manufacturer to offer unit capability of a horizontal OR vertical installation application using state of art design and direct flow through characteristics. Direct flow will be required in order to reduce total head loss through the system. Unit shall be a Multiple Lamp medium pressure system with a bulb range of (2) 1.0 kW – (4) 3.0 kW power range. Multiple lamp system is required in order to maintain quality disinfection in the event of a single bulb failure. ANSI or PN (as specified) flange range of 4"/100MM – 12"/300MM and flow pattern of 350 to 3700 GPM (1540 m3/hr to 16,313 m3/hr). @ 94% UVT. Any systems validated or designed for flows based on 98 % UVT are not acceptable. Chamber and Control Cabinet shall be as indicated on the drawings. Electrical requirements are indicated in the table below. The electrical contractor is to take into account plus/minus 3% for external breaker. All required electrical work to be performed by licensed electrician.

Pool Type	Model Number	US EPA 3-log and calculated 40mj/cm2 (GPM)	Calculated 60 mj/cm2 (GPM)	NY DOH Validated 40mj/cm2 (GPM)	Lamps	Power (KW)	Voltage (V) with Breaker Size
Endless Pool (Alternate #2)	ECP-113-5SPV	260	176	100	1–1.3kW	1.3	220 V (1ф)– 20A
Competition Pool	ECF-430-12V	3705	3350	1980	4–3.0kW	12.0	480 V (3ф)– 50A
Dive Pool	ECF-430-12V	3705	3350	1980	4–3.0kW	12.0	480 V (3ф)– 50A

5. Ultraviolet Chamber

   a. Pressure rated for 100 psi/8 Bar (tested to 150 psi/11 Bar), and pressure drop across the unit will be minimal. The unit shall be constructed of 316L stainless steel, schedule 10 pipe, passivated to prevent corrosion within the harsh pool environment. The Ultraviolet chamber shall come complete with the following equipment.

      I. Ultraviolet intensity monitor factory calibrated to provide intensity in mw/cm2, it must include a built-in alarm system to notify operator when output level drops below required level of 60 mj/cm2 for indoor pools or 40mj/cm2 for outdoor pools (or operator set dosing levels).

      II. Ultraviolet temperature control system shall be provided to maintain system integrity in the event of flow interruptions to the chamber.

      III. Ultraviolet chamber shall come complete with annealed quartz sleeve with “O” ring seals for water tightness.

      IV. Chambers shall be complete with ANSI or DN flanges (as specified) and all ports or vents shall be threaded NPT. The Ultraviolet chamber must be capable of installation in the system so that it remains full under all conditions.

      V. The Ultraviolet unit must be complete with integrated brackets or feet for ease of installation in either vertical or horizontal mounting.

      VI. The Chamber shall have a sacrificial anode attached to the chamber, extending inside the chamber and be bonded to the installation bond loop.

6. Ultraviolet Lamp

   a. Ultraviolet lamp shall be medium pressure high intensity. Lamp shall be designed to emit continuous Ultraviolet wavelengths in the range of 200nm to 400nm. This will provide optimal disinfection benefits and destruction of the Monochloramine, Dichloramine, and Trichloramine compounds. Lamp must remain unaffected by temperature variance of 0 degrees F (-17 C) to 200 degrees Fahrenheit (93 degrees Celsius).

   b. The lamp system must provide a constant dose of not less than 60 mj/cm2 until the end of the lamp life for indoor applications and not less than 40 mj/cm2 for outdoor disinfection and this must be based on constantly monitoring the full recirculating flow rate, not on a side stream treatment. The system must be equipped with variable power control to control the intensity & dose of the lamp in 1% increments.

7. Automatic Wiper System

   a. An automatic cleaning system shall be provided for cleaning of quartz sleeve and Ultraviolet monitor probe. The system shall travel the entire length of the quartz sleeve twice per desired

cleaning cycle. Precision molded wiper rings shall be provided to ensure thorough quartz tube cleaning and quartz tube protection. Wiper cycle shall be user selectable and adjustable within a range of 5 minutes to 24 hours depending on anticipated application and deposit build-up.

8. UV Strainer

   a. The UV system must be provided with a downstream strainer to protect against the possibility of lamp/quartz breakage traveling downstream.

9. Ultraviolet Control System

   a. Control cabinet shall be an ETS SPECTRA Touch control unit and or pre-approved equal. The cabinet shall be an epoxy coated NEMA 12 / IP52 rated cabinet. If mounted outdoors it must be a NEMA4X /IP56 rated cabinet with an integral A/C unit to protect the components from the environment. The power must be controllable to provide full power, half power and infinite variable power based on real time interface with changes in UVT, Flow Rate or Combined Chloramines. Three levels of operation shall be provided to meet the needs of the operator and pool environment: Simple Control (start, stop and reset), Full Parameter Display, and Customized Operator Configuration. Modes of operation shall be password protected to secure system critical setup functions. Touch Control system shall have clearly identifiable start, stop, and reset icons (suitable for gloved operation) with Running and Fault LCD indicators.

      I. The main Touch screen shall display a minimum of the following: Ultraviolet calculated dose (derived from flow and intensity inputs), Ultraviolet intensity (as a % and mw/cm2), Lamp Current, Flow rate (accepts signal from optional flow meter – displayed as gallons per minute or m3/hour), Chamber temperature (displayed as deg. F or deg. C), Operation hour meter, and fault indicators to include Lamp fault, low Ultraviolet & temperature alarm, Ground fault trip, Wiper fault. All alarm functions shall have simple text message display to assist in fault finding.

      II. Touch Control system shall have a minimum of the following system interface controls: Remote operation, Process interrupt features (from valves, flow meters), Low UV dose (configurable to shutdown or alarm only), Flow meter input, Auto-Restrike, Half to full power Ultraviolet setting with 24 hour/7 day settable timer. Variable power/Dose pacing interface.

      III. Touch Control system shall have built in data-logging capabilities to record the following information: Ultraviolet intensity required, Ultraviolet intensity measured, Lamp current, Chamber temperature, Flow rate (if flow meter is connected), Time and date stamp, All alarms generated.

      IV. Touch Control system must be able to be interfaced with a Chemistry Controller that can measure Total or Combined Chloramines in order to maintain the proper dosage required during the life of the lamp.

      V. Touch Control system must be able to interface with any automatic or semi-automatic filtration controller.

      VI. Touch Control system must be capable of operating through Ethernet or Wi Fi.

      VII. Touch Control system must be capable of interfacing with a SCADA system including both Profibus and Modbus.

10. System Startup

    a. Install in accordance with contract documents and manufacturer's instructions.

    b. Commissioning:

I. Ultraviolet Chamber and Control Panel shall be commissioned by a qualified factory trained technician to institute the warranty.

II. Final electrical and control cabling will be connected from the Touch Control cabinet to the Ultraviolet disinfection chamber during the commissioning process.

III. Daily operation and simple maintenance instructions shall be provided during the commissioning process.

11. Warranty

a. All components, excluding lamps, quartz and seals, shall have a limited warranty to be free from defects in workmanship and materials for a period of 12 months from date of start-up. Medium pressure Ultraviolet bulbs shall be warranted for a period of 8,000 hours. Intermittently operated lamps (1 on/off cycles per day) will be replaced free of charge should failure occur prior to 4,000 hours and replacement will be prorated between 4,000 and 8,000 hours.

b. Manufacturer must maintain spare or replacement parts in the USA for same day or not longer than next day delivery in North America.

2.7 WATER CHEMISTRY MONITORING AND CONTROL SYSTEMS

A. The water chemistry control system for the competition pool and dive pool shall provide continuous monitoring and control of sanitizers, oxidizers, pH, ORP, free chlorine, temperature, system flow rate and water chemistry balance calculations. The controller shall manage the recirculation pump with a programmable Fireman Cycle feature, which automatically turns off the Heater, UV and Auxiliary systems prior to shutting off the recirculation pump. All line-voltage wiring shall be performed in a separate NEMA 4X enclosure that precludes access to the controller electronics. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the Owner and the training shall be videotaped per 131100, Section 1.12 of the project contract documents. The specified controller, a BECSys7 manufactured by BECS Technology, Inc. shall be provided or Chemtrol by SB Control Systems, AcuTrol by Pentair, ProMinent, or a technically equal system capable of providing equal performance for all operating functions. Provide a BECSys3 for the Endless Pool (Alternate #2).

B. Certifications

1. The controller shall carry the following product certifications

a. NSF/ANSI Standard 50;

b. UL 61010-1

C. Sensors

1. The controller shall come with the following sensors

a. pH - The controller shall provide a measurement of pH by utilizing a sensor with the following characteristics:

1) 0 – 14 sensing range

2) ABS body with ½" NPT process connection

3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal

4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction

5) A silver/silver chloride (Ag/AgCl) reference element

6) A general purpose glass membrane pH sensing element

7) Operating temperature range of 0 - 80 degrees C

8) Operating pressure range of 0 - 100 psiG.

9) The controller shall continuously monitor, display and data log pH with 0.1 or 0.01 resolution (programmable).

b. ORP - The controller shall provide a measurement of ORP by utilizing a sensor with the following characteristics:

1) -1000 to +1000mV sensing range

2) ABS body with ½" NPT process connection

3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal

4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction

5) A silver/silver chloride (Ag/AgCl) reference element

6) A solid platinum or solid gold ORP sensing element with a minimum of 1 cm^2 surface area; platinum-plated and gold-plated sensing elements, which are susceptible to abrasives, shall not be considered equal

7) Operating temperature range of 0 - 80 degrees C

8) Operating pressure range of 0 - 100 psig

9) The controller shall continuously monitor, display and data log ORP with 1mV resolution

c. Flow Sensor - The controller shall provide a measurement of pool circulation flow rate and volume by utilizing a flow sensor with the following characteristics:

1) 0-8800 gpm (0-33265 liter/min) measuring range,

2) Magmeter flow sensor with a frequency output,

3) Dual O-ring seal,

4) Cable to meet length requirement for installation,

5) Saddle to meet return line size,

6) Flow volume: 999 trillion gallons, 1 gallon resolution; 999 trillion liters, 1 liter resolution.

7) The controller shall continuously monitor, display and data log flow rate with 0.1 gpm resolution.

d. Temperature - The controller shall provide a measurement of water temperature by utilizing a sensor with the following characteristics:

1) 32 – 212°F (0 – 100°C) sensing range;

2) 2 wire, 100Ω resistive temperature detector (RTD) with a 0.00385 Alpha.

3) The controller shall continuously monitor, display and data log temperature with 1°F resolution.

e. Free Chlorine Sensor - The controller shall provide a measurement of free chlorine by utilizing an amperometric sensor with the following characteristics:

1) 0.0 to 20.0 mg/l (ppm) measuring range with fully selectable scale,

2) 32° - 113°F operating temperature range,

3) A PVC body,

4) Replaceable PTFE membrane and electrolyte,

5) Gold cathode and silver/silver chloride anode.

6) The controller shall continuously monitor, display and data log free chlorine with 0.1 mg/l resolution.

f. 4-20mA Sensors

1) Total Chlorine Sensor (with Combined Chlorine Reading) - The controller shall provide measurement of total chlorine utilizing a sensor with the following characteristics:

a) 0.0 to 20.0 mg/l (ppm) measuring range,

b) 41° - 113°F operating temperature range,

c) Replaceable PTFE membrane and electrolyte,

d) Gold cathode.

e) The controller shall continuously monitor, display and data log total chlorine with 0.1 mg/l resolution. The controller shall also continuously monitor, display and data log combined chlorine (from the total chlorine and free chlorine sensors) with 0.1 mg/l resolution.

D. User Interface

1. Standard Display - The standard display shall be a backlit transflective LCD with 14 line x 40 alpha/numeric graphical characters that will continuously display information related to the following:

a. All installed sensor readings

b. Set points, with current control status

c. All active alarms, including time activated

d. Smart menus w/ integrated on-screen help

e. Contrast adjustment of the backlit LCD shall be provided through clearly marked keys on the front-panel without the need for access to internal controller circuitry. After initial adjustment, controller

shall monitor internal temperature and automatically adjust contrast to prevent LCD blackout in extreme ambient temperature conditions. Controllers that do not include front-panel contrast adjustment and automatic temperature compensation shall not be considered equal.

f. The standard user interface shall include single-touch access to Set Points, Relay Modes, Calibrations, Backwash status and settings, Menu access, and Reset Fail/Safes. An alphanumeric keypad shall be provided for ease of system configuration.

E. Control Functions

1. Water Chemistry

a. pH Control: The controller shall continuously control pH. Chemical feed shall be configurable for feed-up, feed-down, or dual feed and either on/off or time-based proportional feed.

b. Sanitizer Control: The controller shall continuously control sanitizer based upon the ORP reading, the amperometric sensor, or both with a bracketed control program. Chemical feed shall be configurable for either on/off or time-based proportional feed.

c. Bracketed Sanitizer Control: With the amperometric ppm sensor, the controller shall be configurable for bracketed sanitizer control; The bracketed control algorithm shall allow either the ORP or ppm setpoint to be chosen as the primary control point, while using other parameter to create a secondary boundary (min and max settings) that must be maintained in addition to the primary control point.

d. Sanitizer Booster Feed: The controller shall have a sanitizer booster program with selectable ORP and/or ppm set points with separate ending set points, allowing the option of the booster sanitizer to control to a lower set point while the primary system can recovers.

e. UV Control: A Fireman Cycle feature shall turn off (ramp down) the UV relay 0 to 60 minutes (settable) prior to backwash initiation or recirculation pump shutdown.

f. Superchlorination: The controller shall have a programmable superchlorination function, based upon ORP or ppm superchlor setpoint, which is triggered manually.

g. Dechlorination: The controller shall have a programmable dechlorination function, based upon ORP or ppm dechlor setpoint, which is triggered either manually or by the completion of the superchlorination function.

h. LSI & RSI: The controller shall compute the Langelier Saturation Index and the Ryznar Saturation Index based upon current inputs and the Ca Hardness and Alkalinity entered by the operator.

2. Expanded

a. Flow Monitoring: The controller shall continuously monitor, display, and datalog system flow, maintaining a total flow volume. A Low Flow Alarm shall be operator settable, which can be programmed to disable chemical feeds. Controller shall also have a Minimum Flow Rate setting to turn off heater whenever system flow is less than this programmed minimum level.

3. Energy Conservation

a. Alternate Setpoints: The controller shall have alternate Sanitizer, Heater, and Autofill setpoints, based upon a 4 event 28 day timer.

b. Energy Conservation Mode: The controller shall have the capability to disable all mechanical and chemical functions during programmed conservation cycle. The Energy Conservation Mode shall

include the ability to periodically monitor and satisfy all operation requirements based upon a programmed time schedule.

F. Main Recirculation Pump

1. On/Off Control with Relay

a. Controller shall provide the capability to interface to and control a recirculation pump with a programmable relay. The controller shall provide 3 operator-settable independent Fireman Cycle settings and relays for the UV controls. The controller shall include the following capabilities, available as appropriate based upon installed sensors and implemented features:

1) Fireman Cycle: Upon the following events, the controller shall automatically delay recirculation pump shutdown until the UV controls have been deactivated and the corresponding Fireman Cycles have expired:

a) Backwash Operations

b) Energy Conservation mode (24 hr., 7 day function)

c) Manual off (per Operator)

2) Immediate: Upon the following events, the controller shall immediately turn off the recirculation pump (and UV controls), without first satisfying Fireman Cycle timing requirements:

a) Surge Tank Level Low Alarm: Turn off pump immediately (surge tank is almost empty)

b) Strainer Vacuum High Alarm: Turn off pump immediately (possible entrapment)

c) Emergency shutdown, triggered by front-panel Emergency Off: Turn off pump immediately (per Operator)

2. VFD Interface with 4-20mA signal

a. Controller shall provide the capability to interface to and control a recirculation pump equipped with a Variable Frequency Drive (VFD) through a 4-20mA signal. The controller programming shall allow the operator to manage the VFD entirely from the water chemistry controller, by providing the following capabilities:

1) Programmable setpoint specified as either flow rate, effluent filter pressure, or fixed setting,

2) Four programmable operator-triggered alternate profiles (“Manual Turndowns”),

3) Four programmable scheduled alternate profiles (“Scheduled Turndowns”),

4) Override setting for backwash,

5) Ramp up and ramp down settings,

6) Minimum output setting.

7) Remote access to current VFD status and all VFD parameters shall be provided through the BECSys for Windows PC software provided with controller. The name of each alternate profile shall be changeable by the operator, so that VFD menus and data log entries are intuitive and recognizable by the users of the system.

8) Systems that do not provide both local and remote management of the VFD through the water chemistry controller shall not be considered equal.

G. Control Outputs

1. Relay Outputs

a. Solid-State Relays

1) The controller shall come with a total of 4 integral line or dry contact 5A solid-state relay outputs capable of switching 3A under all normal operating conditions, accounting for the effects of the temperature gradient inside the NEMA 4X enclosure. Systems that utilize relays that are not de-rated must submit an engineering evaluation justifying the use of relays at their full, optimal-condition capacity. All solid-state relays shall have a provision for an electrical interlock with the circulation pump motor starter.

2. Mechanical Relays

a. The controller shall come with a total of 5 mechanical relays:

1) 1 integral 8A dry contact mechanical relay, and

2) 4 integral 3A dry contact or line powered mechanical relays.

3) Since mechanical relays have the inherent risk of failing in the closed (active) position, as a safety measure the controller shall preclude the ability to assign any of the integral mechanical relays to chemical feed functions. Systems that do not preclude mechanical relays from being configured for chemical feeds shall not be considered equal. All mechanical relays shall have a provision for an electrical interlock with the circulation pump motor starter.

3. Solid-State Relay Expansion Modules

a. Each Solid-State Relay Expansion Module provides 5 integral 5A solid state dry contact or line powered relays capable of switching 3A under all normal operating conditions. Systems that utilize relays that are not de-rated must submit an engineering evaluation justifying the use of relays at their full, optimal-condition capacity. All solid-state relays shall have a provision for an electrical interlock with the circulation pump motor starter.

4. Mechanical Relay Expansion Modules

a. Each Mechanical Relay Expansion Module provides 5 integral mechanical relays:

1) 1 integral 8A dry contact mechanical relay, and

2) 4 integral 3A dry contact or line powered mechanical relays.

3) Since mechanical relays have the inherent risk of failing in the closed (active) position, as a safety measure the controller shall preclude the ability to assign any of the integral mechanical relays to chemical feed functions. Systems that do not preclude mechanical relays from being configured for chemical feeds shall not be considered equal. All mechanical relays shall have a provision for an electrical interlock with the circulation pump motor starter.

5. 4-20mA Outputs

a. The controller shall come with eight separately isolated 4-20mA output signals with a load capacity of 440Ω per output channel. Each output signal shall be independently configurable for either of the following functions:

1) Any enabled input, scaled between two operator-defined end points,

2) VFD control of recirculation pump.

H. Safety Features

1. Manual-On limit

a. The controller shall have built-in limits to the amount of time any relay control output may be forced on (i.e. in “Manual On” mode). This is an important safety feature to prevent control outputs from inadvertently being left forced on after service or diagnostics.

2. High/Low Alarm Settings & Control Lockouts

a. The controller shall have programmable high and low alarm settings for pH, ORP, PPM, temperature, low flow & no flow and chemical overfeed, turbidity, pressure & vacuum, surge tank levels, chemical inventory. The controller shall have a programmable lockout of sanitizer feed upon pH high or low alarm.

3. No Flow Alarm & Flow Restored Delay

a. The controller shall activate a No Flow alarm when the dedicated sample stream flow switch indicates there is insufficient flow through the sample stream. This No Flow alarm shall lockout all chemical feed control operations. The controller shall include a Flow Restored Delay, which shall extend the No Flow lockout user-programmable amount of time after the No Flow alarm ends (i.e. flow is restored). This feature is necessary to assure that the system has valid, stable sensor readings of circulating water prior to making chemical feed control decisions.

4. Feed Limit Alarms

a. The controller shall trigger a FailSafe 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 FailSafe alarm condition.

5. Emergency Off

a. The controller shall have a 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.

6. Safety shield

a. The controller shall include a safety shield or other mechanism for allowing fuse replacement without access to high voltage circuitry or wiring.

I. Security

1. The 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.

J. Data Logging

1. The controller shall have 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).

2. The controller shall 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.

K. Local Alarms Indicators

1. The controller shall signal all alarm conditions with the following indicators:

a. A bright red flashing LED on the front of the controller,

b. Activation of a master alarm signal provided as a dry contact relay enabling the use of 0-240 VAC alarms, and

c. Each active alarm listed on the LCD display along with time activated.

L. Remote Communication, Access & Alarm Notification

1. Ethernet

a. 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.

2. Remote Access

a. The controller manufacturer shall provide BECSys for Windowsä 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:

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 and control status 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.

3. Alarm Notification

a. The controller shall be capable of providing alarm notification to 8 different recipients. Each recipient shall be individually configurable to receive alarm notification by one of the following methods.

1) Email: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.

2) Text Message: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.

3) Fax: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.

4) Numeric Pager: Notification message shall include callback number. Controller shall acknowledge pager notification when callback is received, and not notify subsequent recipients programmed for pager notification.

4. The controller shall support an MS/TP (RS485) or TCP/IP (Ethernet) BACnet connection to 3rd party applications such as EMS, BMS, BAC and SCADA systems. The BACnet connection shall support access to Inputs (current readings), System Information, Set Points, Alarm Points, Control Status and Alarms. Set Points and Alarm Points shall be modifiable from the 3rd party application via the BACnet interface.

5. Wi-Fi

a. The controller shall come with a BECSys Wi-Fi module, which allows wireless integration into existing Wi-Fi networks.

M. Enclosures

1. The controller shall be housed in a NEMA 4X polycarbonate enclosure.

2. Field wiring enclosure - All high voltage field wiring shall be through a separate NEMA 4X enclosure that precludes access to controller electronics. All high voltage connections shall be clearly identified and a field wiring diagram shall be provided with the controller for installer reference. All controller high-voltage relay assignment parameters shall be programmed at the factory prior to delivery to installation location.

N. Flow Cell

1. Lighted flow cell

a. The flow cell shall have a polyethylene body with two ½“ NPT ports for pH and ORP sensors, two ¼“NPT ports for temperature sensor and sensor wash acid injection, integrated flow switch and clear acrylic front viewing windows. The flow cell shall also include a port for the CP-1 free chlorine sensor, if present. The flow cell shall be backlit to support inspection of sensors, and red LEDs shall illuminate to indicate a No Flow condition. The flow cell design shall provide precise sample flow rate and water velocity regulation past the sensors. The flow cell shall come provided with PVC ½” isolation ball valves and PVC ¼” wet test valve.

b. 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.

O. Start-up and Manuals

1. 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.

2. Manufacturer shall supply an Operation and Maintenance Manual describing features, operating instructions, maintenance procedures and replacement parts.

2.8 FLOW METERS

A. Flow Meter

1. Flow meters (3 required) shall be installed according to the manufacturer in the filtered water return lines to each of the pools. Flow sensor shall be the GF Signet 2551 insertion magmeter. Provide the coaxial cable from the sensor to the display/transmitter. Flow meter accuracy shall be +/- 2% of reading. The flow instrument shall have a LCD for simultaneous display of four-digit flow rate and eight-digit totalizer. Display/Transmitter capability will be part of chemical controller function or as separate Signet GF Signet

9900 display/transmitter. Signet GF Signet 9900 display/transmitter shall be powered by 24VDC and provide a 4-20mA output.

2. Backwash piping flow meter (3 required) shall be a pilot, impact ball, variable area type with one piece, impact resistant machined acrylic plastic body. GPM scale to be permanently etched or imprinted on the meter. Flow rate indicator to be of stainless steel material. Scale range to be appropriate for specific flow rate. Pipe size to accommodate backwash rate. Backwash piping flow meter shall be BLUE-WHITE series F-300 or approved equal.

B. Refill Flow Meter

1. Refill flow meter (2 required) shall be installed on dilution piping to backwash tank. Flow meter shall be one piece meter body of injected molded polysulfone adapters, viton o-ring seals, and 316L stainless steel floats and float guide, impact resistant machined acrylic plastic body. GPM scale to be permanently etched or imprinted on the meter. Flow rate indicator to be of stainless steel material. Scale range to be appropriate for specific flow rate. Manufacturer shall be BLUE-WHITE or approved equal Model F-45750L-12, 3/4" M/NPT @ 1.0 to 10.0 GPM.

2.9 WATER LEVEL CONTROLLERS

A. In Surge Tank Water Level Controller

1. Provide a water level sensing and control system for each of the Dive Pool and Competition Pool that will monitor the water level in the surge tank and automatically activate the auto water make-up control valve. For sensing water level and activating make-up water control valve for each pool, use Series ELC-810 Controller housed in a watertight NEMA 4X UL94 5V UL flammability rated polycarbonate enclosure to meet IP66 and NEMA 4, 4X, 12 and 13 ratings. The Controller shall utilize two sensor(s) to control water level. ELC-810 series shall have a menu-driven LCD display screen and utilize a five-switch user interface for navigation through the menu. The menu shall allow changing the following settings: delay to shutoff, alternate sensor option, maximum time on, manual override, delay to normal, type of sensor, high level option, flow sensor active, and sounder with alarm. All menu settings shall be capable of password protection. The Controller shall be capable of displaying the following data: last fill time, last drain time, last alarm. The Controller shall be capable of determining the following: maximum time on exceeded, over current to solenoid valve, no valve/valve wiring problem, and sensor not working properly. The Controller shall have a low voltage interlock with auto water make-up solenoid valve, shall provide adjustable time delay for increasing level and manual override; and shall require 115 VAC, 1 phase, 60 Hz power. Manufactured by AquatiControl Technology, Model ELC-810-DS-ST-XXX (Contractor to coordinate the specific length(s) of cable required for each controller prior to ordering). Refer to drawings for additional information. Provided and installed by CONTRACTOR and connected by electrical.

2. Provide a solenoid valve for high level sensor, normally opened, stainless steel fitted, bronze body, 24 VAC slow closing type. Size to pipe. Interlock with automatic water level control system. Refer to the Drawings for additional information. Such as ASCO, or approved equal.

3. Provide a proximity switch sensor that shall be sensitive to within +/- 1/8" (4mm) of nominal water level. Supply voltage to sensor shall be 12V to 24V DC from Controller. Current consumption shall be < or = 15mA. Response frequency shall be 100Hz. Maximum control output shall be 200mA. Sensor operating temperature shall be -25 Deg. C to 70 Deg. C. Operating humidity shall range from 35% RH to 95% RH. Sensor shall be mounted in a 1" SCH80 PVC pipe (length to be determined by depth of surge tank). Sensing pipe to be mounted to surge tank wall with composite/non-metallic hangers and stainless steel hardware. Sensing pipe shall be capable of being submerged under water safely. Refer to drawings for additional information.

4. Wiring from the sensor to the Controller shall be provided and shall be connected to the terminal points mounted within a corrosion-resistant, nonmetallic NEMA 4X enclosure. All wiring connections shall be made through the bottom of the enclosure. The enclosure size shall be no less than 8" wide x 5" high x 4"deep. The access door shall be the entire front face panel of the enclosure. Confirm location in field.

5. Major components shall be plugged in using WAGO terminal blocks for ease of installation and replacement. Unit shall be designed to activate a 24-volt AC solenoid valve.

6. Provide a make-up water solenoid valve, normally closed, stainless steel fitted, bronze body, 24 VAC slow closing type. Size to pipe. Interlock with automatic water level control system. Refer to the Drawings for additional information. Such as ASCO, or approved equal.

7. Discharge of make-up water shall be into a fill standpipe and piping to the Dive Pool and Competition Pool surge tanks. Refer to the Drawings for additional information.

2.10 INSERTS AND ANCHOR SOCKETS

A. Sockets and anchors shall be provided as stainless steel or cast bronze for swimming pool accessories. The CONTRACTOR shall confirm compatibility of deck equipment and deck anchors with the deck equipment manufacturer. All anchors or sockets shall be provided with flush closure caps and escutcheons with set screws where indicated. Escutcheons shall be of the keyhole or oblong shape, similar to the casted, electro-polished stainless steel escutcheon with set screw by Paragon #28303SS, or approved equal.

1. Anchor sockets for all railings and grab rails shall be of the wedge type, cast bronze, 4 inches in depth and made to receive 1.50 inch OD tubing as manufactured by Paragon #28105, or approved equal. The wedge shall be cast bronze, incorporate a stainless steel tightening bolt and flat washer, and be designed as the sacrificial element to the anchor system. All metallic components shall be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance.

2. Anchor sockets for all stanchions shall be of cast bronze, sized to receive a full 6 inches penetration of 1.900 inch OD tubing as manufactured by Paragon Aquatics Catalog No. 38201TC, Spectrum Products No. 23626, Kiefer No. 700103, or approved equal. Each anchor socket is to be provided with a flush threaded, vandal proof closure cap Paragon Aquatics Catalog No. 38201TC or Spectrum Products No. 23628, or Kiefer No. 700103C, and a grounding lug with screw. Provide Paragon Aquatics catalog no. 38303, Spectrum Products catalog no. 23630, Kiefer No. 700103K, or approved equal spanner wrenches for removing the closure cap.

3. Cup anchors for racing lane lines, water polo tether and boundary lines etc. shall be incorporated into the perimeter overflow system. Cup anchors shall be 316L stainless steel with stainless steel threaded eyebolts. The heavy-duty cup anchors shall be 3-3/8” in diameter. Cup anchors shall be Spectrum round cup anchor, part no. 58316, SR Smith Lane Line Wall Anchor, part no. WA-100, or approved equal.

4. Anchors sockets for single post starting platforms located on the deck level, rollout, parapet and bulkheads shall be designed to prevent rocking. NOTE THAT STARTING PLATFORMS SHALL BE DESIGNED TO BE INTERCHANGEABLE BETWEEN ALL POOL EDGE CONDITIONS, INCLUDING BULKHEAD, REQUIRING DIFFERENT ANCHOR SOCKET DEPTHS FOR INSTALLATION AT EACH EDGE CONDITION TO MAINTAIN PROPER PLATFORM HEIGHT ABOVE WATER LEVEL – REFER TO PLANS. A stainless steel cap shall be provided to flush mount on the deck when platform is removed. Anchors for starting platforms shall be by the starting block manufacturer - SR Smith Rock Solid anchor is required by Owner.

5. Anchor assembly for pool lift shall be supplied by the pool lift manufacturer and shall include a grounding lug for proper bonding. Install in accordance with manufacturer's instructions and provide the concrete foundation reinforcing required to properly anchor and support the unit for its intended use. Manufacturer shall provide an anchor that has a completely flush cover or flush plug for times when the lift is not in use.

6. Anchors for the diving board stands shall be all bronze threaded castings for respective 5/8” threaded anchor bolts. The stand shall be designed for mounting with the use of Durafirm catalog number 70-231-900 bronze deck anchors.

7. Anchors for bulkhead locations shall be provided by the bulkhead manufacturer and installed into the gutter system by the CONTRACTOR where shown on drawings.

2.11 DECK EQUIPMENT

A. Grab rails shall be provided as required in the quantities and to the dimensions as shown on the drawings. Grab rails shall be fabricated of one continuous length of polished and buffed tubing. The tubing shall be ASTM-A-554 grade 316L stainless steel, 1.50 inch OD x .120 inch minimum wall thickness, polished and buffed to 320 grit finish and shall be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. All bends shall be smooth and free of wrinkles. Grab rails shall be pretzel bend style with dimensions as indicated in the plans and as manufactured by Spectrum, SR Smith, Paragon, or approved equal.

B. Railings for the diving tower and springboard pedestals shall be provided as detailed on the architectural drawings. Rails shall be custom fabricated of one continuous length of tubing wherever possible. The tubing shall be Anodized Type 6061-T6 Schedule 40 Aluminum, 1.50-inch OD x .120 inch wall thickness – A31 Architectural Class II Clear Anodize, or as specified by Architect. All rails shall be vented for Anodizing. All welding shall be in accordance with American Welding Society Code D1.1-94. Welding electrodes shall be Aluminum 5356. Welding slags, burrs and splatter shall be removed from hand rail surfaces and all exposed welds shall be ground smooth. All dimensions shall be field verified prior to fabrication.

C. Stanchion posts (backstroke and false start) shall be provided as required and in the quantities shown on the drawings. The posts shall be a straight length of type 316L stainless steel tubing, 1.900 in. OD x .145 in. wall thickness x 8 ft. 0 in. overall length, polished and buffed to 320 grit finish. Stanchions shall be capped at one end with a closure plug containing a U-shaped hook and fitted with a stainless steel eyebolt attached to an adjustable nickel plated bronze sliding collar. Stanchion shall be as manufactured by Paragon Aquatics, catalog no. 38106, or Spectrum Products catalog no. 23614 with Paragon Aquatics catalog no. 38301 or Spectrum Products catalog no. 23625, sliding collar, with eyebolt or approved equal.

D. Starting Platforms

1. Single post starting platforms for the rollout/parapet/bulkhead (19 required, 18 plus 1 spare) shall have number plates on both sides numbered 1 through 18. Spare block shall not be numbered. Platform block height shall be 29-1/2” inch above water level. The platform top (24” wide x 32” deep) and intermediate side step (8” x 12”) shall be constructed of fiberglass. Contractor shall confirm step is on correct side (right or left) according to plans. The top shall be permanently positioned at a 10° tilt towards the pool. Frames to be 2.5 square inch x .125 inch wall thickness 304 stainless steel tubing with a powder coated finish. Architect/Owner to select colors. Verify height of platform above water before ordering. Backstroke bar shall be 1” diameter and allow both horizontal and vertical grab positions. Blocks shall have raised side grip handles and adjustable back plate. Platforms shall be custom blocks as detailed on the plans. Blocks shall be SR Smith Velocity single post starting platforms as required by Owner. Each starting platform shall have two labels affixed stating "Warning-Execute Shallow Racing Dive - Impact with Pool Bottom can Cause Permanent Injury." NOTE THAT STARTING PLATFORMS SHALL BE DESIGNED TO BE INTERCHANGEABLE BETWEEN ALL POOL EDGE CONDITIONS, INCLUDING BULKHEAD, REQUIRING DIFFERENT ANCHOR SOCKETS DEPTHS FOR INSTALLATION AT EACH EDGE CONDITION TO MAINTAIN PROPER PLATFORM HEIGHT ABOVE WATER LEVEL – REFER TO PLANS

2. Starting platform safety covers (18 required) are designed to keep unwanted users off stating platforms. The cover is made of 1/16” thick tough, lightweight plastic with a UV stabilizer and fits 20” x 24” platform tops. The conical shape and safety orange color act as a deterrent of stating platform use. Each cover is provided with a bungee cord for securing cover platform top.

E. Backstroke Start Assist Device

1. The Backstroke Start Device (eight (8) required) shall provide swimmers with an automatically retracting foot wedge to be used to aide backstroke starts. The backstroke start device shall offer multiple anchoring options to accommodate a variety of deck and block profiles. Backstroke Start Device shall be as manufactured by Spectrum Products, or approved equal.

2. Structure: The backstroke start device frame shall be fabricated from 12 ga 316L stainless steel material. This frame shall provide the structure for the multiple anchoring options of the unit. The frame shall contain the strap and retraction systems of the device.

3. Wedge: The wedge shall be constructed of an injection molded glass reinforced polypropylene copolymer. The wedge shall have the following dimensions: 8cm height 2cm width at the bottom edge 10° sloping face and 0.5cm radius along the upper edge. The wedge shall have a molded non slip surface for contact with the swimmers feet. This surface shall be easy to clean.

4. Cover: The internal workings of the unit shall be enclosed by a molded acrylic polyvinyl chloride. The cover material shall be UV resistant.

5. Mounting System: Each Backstroke Start Device shall include a standard strap mounting plate and straps. This attachment shall accommodate mounting in standard single and dual post starting platforms with a setback up to 36".

6. Retraction System: The backstroke start device shall retract the wedge from the pool upon the swimmer's start. The device shall have a ratchet system preventing unintentional downward displacement of the wedge during the swimmers start.

F. Dive Harness System (Three (3) required)

1. Provide a complete dive harness spotting system for one 3-meter and one 1-meter springboard as indicated in the plans. Dive harness system and all components shall be as supplied by Springboards And More (877-348-3246) www.springboardsandmore.com, or approved equal.

2. Beam Clamps: Provide beam clamps as required for attachment to natatorium structure overhead. Clamps shall be sized as appropriate for mounting to the welded flange at tube steel (refer to structural) and shall be constructed entirely from heavy-gauge cold-rolled steel provided with a corrosion resistant factory powder coat finish. Two (2) clamps required per dive harness.

3. Pulleys: Provide single and double pulleys designed for use with diving harness equipment. These pulleys shall have a strong swivel mechanism attached at the top that allows spotting equipment to move effortlessly. Pulleys shall be constructed of grade 316 stainless steel load straps and cheeks, and anodized aluminum sheaves that run on a self-lubricating Oilite Bronze bearing. The single pulleys shall have a maximum working load of 1,000 lbs. and a break load of 10,000 lbs. The double pulleys shall have a maximum working load of 1,200 lbs. and a break load of 12,000 lbs. Single pulleys shall be "RSI 3 Inch Single Rescue Pulley" and double pulleys shall be "RSI 3 Inch Double Rescue Pulley" as provided by Springboards And More or approved equal.

4. Spotting Rope: Provide 9.5mm spotting rope where shown on the drawings. Spotting rope shall be of kernmantle construction, and designed for low elongation. Spotting rope shall have a nylon or polyester 16-strand sheath combined with a Type Six double-twist continuous strand core to provide high tensile strength. Core strands shall have opposing twists to prevent unnecessary spinning. Spotting rope shall be "Blue Water Static Kernmantle Spotting Rope" as provided by Springboards And More or approved equal.

5. Spotting Belt: Provide one (1) adjustable spotting belt per dive harness assembly. The belting, hardware, and fabrics of the spotting belt shall be designed for use in water. The spotting belt shall have parachute webbing and cast steel hardware. The buckles shall be non-slip, cinch-type. Two (2) 4 ft nylon webbing straps with swivel belt clips shall be provided. The belt shall be adjustable for waist sizes 24" to 32". Adjustable spotting belt shall be "AAI Padded Adjustable Tumbling Belt" as provided by Springboards And More or approved equal.

6. Twisting Belt: Provide one (1) twisting belt per dive harness assembly. The twisting belt shall be designed for use in water. The rotating rings shall be cast of high tensile strength aircraft aluminum alloy. Inner belts shall be made of high strength nylon parachute webbing and open from both the front and back for quick-fit adjustments. High strength, cinch-type buckles shall be made of forged steel designed for use in parachute harnesses. Two (2) 4 ft nylon webbing straps with swivel belt clips shall be provided. Twisting belt shall be "AAI Padded Twisting Belt" as provided by Springboards And More or approved equal.

7. Nylon Boat Cleat: Provide two (2) nylon boat cleats for dive harness concealment. The boat cleat will provide a tie-down point for the dive harness spotting rope (9.5mm) on each side of the pool. Each boat cleat shall be located at a height of seven (7) feet above the finished pool deck. The boat cleat shall be 4" in length designed to support 3/8" line. Construction shall be injection molded, open base, glass-filled nylon with two mounting holes. Mounting hardware shall be stainless steel.

G. Water Polo Goals

1. Goals shall be constructed to meet all official regulations of FINA, NCAA, NFSHSA, and USWP. Where a conflict exists between these specifications and the official regulations of FINA, FINA shall govern. Special finishes and backings shall comply with the regulations. Deck-mounted water polo goals shall be adjustable vertically to provide the regulation cross bar elevation in shallow or deep water.

2. Floating water polo goal (6 required) shall consist of a front frame made of non-corrodible 3 inch x 2 inch aluminum with rounded edges and supported by 1 ¼" non-corrodible polished pipe. The flotation unit shall be vacuum formed ABS plastic supported by high-density ethafoam. The floating goal shall be as manufactured by Anti-Wave Club, Anti-Wave Odyssey, Kiefer KAP204, Kiefer WPG1402, or approved equal. The goal shall be provided with mesh netting securely fastened to the cage. Goal shall incorporate attachments for wave quelling cable floats, hooks and take-up ratchet for securing to rope anchors.

H. Lifeguard Chairs

1. Lifeguard chairs shall be constructed of UV inhibited recycled HDPE chairs. Seat height shall be 48" and 66" above the pool deck. All joints shall be secured using T- 316L stainless steel screws. Refer to architect for color finish.

   a. Lifeguard chairs (6 required) shall be Spectrum Mendota #45023, Tailwind Furniture model no. LG510, Kiefer Forever Guard Chair model no. 500231, SR Smith Sentry #SLGC42, or approved equal.

   b. Tall Lifeguard chairs (3 required) shall be Spectrum Mendota #45023, Tailwind Furniture model no. LG510, Kiefer Forever Guard Chair model no. 500231, SR Smith Sentry #SLGC42, or approved equal.

I. Diving Stands

1. Diving stands for the one-meter/three-meter springboards shall be installed as shown on the plans. The diving board stand shall consist of heavy aluminum castings dipped in erudite chromic acid solution, followed by a 20 mil coat of baked epoxy. Finish must be touched up in the field if damaged in shipping or assembly. The roller tube and tracks shall be heat-treated extruded aluminum processed by Alcoa Duranodic 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 psi and shall receive Alcoa Duranodic hard anodizing. Hinges shall be designed to allow 180-deg. 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-inch diameter by 3-1/2 inch long silicon bronze. Fulcrum shall have an adjusting wheel at one end that can be turned by hand or foot. Diving stands to be as manufactured by Duraflex International Corp.

   a. Short stand (4 required) shall be Durafirm catalog #70-231-524 and included with six (6) bronze deck anchors, Durafirm catalog #70-231-900.

J. Diving boards (4 required) shall be an aluminum extrusion type springboard. The diving boards shall be a Maxi-Flex Model "B" diving board as manufactured by Duraflex International, Inc., model #66-231-330 or approved equal. The diving board shall be 16 ft long and 19-5/8 inches wide. The top surface shall be finished with three coats combined with a mixture of sand and white aluminum oxide to affect the non-skid surface with 200 perforations.

K. Surge tank access hatch (2 required) shall be provided as shown on the drawings. The access hatch shall be a single door 3 ft.-2 in. x 2 ft.6 in with 1" fillable pan to receive ceramic tile and grout or concrete fill to match the surrounding deck. The frame shall be ¼ inch extruded aluminum with built in neoprene cushion and continuous anchor flange. Door shall be ¼" aluminum plate reinforced with aluminum stiffeners as required. Door shall be equipped with heavy continuous stainless steel hinges and shall have compression spring operators for easy operation. Door shall open to 90 degrees and lock automatically in that position. Door shall be built to withstand a live load of 150 lbs. per square foot and equipped with a continuous Type 316L stainless steel hinge, tubular type, and an automatic hold open arm with release handle. All hardware is to be type 316L, 18-8, stainless steel. A flush lift handle and a snap lock with removable key wrench shall be provided. Factory finish shall be mill finish with bituminous coating applied to the exterior of the frame. The access door shall be Type TER-3 single leaf pan type door as manufactured by the Bilco Company.

L. Surge tank and backwash catch basin ladder rungs shall be ½ inch Grade 60 steel encased with co-polymer polypropylene plastic as manufactured by M.A. Industries, Inc, phone 770-487-7761.

M. Pool Lift

1. Pool lift at dive pool (1 required) shall be a battery powered handicap lift with footrest assembly. Lift shall comply with the Americans with Disabilities Act Access Guidelines (ADAAG), be capable of lifting 400 lbs, and shall include a stainless steel anchor socket, cover, spanner key, and a seat belt assembly. The following accessories shall also be provided: caddy, arm rest assembly, lift cover, stability vest, extra battery, wired controls, and spineboard attachment. All stainless steel components shall be 304L. Lift to be a Splash Aquatic Lift, model #300-0000, manufactured by S.R. Smith, the Motion Trek BP 400 model #163145, manufactured by Spectrum Products, or approved equal. Contractor to confirm pool lift fits on pool perimeter and operates correctly.

2. Pool lift at competition pool (2 required) shall be a battery powered handicap lift with footrest assembly. Lift shall comply with the Americans with Disabilities Act Access Guidelines (ADAAG), be capable of lifting 400 lbs, and shall include a stainless steel anchor socket, cover, spanner key, and a seat belt assembly. The following accessories shall also be provided: caddy, arm rest assembly, lift cover, stability vest, extra battery, wired controls, and spineboard attachment. All stainless steel components shall be 304L. Lift to be a Splash Extended Reach Aquatic Lift, model #370-0000, manufactured by S.R. Smith, the Motion Trek BP 400 model #163145, manufactured by Spectrum Products, or approved equal. Contractor to confirm pool lift fits on pool perimeter and operates correctly.

N. Provided a ship's ladder in the size and shape shown on the drawings. Ladder shall be aluminum with aluminum stiffeners if required by OSHA. CONTRACTOR shall provide ladder to general contractor for installation. Refer to the Architect.

2.12 LOOSE EQUIPMENT

A. Competition floating lane ropes shall be as shown on the drawings and described in these specifications. Floating lane ropes shall be a non-turbulent type with wave quelling floats and 3/16" stainless steel coated cable. Floats shall be injection-molded polyethylene. Colors to alternate the length of the pool with a contrasting solid color for the final 15 feet/16 feet 5 inches (Architect/Owner to select colors). All floating lane ropes shall be provided as completely assembled and installed with take up reel, type 304 stainless steel spring and cable lock, hooks, and wrench. 5/8" wrench shall be made of a forged steel shaft with a polished chrome finish. The take up reel shall be constructed of type 304 stainless steel. The spool shall be a bronze nickel-plated casting with a nylon sleeve. Floating lane ropes shall be similar to Competitor Swim Products, Competitor Gold Medal 6" Racing Lanes, Kiefer Advantage II (6") Racing Lanes, or Anti-Wave Maximum (6") Racing Lanes, pre-assembled and sized to fit the length of the pool. Provide Competitor lane rope extension hooks as detailed on the drawings complete with protective sleeve for the competition pool. Floating lane ropes with disconnects for shorter distance are acceptable for conversion between 25-yards and 25-meters. 50-meter lane ropes shall be continuous sections without disconnects. Provide contrasting disks located 15 meters from each end to meet resurfacing requirement. This requirement shall be met for each possible course length.

Quantities:
Competition Pool: Provide 22 at 25 yards with disconnects for 25 meters

	Provide 18 disconnect extensions for conversion to 25 meters
	Provide 9 at 50 meters (continuous length)
	Provide 12 additional extension hooks
Dive Pool	Provide 5 at 25 yards for deck level gutter

B. Water polo floating ropes shall be as shown on the drawings and described in these specifications. Floating ropes shall be a non-turbulent type with wave quelling floats and 3/16" stainless steel coated cable. Floats shall be injection-molded polyethylene. All floating ropes shall be provided as completely assembled and installed with take up reel, type 304 stainless steel spring and cable lock, hooks, and wrench. Water polo floating ropes shall be pre-assembled and sized to fit the length of the water polo course. Provide extension hooks as detailed on the drawings complete with protective sleeve. Floats shall be colored per NCAA and FINA guidelines for each water polo course as shown on the drawings and listed below. Water polo floating ropes shall be similar to Competitor Swim Products Water Polo Rink, Anti-Wave Water Polo Course Ropes, Kiefer Advantage Water Polo Course Markings, or approved equal.

Colors:

Goal Line	White
2 Meter Line	Red
5 Meter Line	Yellow
Half Distance Line	White

Quantities:

Competition Pool:	Provide a complete set of boundary ropes for FINA/NCAA water polo field of play (disconnects for men and women fields of play are acceptable)
	Provide 6 boundary ropes for cross course water polo field of play
	Provide four (4) goal tether ropes with 4" white disks for each goal with a FINA/NCAA field of play. Two (2) tether ropes for each goal shall include 2 meters long x 1.08 meters wide area of solid red disks to identify the re-entry area per FINA WP1.2 field of play diagram.

C. Water Polo Floating Ball Release

1. For pools with floor anchors, the water polo floating ball release device shall be shown on the drawings and described in these specifications. The release device shall be anchored to the pool floor in the center of the water polo half distance line using two (2) 316L stainless steel eyebolts, inserted in 316L stainless steel sleeves. The water polo floating release device shall be made of high quality plastic or PVC construction and securely fastened to a pull cord. The water polo floating release device shall be Aquam WP-75995 or approved equal.

D. Water polo ejection board shall be shown on the drawings and described in these specifications. The ejection board shall be capable of displaying both teams' cap numbers, the number of ejections per cap number, and each team's remaining time outs. The board shall be ¼" aluminum material with attached acrylic tracks that fit 2" high quick change letters and colored circles. The ejection board shall be securely attached to a wall or attached to a moveable stand. The ejection board shall be custom made by All Star Record Boards, call (814) 725-5834, or approved equal.

E. Backstroke flags:

1. Backstroke flags shall be made of Nylon material, triangular in shape (12" wide x 17" long), and alternating in color, and sewn onto a Nylon tape. Additional tape shall be provided at both ends for fastening to the stanchions. Submit samples for review and approval. Equipment shall be Kiefer Nylon Backstroke Flags, #600120, or approved equal. Provide backstroke flags with team/school name/logo on one side and lane identification on the other. Coordinate logo with Architect.

F. Recall rope shall be 1/2 inch yellow polypropylene rope complete with weight rings and two quick snap connectors made of chrome-plated brass. The rope shall consist of a neco plate constructed of soft aluminum that is crimped and used to connect the two pieces of rope to form the required loops. Recall rope shall be Recreonics, catalog no. 92-967 for an 8 lane pool.

G. Lane rope storage reels shall be fabricated from two powder-coated enclosed aluminum wheels joined together by a 1-1/4 inch aluminum axle. This unit must ride easily on four 6" stainless steel casters with individual brakes. The reel shall have a collapsible tow handle for safe movability. The storage reel should be able to hold 902' of 4" lane ropes or 492' of 6" lane ropes. The CONTRACTOR is responsible for assembly. The correct number of storage reels shall be provided to store all floating lane lines. Lane line storage reel to be Competitor Swim Products Elite Stor Lane Reel, Catalog #200 850 with Competitor storage reel cover, catalog #200 861, or approved equal.

H. Hanging nets (2 required) shall be provided to span the width of the pool to divide various areas of the pool and / or protect the interior walls of the natatorium during water polo. Nets and harness system shall be mounted to stanchions anchored in the movable stanchion anchors. Nets to be heavy duty knotless nylon. Nets to be located on the bulkheads.

I. T-wrench for operation of valve extensions shall be fabricated of ¾" diameter SCH 40 stainless steel pipe. The T-wrench shall be 4'-0" in length with a 24" long welded "T" handle. The wrench shall be fitted with a ¾" square stainless steel male end, 1" in length, for operation of valve extensions at the surge tank. Two complete T-wrenches shall be provided.

2.13 MAINTENANCE EQUIPMENT

A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.

1. Wall brush (4 required) - Brush backing shall be a flexible polyethylene material with five (5) rows of nylon bristles. Pool brush holder shall be permanent mold cast aluminum with hydrofoil flap. Holder shall have stainless steel screws to facilitate brush changes. Handle bracket shall be quick detachable mount to fit standard 1 ¼ or 1 ½ inch diameter handles. Brush to be Recreonics no. 10-135, Lincoln Aquatics 31-020, or approved equal.

2. Skimming net (4 required) - Skimmer head shall consist of one-piece molded plastic frame with a reinforced, integral handle bracket suitable for quick attachment to a standard 1¼ or 1 ½ inch diameter handle using bolts and wing nut. The standard nylon net shall be attached to the frame using the groove and spline method. Net depth shall be 4 inches minimum in the center. Skimmer net shall be manufactured by Skimlife No. SS8, or approved equal.

3. Telescopic Poles (4 required) - Cleaning tool handle shall be of the telescopic design and fabricated from corrosion resistant, high-quality anodized aluminum. Poles shall be fully adjustable, to desired length, with a simple twist of a cycolac threaded locking device. Poles shall consist of a 1 inch tube fitted inside a 1¼ inch tube and be adjustable from a range of 8 ft. to 16 ft. Handle shall be adjustable from 8 ft. to approximately 16 ft. having a threaded bushing type clamp to lock handle at desired position. Poles shall be manufactured by Pool King, or approved equal.

4. Portable Vacuum Poles

   a. Telescopic poles fiberglass poles (3 required) - Vacuum head attachment poles are to have a super-tough 1¼ inch fiberglass handle. Poles are to be 8 ft. each, totaling a 24 ft. length for vacuum head attachment. Poles are to be Recreonics No. 10-370 with quick change adapter Recreonics no. 10-374 or approved equal.

5. Test Kits

   a. Provide two (2) test kits

      1) The first test kit shall feature liquid reagents, color comparator, waterproof instructions and treatment charts, chemistry guide and water gram. Test kit to have the ability to test for free and total chlorine (0.5 – 5.0 ppm), bromine (1-10 ppm), pH (7.0 – 8.0), acid and base demand, total alkalinity, calcium hardness and cyanuric acid. Test kit shall be Taylor Complete 2005 test kit, or approved equal.

2) The second test kit shall be photometric and utilize tablet reagents for stability that will allow accurate measurement of free and total chlorine (0-10 ppm), bromine, pH, alkalinity, calcium hardness, and cyanuric acid. The test kit shall have solid-state digital electronics and built-in filters. The test kit shall be direct-reading with automatic blank settings, automatic power cut-off, and store the last 10 results in nonvolatile memory. Test kit shall be a Pooltest 6 system based on the Palintest system of water analysis. Provide SPH 006D Pooltest 6 - Hard Carry Case Kit and SPC 006 Check Standard or AquaPRO 6 Test Kit manufactured by Orbeco-Hellige Inc. and Reference Standard Kit (LP275680).

6. Vacuum Cleaner

a. Vacuum cleaner (filtered water return to pool) - (1 required) to be complete with a 36 inch dual manifold head with 75 feet of 1-1/2 inch floating hose. Hose to be Recreonics, catalog no. 10-429, Lincoln Aquatics no. 29-065 or approved equal. 24 ft. stainless steel pole shall be available for attachment. The portable cartridge vacuum cleaner system shall include a 155 square foot T-316 stainless steel up-flow single cartridge filter, a 1 HP self-priming thermoplastic self-priming pump 1-1/2 inch suction and discharge connection and 110 cubic inch strainer capacity. Cartridge shall be Harmsco no. ST/155 or approved equal. The system shall be provided with one spare cartridge filter. The pump motor shall be 115 volt single phase, 60-cycle, open-drip proof and shall be UL and NSF listed. The pump motor shall be provided with a 120-volt Hubbell switch, weather proof switch cover, in-line pre-wired GFCI and a 100' power cord. The cord shall be wired to a 20 amp, 115/230 volt switch which shall be mounted on pump motor. All interconnecting pipe and fittings shall be schedule 40 PVC. The entire assembly shall be bolted to a T-316 stainless steel cart and shall have pneumatic wheels with grease fittings and roller bearing hubs. Unit to be Recreonics, catalog no. 10-806, Lincoln Aquatics no. 27-010, or approved equal. Accessories shall include a 1-1/2 inch x 25 ft. discharge hose with stainless steel hose clamp. Hose to be manufactured by Quaker Plastic Corporation no. QT-131, or approved equal.

7. Robotic Pool Cleaner

a. DuraMax Robotic Pool Cleaner

1) Provide one (1) dual motor driven automatic swimming pool vacuum device. Cleaner weighs 49 lbs and has internal water-cooled brushless drive motor with automatic program to clean the pool floor and walls, travelling 1¼ ft per second, scrubbing pool surfaces with onboard rubber brushes and two power-washing jets. Two separate internal oil-cooled, water-cooled, brushless pump motors filter 9,600 GPH, vacuuming a 3 ft wide path using four offset 5½ square inch suction inlets underneath, filtering fine debris <10 microns small and solids as large as 1½ inch into two internal reusable filter bags. Solid ½" 316 stainless steel axles extend the length of the cleaner connecting to a commercial-grade drive-train with Kevlar reinforced drive belts. Stainless steel reinforced side plates are capped with soft gray tracking wheels for durability and corner and curve tracking agility. Unit complete with remote control, air sensor, UltraKart, 120 ft cord, set of SK3016BL deep clean super brushes (for most surfaces), 2 filter bags, digital timer, power supply with 24 volt transformer, 1 hour cleaning cycle delay option, operator manual. Requires 110 volt GFCI receptacle onsite, consumes 5 amps electricity. The pool cleaner shall be a DuraMax Duo as manufactured by Aqua Products, Inc., or approved equal. Include with 120 ft cord/150 ft cord optional. Optional standard or raised high infrared (if needed to detect large obstacles or bulkheads).

8. Stainless Steel Cleaner - Provide a stainless steel cleaner. The cleaner shall comprise of one (1) gallon of organic passivation solution. It shall be complete with instructions for proper maintenance of stainless steel surfaces and material safety data sheets for the passivation solution. The cleaner shall be the Spectra-Clean System 2 as manufactured by Spectrum Products. Product to be applied with 3M scouring pad, or equivalent.

2.14 SAFETY EQUIPMENT

A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.

1. Ring buoy and extension rope (7 required) – Buoy shall be 24 inch diameter vinyl clad PVC foam with a metal ring molded inside. Buoy shall have a 3/8 inch polyethylene rope attached to it at four points and be a minimum 60 feet in length. Preserver shall be U.S.C.G. approved. Buoy and rope to be mounted at each lifeguard chair on hooks. Ring buoy to be manufactured by Cal-June no. G-24-WH or approved equal. Throw rope to be Recreonics no. 12-261, Lincoln Aquatics No. 42-050, or approved equal.

2. Life hook and fiberglass pole (7 required) - Life hook shall be an anodized aluminum 3/8 inch OD "shepherd's crook" with a 1-1/8-inch OD handle attachment suitable for a 1¼-inch 16 ft. fiberglass extension pole. Each life hook shall be provided with a separate 16 ft pole. Hook shall be of looped construction. Each pole to be provided with a set of spring type stainless steel pole clamps for mounting on each lifeguard chair. Life hook shall be manufactured by Rainbow no. 153, or approved equal. Pole clamps shall be Recreonics no. 10-353, or approved equal, and fiberglass poles shall be equal to Recreonics no. 10-372.

3. Spineboards (2 required) - Spineboard shall be 72” long x 20” wide, constructed of 100% virgin high density polyethylene. The design shall provide stiffness and torsional rigidity while remaining lightweight. The spineboard shall accommodate up to 500 lbs and shall feature customizable buoyancy that allows users to adjust the buoyancy by inserting polyethylene foam rods (supplied with the spineboard). There shall be (10) handholds around the perimeter of the board. The spineboard shall be supplied with one (1) 2-piece head immobilizer, one (1) head strap, four (4) body straps, one (1) head immobilizer with head bed, and two (2) flotation rods. The spineboard shall be CJ Rescue 6 package as manufactured by CJ spineboard at 1-206-824-8886 or approved equal. The CONTRACTOR shall provide one (1) set of heavy duty stainless steel utility hooks per spineboard for storing the spineboard at a convenient and readily accessible location near the pool (Recreonics catalog no. 10-362).

4. First aid kit (2 required) - First aid kit shall be a 24 unit kit per American Red Cross standards as manufactured by Swift First Aid, or approved equal.

5. Rescue tube (12 required) - Provide one rescue tube for each lifeguard chair. Rescue tube to be Recreonics No. 12-303, or approved equal.

6. Safety eyewash station (2 required) - Safety eyewash station shall be a self-contained system in which eyewash bottles are securely positioned in a portable holder. Eyewash bottles shall be 32 ounces and easily removable from case, and shall contain a sterile, saline solution with the ability to neutralize a varying quantity acids or caustics. Eyewash stations shall be equipped with a double back screw and holes for easy mounting in location to be determined by the Architect. Stations shall be Recreonics 12-033, Lincoln Aquatics 49-026, or approved equal.

7. Safety eyeglasses - Provided a safety eyeglass dispenser station containing ten (10) pairs of safety glasses. Eyeglasses shall be ANSI/OSHA accepted, and be equal to Lab Safety Supply Inc. (1-800-356-0783) no. WQ-14740B.

8. Bag Valve Masks – Provide two (2) bag valve mask assistant resuscitation systems, one size Adult (1500ml tidal volume) and one size Infant/Child (450ml tidal volume). Product shall be a latex free disposable bag mask unit with support strap, transparent patient valve, and textured surface to eliminate slipping. Integral swivel valve, available with a closed reservoir system. Standard pack includes resuscitator, oxygen reservoir and a transparent bag for storage. Bag Valve Masks shall be Ambu SPUR II, or approved equal.

9. AED – Provide one (1) Automated External Defibrillator and one (1) trainer AED corresponding to the chosen AED per facility level for the aquatic facility. Product location shall be coordinated with the Owner and Architect. AED shall be Recreonics No. 12-430, Lincoln Aquatics No. 48-013, or approved equal and must have an available training AED device. AED Cabinet shall be Recreonics No. 12-434, Lincoln Aquatics No. 48-023, or approved equal.

2.15 THERMOMETERS

A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.

1. Portable thermometer (3 required) shall be a molded ABS plastic tube body type with the ability to measure temperature in both degrees Fahrenheit and Celsius. A 3 ft. polyethylene cord is to be attached to thermometer. Thermometer is to be manufactured by Pac-Fab/Rainbow no. R141036 or approved equal.

2. Inline thermometer to be near the heating loop and shall have a 9 inch adjustable angle with a minimum 6 inch stem. There shall be a minimum of two (2) thermometers per loop, and must have ability to read temperature in both degrees Fahrenheit and Celsius. Thermometers are to be Recreonics no. 32-702, Lincoln Aquatics no. 21-125, or approved equal.

2.16 SWIMMING POOL FINISHES

A. Paint

1. Scope shall consist of the complete competition and dive pool gutter trough interiors, including the underside of parapet on the competition pool.

2. Coating shall be a low VOC compliant polyamidoamine epoxy suitable for chlorinated water below 3.2 ppm for installation on concrete surfaces. CONTRACTOR shall provide on-site technical services and approval from the coating manufacturer prior to application and during the coating application. Coating shall be Tnemec Series 161HS, Induron Perma-Clean II Semi-Gloss or approved equal. Color shall be white.

3. Surface Preparation

a. Cast-In-Place Concrete

1) Allow concrete to cure a minimum of 28 days at 60 deg. F. Brush-off pool interior surfaces, then blast clean to remove laitance and weak surface concrete to produce an anchor profile similar to medium grade sandpaper referencing SSPC-SP13/NACE 6, ICRI-CSP 2-4 Surface Preparation of Concrete. Blasting shall open up surface voids, holes and irregularities. No holes or holidays in the paint membrane will be allowed. Fill with an approved grout or Tnemec Series 215 Surfacing Epoxy, or Induron EFS707 Epoxy Surfacer and Filler, any hole or irregularity that cannot be satisfactorily painted. Do not entirely remove the surface or completely expose underlying aggregate. After blasting, neutralize concrete with a solution of 2 cups aqua ammonia per 5 gallons of water. Flush with clean water and allow to thoroughly dry.

4. Application Procedures

a. Before applying any material, measure and record the temperature and relative humidity. Apply only if temperature is above 55 deg. F. and at no lower temperature than 5 deg. F. above the dew point. Do not apply when the relative humidity is greater than 85%. If possible, plan the painting schedule so that all painting is done in the coolest part of the day. Provide proper ventilation so that paint fumes do not become concentrated.

5. Application of the Primer

a. After the pool surface has been thoroughly dried and cleaned the primer coat can be applied. Surface spreading rate shall be observed as not to exceed the recommended manufacturer's rate of application. The primer will be applied at a minimum rate of 200 SF per gallon and shall conform to local VOC requirements. A good heavy coat shall be applied. A rough or porous concrete pool will require more paint than recommended. On particularly rough surfaces two coats are recommended in order to provide a smooth, uniform finish. Note: Any marks or irregularities that show through the primer will also be apparent when the finish coat is applied.

6. Application will be made by brush, roll, lambs wool applicator, or spray. When the finish coat is to be a color other than white the primer will be tinted.

7. Application of the Finish

   a. After the primer is dry enough to walk on without removing or marking surface, apply the finish coat(s) in accordance with the manufacturer's instructions. Application shall be done by the use of a brush, roller, lamb's wool applicator, or spray methods at a rate of 150-250 SF per gallon. Allow a minimum of 5 hours (at 75 deg. F) drying time between coats. Two coats of finish paint are recommended to improve upon general appearance of pool shell. Allow 7 days curing (at 77 deg. F.) before filling the pool.

8. Application of pool striping, depth markings, warning signs and wall targets, shall be done after final coat of finish paint has cured for at least 24 hours.

9. Slip resistant additive shall be applied to the all outdoor areas, entry steps, ramp areas, zero entry and all deck markings.

10. Final paint coating shall be allowed to dry a minimum of 7 days at 35 degree Fahrenheit or above, before filling the pool.

B. Pool Cementitious Finish – Reference specification section 131104, Swimming Pool Cementitious Finish.

C. Pool Tile – Reference specification section 131103, Swimming Pool Tile.

2.17 WATERPROOFING

A. Products

1. Interior surfaces of Surge Tank, Backwash Pit with NO additional finishes: Apply two (2) coats of BB White from Vandex, Modify or Megamix I from Xypex, or Plainseal 88 from Mapei, directly to surface of surge tank and backwash pit.

B. Surface Preparation

1. Surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion. Surfaces shall be roughened by sand blasting, water jetting, shot blasting, scarifying, or grinding. Surface defects or holes shall be patched per manufacturer's recommendations.

C. Application

1. Do not apply materials under conditions where the ambient air temperature is less than 40 degrees Fahrenheit, or to a frozen substrate.

2. All mixing of products, quantities and application procedures shall be done in accordance with the manufacturer's recommendations.

2.18 SEALANTS

A. Provide sealed expansion joints as shown on the pool and pool structural drawings or noted on the Contractor's construction/expansion joint layout, and as required. Expansion joints shall be constructed and sealed as indicated and in accordance with the manufacturer's recommendation. Sealant to be manufactured by LATICRETE International, Inc., Mapei, or Deck-O-Seal.

1. For submerged joints:

a. Latasil, one component, neutral cure, high performance, 100% silicone sealant in the color(s) as selected. Shall be used in conjunction with Latasil 9118 Primer per manufacturer's recommendations.

b. Mapesil T, 100% silicone sealant in the color(s) as selected.

2. For joints behind the coping, or other horizontal deck joints:

a. Deck-O-Seal, two component (gun-grade or pourable, self-leveling), high resilience, non sag, non flowing, polysulfide-based sealing compound in the color(s) as selected. Shall be used in conjunction with P/G Primer per manufacture's recommendations.

B. Material Storage

1. All materials are to be stored in the original unopened factory containers in a cool dry location 60 to 80 degrees F. Protected from the elements and the hazards of construction. Open only as many containers as can be used in any particular period.

C. Joint Preparation

1. Clean the joints of all deleterious material, to sound, clean and dry substrate.

2. Joint is to be formed or filled with an approved, resilient, non-asphaltic, closed cell, polyethylene joint filler material down to firm substrate. Allow space at the top of the joint for the installation of approved closed cell polyethylene backer rod and install same to the required depth below the surface of the slab to control the depth of the sealant bead to within manufacturer requirements.

D. Surface Preparation

1. Concrete surfaces to receive sealant must be fully cured, clean, dry and free of dirt, dust and any deleterious material that might compromise the adhesion and performance of the sealant. Curing aids, form release agents and joint former residue must be completely removed, if necessary by sand blasting and/or grinding. Loose dust must be brushed off.

2. Prime all surfaces to receive Latasil sealant with Latasil 9118 Primer prior to sealant application, and surfaces to receive Deck-O-Seal sealant with P/G Primer prior to application.

E. Application

1. Apply sealant in accordance with the manufacturer's recommendations.

2. Tool the joint immediately after application to insure a firm, intimate contact with the joint interface.

3. Remove excess sealant and smears from adjacent surfaces with Xylol or Toluol before sealant cures.

4. After the sealant has fully cured (generally a minimum period of five days at 72 degrees and 50% humidity), paint the surface of the sealant with a chlorine resistant chlorinated rubber or equivalent pool paint, such as Ramuc, in a compatible color as selected by the Architect. NOTE: Latasil cannot be painted.

2.19 AQUATIC FACILITY MANAGEMENT APPLICATION

Contractor shall provide a one-year license for a web-based digital application for managing the aquatic facility. Digital application shall include fully customizable check lists, pool testing documentation with NSPF dosage calculations and MAHC references, MAHC compliant lifeguard in service documentation with the ability to link to employee tracking module, pool closure forms, and incident reports. Web-based digital application shall be Facility Manager, or approved equal, contact Johnathan Nies at 303-323-8527 or online at https://nl290.infusionsoft.app/app/storeFront/showStoreFront

A. Contractor shall have web-based digital application representative provide one-hour of online training.

B. Contractor shall set up web-based digital application in Owners name 30 days prior to facility opening.

2.20 UNDERWATER LIGHTS

A. Underwater lights shall be equivalent to 500 watts of incandescent light. Underwater lights shall be UL listed and in the quantities shown and as detailed in the construction drawings and as described in these specifications. Coordinate for proper installation. Refer to the drawings for quantities and locations.

B. The pool underwater lights shall be 120VAC, 55 watts LED-type, and equivalent to 500 watts of incandescent light. Fixture housing shall be stainless steel construction with minimum wall thickness of 0.020 inch per UL 676 underwater pool lighting standard. The niche shall be stainless steel with cast brass mounting ring or PVC plastic with stainless steel mounting ring. Brass construction pressure grounding lug on interior and exterior services. Lens shall be 8-3/8 diameter clear tempered heat resistant glass. Gasket to be single-piece "U" shaped santoprene or silicone. Fasteners shall be silicon-bronze or stainless steel. The light fixture shall be supplied with a #16-3 STW (120V) submersible cord with ground wire positively grounded inside the fixture. Cord entrance shall be a watertight seal and epoxy encapsulated. Light fixture to be IntelliBrite 5g White LED pool light series by Pentair Commercial Pool and Aquatics or approved equal. Underwater lights shall be provided with cord length as required to allow for deck relamping of all fixtures.

C. Junction boxes shall be provided in the quantities required and shall be located at least 8” above the pool coping and 5' from the pool edge. Refer to the Electrical drawings. Cord length shall be sufficient to run from fixture to the junction box with sufficient cable in the niche to re-lamp the fixture on the deck. Junction boxes shall be furnished by the Contractor and installed by Electrical.

2.21 WATER FEATURES AND SUPPORT EQUIPMENT

A. The CONTRACTOR shall provide and install a trampoline and spotting rig.

1. The trampoline shall be a folding trampoline with bed area of 7 feet by 14 feet with overall frame footprint of 10 feet by 15 feet. The equipment is intended to be used indoors in a humid, natatorium space. The frame shall be heavy duty steel tubing and be foldable for ease of storage. Include thick pads covers for edge frame. Trampoline should come with 10 inch springs and a wheel trolley set – for rolling the trampoline away when folded. Base of design; Ross 7 x 14 Folding Trampoline from Springboards and More.

2. The trampoline spotting rig shall be for a folding trampoline. The spotting rig is constructed of 11 gauge square tubular steel and is painted BLACK unless otherwise specified. Other color options are Royal Blue or Primer-coat only with brown / rust primer that would allow the Owner to paint the unit to match school / facility colors.

a. The CONTRACTOR shall provide a Spotting Rig Accessory Kit. The kit comes complete with one 55 foot section and one 40 foot section of ½ inch or 7/16 inch Nylon-Poly static rope. One high load Double or one high load Single aluminum alloy pulleys, three Mailon-Rapide 10mm galvanized steel quick links (for attaching the spotting pulleys to the spotting rig), two swivel clips (for attaching the spotting rope to the spotting belt). Spotting Rig features shall have the EXCLUSIVE Triple Failure Protection. Pulleys, rope and quick links are the same items used by Fire and Rescue workers around the world, and all have high minimum tensile strengths and high working limits.

b. Provide Spotting Belt and Twisting Belt.

c. Base of design; Trampoline Spotting Rig for a Folding Trampoline, by Springboards and More.

2.22 MOVABLE BULKHEAD

A. MATERIAL

1. The CONTRACTOR shall provide and install two movable bulkheads. Bulkheads are to be fabricated to match the design of the end wall gutter. The bulkheads must span the width of the pool. The top of the

bulkhead shall be designed as a walkway and shall be flush with the end walls of the pool as shown and extended over the rollout gutter on the side walls.

a. (1 required) The dimensions are nominally 4 feet 0 inches wide by 75 feet 3/4 inches long by 5 feet 0 inches deep.

b. (1 required) The dimensions are nominally 6 feet 0 inches wide by 75 feet 3/4 inches long by 5 feet 0 inches deep.

2. Provide a complete fiberglass movable bulkhead that is entirely constructed of materials which are unaffected by corrosion when immersed in chlorinated swimming pool water. Paint or protective coatings on any internal or external areas of the bridge are prohibited.

3. The movable bulkhead in its original solid state must be permanently compatible with chlorinated swimming pool water. The use of carbon steel, mild steel, aluminum, manganese, copper, brass or wood for any structural section, fasteners, hardware or parts of the bridge will not be allowed.

4. Bulkhead manufacturer shall supply anchor pin assemblies and support structure integral to the bulkhead, and be responsible for coordinating proper alignment, operation, and support of the bulkheads on the gutter curb, as well as its locking mechanisms that will rigidly set the bulkhead at each course as shown on the drawings.

B. The bulkhead shall be designed to support 5600 lbs with ½" maximum deflection. The safety factor for all live and dead loads shall be at least 10. The bulkhead shall be designed for a uniform lateral live load of at least 30 pounds per linear foot and a point load of at least 500 pounds at the center with a maximum deflection of ½ inch. Racing lane cup anchors shall be molded into the structure and be designed to prevent pullout at a load of at least 400 pounds each.

C. Bulkhead shall feature a toe ledge as shown on the drawings. The toe ledge shall allow water to flow through the bulkhead to ease the moving of the bulkhead.

D. Bulkhead shall feature additional floating lane line anchors as shown on the drawings to provide the pool with floating water polo boundary anchor locations.

E. Bulkhead shall be fitted with anchors for racing starting platforms in the locations noted and in the positions required by the manufacturer of the selected starting platforms. The anchor installations shall be reinforced to produce negligible deflection under the maximum loading conditions recommended by the starting platform manufacturer.

F. Removable guard rails shall be provided at both ends of the bulkhead. Rails shall be custom fabricated of one continuous length of tubing. The tubing shall be type 316L stainless steel, 1.900 inch OD x .145 inch wall thickness polished to 320 grit.

G. The internal air chambers shall be so constructed that when adding air pressure to raise the bulkhead for a change in position it shall be balanced and eliminate the need for removal of the starting platforms. Moving the bulkhead shall be easily accomplished by one person at each end of the bulkhead. Units shall glide freely on corrosion proof guides, or skid plates, both at the gutter lips and side walls. Provide all equipment, including blowers, necessary to operate air flotation chambers.

H. Suitable means of anchoring the bulkhead shall be provided to resist all dead and live load components. Contractor shall provide and install the anchor plates at the park positions shown on drawings. Install a 1" thick fiberglass pin plate receptacle at each park position similar to Stark Model Number SB051. Bulkhead shall be anchored to the end wall for long course competition.

I. Suitable provisions for electronic timing system shall also be provided. Access hatches shall be included at both ends of the bulkheads to facilitate inspection of the interior of the bulkheads, anchor mechanisms, and to allow for installation of future wiring in an existing raceway gutter to carry electronic timing cables and conductors.

J. Provide factory trained and experienced personnel for coordination, consultation, and instruction for the actual bulkhead delivery and for training of the Owner's personnel in the use, operation, and maintenance of the bulkhead. Provide necessary instruction and coordination as required to coordinate anchorage installation.

K. Provide racing lane line anchors at water line along only those faces of the bulkheads where shown on the drawings.

L. Lane line and men and women's water polo boundary line anchors shall be included with the pool bulkhead. The cup anchors shall be molded into the structure and supplied with a stainless steel pin for attachment.

M. Racing lane targets shall be supplied on those sides of the movable bulkhead where shown on the drawings. Lane targets to coincide with lanes on the pool floor and markers on the pool walls.

N. The entire surface of the bulkhead shall be slip resistant. This shall include the black wall targets and white field surface.

O. Quality Assurance

1. A factory quality control program must be submitted to the Owner/Architect with submittals, which ensures that structural tolerances critical for Movable Bulkheads used for competition have been maintained.

P. Basis of design: The bulkhead shall be manufactured by Stark Bulkheads, Inc. (360-403-7707), or approved equal.

Q. Guarantee

1. The manufacturer and Contractor shall guarantee that on completion of the installation, the unit will move freely from one location to the other, providing walls are straight and parallel and do not vary more than plus or minus 1/2 inch and will not rack or bind/stop when moved. Bulkhead manufacturer and Contractor shall coordinate the unrestricted travel of the bulkhead the entire length of the pool (unless noted differently on the drawings).

R. Installation of Bulkhead

1. The installation shall be true, level and plumb with the existing structure to permit full range of movement.

2. The exposed surfaces will be free of all imperfections or irregularities. A field inspection by the Owner/Architect will be conducted upon completion of the installation to ensure compliance before acceptance.

3. During installation, protection shall be provided for the existing deck, pool walls, pool floor and general building construction. The Contractor shall bear the costs for replacement or repair as a result of damage by neglect.

4. Support jacks shall be used beneath the bulkhead until the pool is filled and the bulkhead becomes self-supporting.

5. All costs for installation onto the pool gutter, adjustments, certification of dimensions and cleanup upon completion shall be borne by the Contractor.

6. Contractor shall locate the anchor plates at each stop point and at end walls. Race course dimensions shall be field certified in compliance with the competitive standards having jurisdiction and be submitted to Owner/Architect in writing by the certifying engineer or land surveyor.

7. The bulkhead shall not be moved until water is in the pool and at the level of the gutter lip.

8. Provide instruction to the Owner's personnel in use, operation, and maintenance of the bulkhead.

2.23 POOL COMPRESSED AIR BUBBLING SYSTEM - SPARGER

A. Cast into the pool shell 4 depressions to house an air sparger under the following: 3-meter springboard, 5-meter platform, 7 ½-meter platform, and 10-meter platform. Locate and dimension as indicated on drawings. Provide the sparger units into the depressions. Make all pipe connections from each sparger unit and run each pipe into the storage room and connect to the compressor unit.

B. CONTRACTOR shall provide the control box for operation of the air bubbler system in a wall near the diving pool and shall provide the wiring from the control box to the compressor unit. CONTRACTOR shall provide the control wiring.

C. Provide one (1) 60-CFM rotary screw compressor rated 75 CFM at 200 PSIG actual with one (1) 30 HP motor (1800-RPM) O.D.P. 480V, 3 phase, 60 cycle. Compressor shall be completely factory pre-wired and shall include a standard full voltage magnetic starter. The compressor package includes coalescing and charcoal filters with auto drain, integral air dryer, a regulator and remote motor starter. Compressor as manufactured by Kaeser, Ingersol Rand, Atlas Copco, or approved equal will be considered.

D. Provide one (1) vertical air receiver suitable for 200 PSIG working pressure with total volume of 660 gallons with auto drain.

E. Provide Diffusers and Piping System - There are four diffusers required. The strip will be embedded in the pool bottom and supplied by 3" ABS, stainless steel, HDPE OR Schedule 80 CPVC piping. Each diffuser location shall be equipped with an accessible enclosure that houses a stainless steel swing check valve. All Underground piping shall be approved for use with compressed air up to 200 PSI and tested on site to 75PSI.

F. Provide Control System - There are several components to the control system, the transmitter, receiver, power supply, injection valve and interlocks. The control system will require a 115 VAC supply and a hard-wire connection between the control station and the compressor. The Architect shall approve the location of the receiver. The wiring shall be done per Division 26 and coordinated with the pool wiring.

G. Provide Remote Control Transmitter - The one-channel control transmitter is similar to a television or other remote control device. The transmitter case is made of high impact plastic with a fully sealed membrane type switches to provide a dirt and moisture free environment. The unit is small and light enough to be placed in shirt pocket or hung around the neck on a lanyard. The switches are alternate action; pushing once turns the system on. Transmitter shall be capable of controlling each sparger diffuser line with a separate button.

H. Provide the following components: one (1) ball valve for tank shut-off, automatic water trap (115V), tank safety valves set at 220 PSIG, pressure gauges, pressure reducing valve, pressure switch 200/175 PSI, punch opening electric activated air-operated mechanism (corrosion resistant solenoid valves), remote control device on coil cord, and one quick disconnect fitting for an air hose in the filter room, easily accessible to the pool operator.

I. All above ground exposed piping shall be copper or stainless steel.

J. A supplier’s representative for the equipment specified shall be present at the job site for installation, assistance, inspection and certification of the installation, equipment testing, startup assistance, and training of the Owner’s personnel. Prior to startup, all equipment described herein shall be inspected for proper alignment, proper connection, and performance by means of a functional test.

K. Sparger system shall be manufactured by Pulsair Softwater Landing, Aquair bubbling system, Aquatic Development Group Inc., Natare Corporation, or approved equal.

2.24 POOL HEATERS

A. The pool heaters for the competition pool/dive pool/endless pool (Alternate #2) shall having the following input ratings:

1. Competition Pool input rating of 2,000,000 Btu/hr. – (2) model APN1000

2. Dive Pool input rating of 1,800,000 Btu/hr. – (1) Model APN1750

3. *Endless Pool supplied in packaged system (Alternate #2) – 5.5kw Coates Electric Heater – 240V, 1 Phase, 23 Amps

B. Basis of design: the pool heater for the competition pool/dive pool shall be manufactured by LOCHINVAR, model AQUAS Commercial Model APN.

C. The pool heater shall be orificed for operation on (Natural Gas).

D. The package system shall be made of a BOILER plant with a Shell and Tube POOL HEAT EXCHANGER. The design of the system shall be such that pool water, shall be heated indirectly by the Shell and Tube Heat exchanger and is never directly heated by the boiler plant. The BOILER and the POOL HEAT EXCHANGER shall be completely factory piped and assembled and shall include a cast iron circulating pump, expansion tank, flow switch, ASME Certified pressure relief valve set for 50psi, automatic fill valve with pressure reducer and a temperature / pressure gauge. The entire package shall be skid mounted, pre-piped, assembled, and pressure tested and ready for installation.

E. The BOILER components shall be as follows:

1. The BOILER shall bear the ASME "H" stamp for 160 psi working pressure and shall be National Board listed. There shall be no banding material, bolts, gaskets or "O" rings in the header configuration. The 316L stainless steel combustion chamber shall be designed to drain condensation to the bottom of the heat exchanger assembly. A built-in trap shall allow condensation to drain from the heat exchanger assembly. The complete heat exchanger assembly shall carry a ten (10) year limited warranty.

2. The BOILER shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard for the U.S. and Canada. The BOILER shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard and the minimum efficiency requirements of the latest edition of the BTS2000 Standard. All models shall operate up to 97% thermal efficiency with pool water temperatures below 100°F. The BOILER shall be certified for indoor installation.

3. The BOILER shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided. The burner shall be a premix design and constructed of high temperature stainless steel with a woven metal fiber outer covering to provide modulating firing rates. The BOILER shall be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system, to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency. The BOILER with 399,000 through 800,000 Btu/hr input shall be capable of full modulation firing down to 20% of rated input with a turndown ratio of 5:1. The BOILER with 1,000,0000 through 1,500,000 Btu/hr input shall be capable of full modulation firing down to 10% of rated input with a turndown ratio of 10:1. The BOILER shall operate in a safe condition at a de-rated output with gas supply pressures as low as 4 inches of water column.

4. The BOILER shall utilize a 24 VAC control circuit and components. The control system shall have an electronic display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front and top of the jacket. The BOILER shall be equipped with a temperature/pressure gauge; high limit temperature control with manual reset; ASME certified pressure relief valve set for 30 psi; outlet water temperature sensor; return water temperature sensor; outdoor air sensor, flue temperature sensor; flow switch.

5. The BOILER with 399,000 thru 800,000 Btu/hr input shall feature the "SMART SYSTEM" control with an LCD display and navigation dial. The BOILER with 1,000,000 thru 1,500,000 Btu/hr input shall feature the "SMART TOUCH" control with an LCD touch screen display. The BOILER shall have password security, pump delay with freeze protection, pump exercise, domestic hot water prioritization and PC port connection. The BOILER shall allow 0-10 VDC input connection for BMS control and have built-in "Cascade" to sequence and rotate while maintaining modulation of up to eight packages without utilization of an external controller. Supply voltage shall be 120 volt/60 hertz/ single phase.

6. The BOILER shall be equipped with two terminal strips for electrical connection. A low voltage connection board with 28 data points for safety and operating controls, i.e., Auxiliary Relay, Auxiliary Proving Switch, Manual Reset Low Water Cutoff, Flow Switch, High and Low Gas Pressure switches, Tank Thermostat, Wall Thermostat/Zone Control, System Supply Sensor, Outdoor Sensor, Building Management System signal and Cascade control circuit. A high voltage terminal strip shall be provided for Supply voltage. The high voltage terminal strip plus integral relays are provided for independent pump control of the System pump, the Boiler pump and the Domestic Hot Water pump. The dry pump contacts shall be sized for up to 1.5 hp/120V, 3 hp/240V or 30 amp pumps.

7. The BOILER shall be installed and vented with one of the venting installations described below (confirm venting installation/configuration with Building Mechanical Engineer):

    a. Direct Vent Sidewall system with a horizontal sidewall termination of both the vent and combustion air. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the sidewall with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the BOILER from the outside. The air inlet pipe may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on the same sidewall with the manufacturer's specified air inlet cap. The BOILER's total combined air intake length shall not exceed 100 equivalent feet. The BOILER's total combined exhaust venting length shall not exceed 100 equivalent feet. Foam Core pipe is not an approved material for exhaust piping.

    b. Direct Vent Vertical system with a vertical roof top termination of both the vent and combustion air. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the roof top with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the BOILER from the outside. The air inlet pipe may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on the roof top with the manufacturer's specified air inlet cap. The BOILER's total combined air intake length shall not exceed 100 equivalent feet. The BOILER's total combined exhaust venting length shall not exceed 100 equivalent feet. Foam Core pipe is not an approved material for exhaust piping.

    c. Sidewall Vent with Room Air system with a horizontal sidewall termination of the vent with the combustion air drawn from the interior if the building. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the sidewall with the manufacturers specified vent termination. The BOILER's total combined exhaust venting length shall not exceed 100 equivalent feet. Foam Core pipe is not an approved material for exhaust piping.

    d. Vertical Vent with Room Air system with a vertical rooftop termination of the vent with the combustion air drawn from the interior of the building. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the rooftop with the manufacturers specified vent termination. The BOILER's total combined exhaust venting length shall not exceed 100 equivalent feet. Foam Core pipe is not an approved material for exhaust piping.

    e. Vertical Vent with Sidewall Air system with a vertical rooftop termination of the vent with the combustion air being drawn horizontally from a sidewall. The flue shall be PVC, CPVC, or Stainless Steel sealed vent material terminating at the roof top with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the POOL HEATER from the outside. The air inlet may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on a sidewall using the manufacturers specified air inlet cap. The BOILER's total combined air intake length shall not exceed 100 equivalent feet. The BOILER's total combined exhaust venting length shall not exceed 100 equivalent feet. Foam Core pipe is not an approved material for exhaust piping.

f. The BOILER shall have an independent laboratory rating for Oxides of Nitrogen (NOx) of 20 ppm or less corrected to 3% O2. The manufacturer shall verify proper operation of the burner, all controls and the heat exchanger by connection to water and venting for a factory fire test prior to shipping.

g. The BOILER shall operate at altitudes up to 4,500 feet above sea level without additional parts or adjustments.

h. The BOILER shall be suitable for use with polypropelene glycol, up to 50% concentration without contingencies.

8. The SHELL AND TUBE POOL HEAT EXCHANGER shall have a working pressure of 87 psi and shall be constructed of Cupro-Nickel Tubes and Bronze Headers and carry a one (1) year limited warranty. The POOL HEAT EXCHANGER shall be sized so that heat can be transferred into the pool water with an efficiency of up to 99%. The entire assembly shall be mounted on "I" beam skids to facilitate handling and installation.

9. The CIRCULATING PUMP shall be constructed of cast iron and operate on a 120 volt, 60 Hz, 1 phase power supply (unless otherwise specified). The pump shall be factory wired to run with intermittent pump operation

10. The EXPANSION TANK shall be of a bladder type design and shall be sized adequately to allow for the expansion of the boiler water when heated.

11. The FLOW SWITCH shall be of a paddle type design and shall be wired to the internal boiler control safety circuitry so to not allow the boiler to operate when there is not sufficient flow.

12. The AUTOMATIC FILL VALVE WITH PRESSURE REDUCER shall be factory set for 15 psi and shall allow fresh water to be added to the boiler system only when the water pressure has fallen below the pressure setting.

13. The PRESSURE RELIEF VALVE shall be ASME Certified and have a setting of 50 psi.

14. The TEMPERATURE AND PRESSURE GAUGE shall be capable of reading temperature in both degrees Fahrenheit and degrees Celsius. The Pressure units shall be read in pounds per square inch (psi)

15. The Contractor shall provide the pool water heating system. Heating system to include all piping, heaters, booster pumps, controls, gauges, thermostats, control valves and wiring required to draw water from the recirculation piping, heat the water and return it back to the recirculation piping. The Contractor shall interlock pool heating system with pool recirculation pumps.

16. Contractor shall have pool heater manufacturer representative on site to start and adjust pool heater. Copies of the startup report shall be sent to the Manufacturer and Architect/Engineer prior to final site observation and shall include the following information for each pool heater:
    a. Temperature settings
    b. Inlet Gas Supply Pressure
    c. Manifold Gas Pressure
    d. Air Pressure
    e. Gas Piping Configuration
    f. Venting Configuration
    g. Booster pump interlocked with recirculation pump
    h. Flow switch installed
    i. A component and integrated check shall be made of all controls. Factory tests do not substitute for this test.

2.25 DIVE PLATFORM SURFACING

A. Slip-Resistant Springboard Platform Padded Surfacing

1. This work shall include furnishing and installing a Mondo DIVETEX padded surface for springboard platforms.

2. Material:

   a. Rubber surfacing shall be prefabricated, calendered and vulcanized with a particular closed cell structure, based on special isoprenic rubbers, mineral filters, stabilizing agents and pigmentation, highly resistant to UV rays and atmospheric agents, with system of differential elasticity between top surface and base.

   b. Surface shall have a thickness of ½" (12mm).

3. Adhesive:

   a. The adhesive shall be a high performance two-part polyurethane adhesive for both indoor and outdoor installations of the Mondo DIVETEX surfacing. It shall have an excellent resistance to moisture, heat, and water.

   b. The adhesive shall be PU 105 Polyurethane Adhesive.

4. Installation:

   a. Installation of the DIVETEX surfacing shall be performed by a flooring contractor experienced in projects of this size and scope.

   b. The concrete surface shall be clean, and without paint or other contaminants.

   c. Scarify the concrete surface prior to installation.

   d. If curing compounds were used, the surface must be thoroughly cleaned prior to installation.

   e. After installation, add weight around the edges and seams of the surfacing material until the adhesive is completely dry.

   f. Seal the edges of the surfacing with a bead of clear silicone caulk.

5. Delivery, Storage, and Handling:

   a. Materials must be delivered in the manufacturer's original unopened and undamaged containers with identification labels intact.

   b. Store material upright on a clean, dry, flat surface protected from all possible damage, and protect from exposure to harmful weather conditions.

   c. Recommended environmental condition for storage is a minimum of 55° F.

6. Site Conditions and Installation:

   a. Maintain a stable room and concrete temperature for a period of 48 hours prior, during, and 48 hours after installation. Recommended range is between 65° F and 86° F.

   b. Installation to be carried out no sooner than the specified curing time of the concrete.

   c. Moisture vapor emission content of the concrete slab must not exceed 5 lbs. / 1,000 SF / 24 hours when tested using the anhydrous calcium chloride test as per ASTM F1869.

d. Installation of the DIVETEX flooring shall not commence until all other trades in the building are completed.

e. Follow manufacturer's installation instructions for both DIVETEX flooring and PU 105 adhesive.

7. DIVETEX padded surface and PU 105 adhesive shall be manufactured by Mondo USA and supplied by Springboards and More (Phone #: 877-348-3246).

B. Slip –Resistant Dive Platform Surfacing

1. This work shall include furnishing and installing a Rough-Tex slip-resistant padded surface for dive tower platforms.

2. Three-Ply Black Rough-Tex

a. Material shall be 5/16" thick, high strength synthetic fabric with a nylon backing, and a 225 lb tension rating.

3. The front edges (horizontal and vertical) of this material shall be cut by the factory, and be a clean, straight edge.

4. Adhesive:

a. The adhesive shall be a high performance two-part polyurethane adhesive for both indoor and outdoor installations of the Rough-Tex surfacing. It shall have an excellent resistance to moisture, heat, and water.

b. The adhesive shall be PU 105 Polyurethane Adhesive as manufactured by Mapei.

5. Installation:

a. Installation of the Rough-Tex surfacing shall be performed by a flooring contractor experienced in projects of this size and scope.

b. The vertical surfacing of the front edge of the platform shall be installed before the horizontal surfacing. The length of the horizontal surfacing shall include the length of the concrete platform plus the thickness of the vertical surface; the horizontal surface shall overlap the vertical surface. A clean, straight, square, factory cute edge shall be installed at the leading edge of each diving platform with the horizontal material lapping the thickness of the material installed on the vertical face.

c. The concrete surface shall be clean, and without paint or other contaminants.

d. Scarify the concrete surface prior to installation.

e. If curing compounds were used, the surface must be thoroughly cleaned prior to installation.

f. After installation, add weight around the edges and seams of the surfacing material until the adhesive is completely dry.

g. Seal the edges of the surfacing with a bead of clear silicone caulk.

6. Delivery, Storage, and Handling

a. Materials must be delivered in the manufacturer's original unopened and undamaged containers with identification labels intact.

b. Store material upright on a clean, dry, flat surface protected from all possible damage, and protect from exposure to harmful weather conditions.

c. Recommended environmental condition for storage is a minimum of 55° F.

7. Site Conditions:

a. Maintain a stable room and concrete temperature for a period of 48 hours prior, during, and 48 hours after installation. Recommended range is between 65° F and 86° F.

b. Installation to be carried out no sooner than the specified curing time of the concrete.

c. Moisture vapor emission content of the concrete slab must not exceed 5 lbs. / 1,000 SF / 24 hours when tested using the anhydrous calcium chloride test as per ASTM F1869.

d. Installation of the Rough-Tex surfacing shall not commence until all other trades in the building are completed.

e. Follow manufacturer's installation instructions for both Rough-Tex surfacing and PU 105 adhesive.

8. Rough-Tex slip-resistant surfacing shall be supplied by Springboards and More (Phone #: 877-348-3246).

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS, INSPECTION AND PREPARATION

A. Carefully examine all of the contract documents for requirements that affect the work of this section. Prior to starting any work, notify the General Contractor of defects requiring correction. Do not start work until conditions are satisfactory.

B. Verify that all work by others, related to this section, has been completed. This includes all earthwork, concrete work, and mechanical, electrical and plumbing connections.

C. Protect all materials and work completed by others from damage while completing the work in this section.

3.2 FIELD MEASUREMENTS

A. Verify benchmark and pool location prior to layout.

B. If field measurements differ from the construction drawing dimensions, notification shall be given to the Architect prior to proceeding with work.

3.3 EXCAVATION, REINFORCING STEEL AND SWIMMING POOL CAST-IN-PLACE CONCRETE

A. Reference Division 31 - Earthwork

B. Reference Division 3 - Concrete

C. Reference Section 131101 – Swimming Pool Cast-In-Place Concrete

3.4 TOLERANCES FOR CONSTRUCTION OF THE POOL SHELL

A. The completed structures shall be constructed level and to the dimensions, elevation, depths and thickness as shown on the plans.

B. The elevation tolerance of the pool shell and gutter lip shall be plus or minus 1/8 inch.

C. The vertical wall surface tolerance of the pool shell, for the first 36 inches from the water surface shall be plus or minus 1/4 inch from plumb measured with a 6 foot straight edge.

D. For competitive race courses, the following pool shell tolerances shall apply:

Course	Tolerance	Minimum	Maximum
25 Yard	+ 1 3/16" /- 0"	75' – 3/4"	75' – 1 15/16"
25 Meter	+ 0.010 M	25.02 M	25.03 M
50 Meter	+ 0.010 M	50.02 M	50.03 M

1. The above dimensions include allowances for a touchpad at each end of the course. The maximum dimension includes the construction tolerance. These above tolerances also apply to courses utilizing moveable bulkhead(s).

2. The above dimensions apply to a vertical plane extending 1'-0" above and 3'-0" below the surface of the water at all points of both end walls.

E. The CONTRACTOR shall provide the services of a registered engineer or land surveyor who shall measure and certify the elevations of the gutter lip at 10 foot centers as well as the length of each lane for each possible racing course. Courses designed with touchpads for competition shall be measured and certified with touchpads in place. Course length survey must be made with the pool filled with water between 78 and 82 degrees Fahrenheit. Forms for the lane measurements are available from USA Swimming (719-866-4578) and must be submitted by the Contractor.

F. Ground wires or grade pins, if used, shall be installed in such a manner that they accurately outline the section of the pool shell as indicated on the plans. They shall be located at intervals sufficient to insure proper thickness throughout and shall be maintained tight. Grade pins or grounding wires shall not be permanently embedded in the pool shell.

3.5 WATER TIGHTNESS TEST

A. This test applies to the pool(s), the surge tank(s), and the gutter system(s). The water tightness test shall be completed prior to the application of the pool finish.

B. Water Tightness Test Procedure

1. Preparation

a. Allow the concrete structure to set 28 days for curing purposes. Once the pool shell has gained sufficient strength to withstand the test load and after all the outlets have been securely sealed, the pool shall be filled with water.

2. Fill: Fill and then isolate the pool(s), the surge tank(s), and the gutter system(s). The water tightness test shall begin after the vessel has been filled for a minimum of three (3) days. During the filling, all outlets shall be monitored for water tightness and all concrete joints shall be monitored for any visible leakage. If any visible leakage from the vessel is observed, the condition shall be corrected prior to the start of the test.

a. After the initial fill, all ground water shall be removed from the pool sight sump or the pool location de-watering system. This shall be completed prior to the start of the water tightness test. De-watering of the pool sight sump shall be maintained during the entire duration of the test.

3. Evaporation Measurement Procedure

a. Fill a floating, restrained, partially filled, calibrated, open container with water and allow the container to float within the pool during the testing period. This will be used to measure evaporation.

4. Measurement

   a. On a separate sheet of paper draw a sketch of the pool. Measurements shall be taken at the pool(s), the surge tank(s), and the gutter system(s). Multiple test points with averaging are recommended for vessels which will be exposed to wind. Document the separate findings on the chart below. Repeat the measurements and document every 12 hours for a total of three (3) days. The General Contractor shall check the pool(s), the surge tank(s), and the gutter system(s) for water loss with the Architect or Owner's representative every 12 hours. The Contractor(s) shall submit photo documentation of each measurement with the completed water tightness report.

Total Allowable Water Loss:	Total Gallons: _____	(0.1%) x 0.001 = _____	Allowable Loss	Pan Depth Per 24 Hrs.	
Pool Measurements	Competition Pool	Dive Pool	Gutter System	Surge Tank _	Pan Measurements
12 Hrs.					
24 Hrs.					
36 Hrs.					
48 Hrs.					
60 Hrs.					
72 Hrs.					

5. Total Loss = 7.481 x Structure Surface Area (SF) x Total Water Loss per Day (FT) – Evaporation per Day (FT) + Precipitation per Day (FT)

   a. Day #1 =

   b. Day #2 =

   c. Day #3 =

6. Repair

   a. The allowable leakage rate for an unlined pool structure shall not exceed 0.1 percent of the total water volume in a 24-hour period. (Example: 0.001 x 200,000 gallon pool = 200 gallons per 24 hour period.) This excludes the loss/addition of evaporation/precipitation.

7. Absorption

   a. Waiting 3 days after the initial water fill will allow the concrete to absorb water and shall be sufficient to minimize the effect of absorption on the test results.

8. Evaporation

   a. Evaporation shall not have a significant effect on natatoria that are completely enclosed with no air circulation during the water tightness test. However, evaporation will have a significant effect on the water level in natatoria that has air movement across the water surface or are still partially uncovered.

9. If leaks are detected, repair the vessel and make water tight in accordance with these requirements.

10. With regard to this test, the curing requirements, the final fill and the cost of the water for two (2) complete fillings shall be borne by the Owner. Any subsequent fillings or partial fillings (more than 25%) of the pool shall be by the CONTRACTOR, at its own expense.

3.6 PIPING INSTALLATION

A. General

1. Provide and erect, according to the best practices of the trade, all piping shown on the drawings and required for the complete installation of these systems. The piping shown on the drawings shall be considered as diagrammatic in indicating the general run and connections, and may or may not in all parts be shown in its true position. The piping may have to be off set, lowered or raised as required or as directed at the site. This does not relieve the CONTRACTOR from responsibility for the proper erection of the systems or piping in every respect suitable for the work intended as described in the specifications and approved by the Architect. In the erection of all piping, it shall be properly supported and proper provisions shall be made for expansion, contraction and anchoring of piping. All piping shall be cut accurately for fabrication to measurements established at the construction site. Pipe shall be worked into place without springing and/or forcing, properly clearing all windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted. All pipes shall have burrs and/or cutting slag removed by reaming or other cleaning methods in strict accordance with the manufacturer's instructions. All changes in direction shall be made with fittings. All open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the systems. Plugs of rags, wool, cotton waste or similar materials will not be used in plugging. All piping shall be arranged so as not to interfere with removal and maintenance of equipment, filters or devices, and so as not to block access to manholes, access openings, etc. Flanges or unions as applicable for the type of piping specified shall be provided in the piping at connections to all items of equipment. All piping shall be installed to ensure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access.

B. Pipe Hangers and Supports

1. Pipes shall be adequately supported by pipe hangers and supports specified in Paragraph 2.05 Pipe, Hangers, and Valves.

2. Horizontal PVC Schedule 80 piping shall be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 120 degree F and as listed below:

Nominal Pipe Size (Inch)	Hanger Support Spacing (Feet)	Minimum Rod Size for Single Rod Hanger (Inch)
1-1/4" and less	5	3/8"
1-1/2" to 3"	6	1/2"
4" to 6"	8	5/8"
8" to 12"	10	7/8"
Greater than 12"	12	1"

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

Nominal Pipe Size (Inch)	Hanger Support Spacing (Feet)	Minimum Rod Size for Single Rod Hanger (Inch)
½" and less *	4	3/8"
¾" to 2"	6	3/8"
2-1/2" to 3"	7	1/2"
4" to 8"	8	7/8"
Greater than 12"	10	1"

C. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape.

D. Install hangers to provide a minimum of 1 inch space between finished covering and adjacent work.

E. Place a hanger within 12 inches of each horizontal elbow.

F. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

G. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in section 2.05.C.3. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to the support spacing schedules.

H. Do not support piping from other pipes, ductwork or other equipment that is not building structure. Do not modify building structure for hanger installation.

I. Concrete Inserts

1. Provide inserts for placement in form work before concrete is poured.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

3. Where concrete slabs form finished ceilings, provide inserts to be flush with the slab surface.

4. Provide hook rods to concrete reinforcement section for inserts carrying pipe over 4 inches.

J. Pipe Hangers and Supports

1. All piping shall be rigidly supported from the building structure by means of hanger assemblies properly selected and sized for the application in accordance with the manufacturer's recommendations and specifications.

2. All piping in a service tunnel, if required shall be supported by a structure of the CONTRACTOR'S design. The structure shall be non-corrodible and shall be of a size and configuration to rigidly support all the piping as shown in the plans at a minimum spacing as shown below.

3. Piping hangers shall be spaced per the below schedule and shall have hangers not more than one foot on each side of every change in direction. The piping systems shall be installed in an approved manner and shall not overload the building structural frame. The CONTRACTOR shall provide additional hangers and miscellaneous steel supports as required to distribute the piping system load over several structural members where required or directed. Maximum allowable spacing for piping shall be as follows:

PVC Piping	Maximum Spacing
3/4" thru 2"	5'-0"
2 1/2" thru 4"	6'-0"
6" thru 10"	9'-0"
12" thru 14"	12'-0"

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

1/2" to 2" pipe	-3/8" rod
2-1/2" to 3" pipe	-1/2" rod
4" to 5" pipe	-5/8" rod
6" pipe	-3/4" rod

5. Hanger rods shall be galvanized steel. Provide for controlling level and slope by turn buckles or other approved means of adjustment and incorporate lock nuts.

6. Where piping is installed side by side, the CONTRACTOR will support the piping by utilizing trapeze type hanger assemblies. Horizontal trapeze member shall be non-metallic channel. The CONTRACTOR shall provide heavier members as required for the load to be supported for the entire span distance.

Hanger rods shall be as specified above and properly sized for the load supported, but not less than 5/8 inches diameter.

7. The use of pipe hooks, chains, or perforated iron for pipe hanger supports will not be permitted.

8. Attachment of piping hangers to the building structure shall be provided in a manner approved by the Architect. The CONTRACTOR shall provide concrete inserts to be installed by the General Contractor in the building construction at the time the concrete is poured and hangers shall be attached to these inserts.

K. Piping Installation

1. Trench bottoms shall be smooth and free of rocks and debris. If the trench is dug in ledge rock, hardpan or where large boulders are not removed, place 3 inches of sand or compacted fine-grained soil below pipe. Pipe must be supported over its entire length with firm, stable material. Blocking will not be used to change pipe grade or provide intermittent support over low sections in the trench. Surround the pipe with backfill meeting the requirements of Section 312000 with a particle size of 1-1/2 inch or less and in accordance with the project geotechnical report. Compact in layers not to exceed 6 inches with vibratory method. Follow installation methods of ASTM D2774 "Underground Installation of Thermoplastic Pressure Piping".

2. Installations are to be installed in a straight run of pipe, with a minimum 10 pipe diameters upstream and minimum 5 pipe diameters downstream of any pipe fitting.

L. Flushing, Draining and Cleaning Pipe Systems

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

M. Expansion and Contraction

1. The CONTRACTOR shall make all necessary provisions for expansion and contraction of piping with offsets, loops, flexible connections and anchors as required to prevent undue strain. The CONTRACTOR shall provide shop drawings for proposed method and arrangement for control of expansion and contraction of piping.

N. Testing

1. All piping installation and pressure testing shall be reviewed by the Owner’s testing agency before commencement of backfilling. A minimum notice of one (1) week is required prior to review. Results of review shall be documented.

2. All pool related piping, shall be hydraulically pressure tested (with water, not air) to a pressure of not less than 50 PSI for a period of no less than two (2) hours.

3. Contractor is responsible for the maintenance of a sustained 20 PSI pressure on all pool related piping throughout the course of construction.

4. The Contractor shall adhere to the applicable provisions of Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.

3.7 EQUIPMENT AND SYSTEMS INSTALLATION

A. The CONTRACTOR shall assemble and install all equipment, special parts and accessories as shown on pool drawings, specifications and shop drawings of the equipment suppliers.

B. The CONTRACTOR shall provide all anchors and inserts to be imbedded in the deck including all fittings, inserts and structure sleeves and required anchorage as shown on the plans and as indicated in this section of the specifications. Equipment shall be set true and plumb, using factory jigs where available. Removable equipment items shall be easily removable from anchors and shall fit without noticeable wobble.

C. Provide templates for all equipment anchors. Provide anchor bolts of the size and spacing as required by the equipment manufacturer. All anchor bolts shall be stainless steel Type 316L and of a length capable of adequate anchorage into rough slab-on-grade allowing for finish deck tile and setting bed. Anchors shall be set and cast into place during building concrete work. Inspect all anchor settings for horizontal and vertical alignment prior to placing concrete.

D. The CONTRACTOR shall install all equipment and systems in accordance with manufacturer's directions. Equipment shall all be assembled and in place for final observation.

E. All items necessary to complete this section are shown on the plans or described in the specifications including items that may be purchased by the Owner. Items are detailed and specified as a guide for dimensional purposes. The CONTRACTOR must make provisions accordingly and submit shop drawings and submittals based on that data.

3.8 START-UP AND INSTRUCTION

A. The CONTRACTOR shall supply the services of an experienced swimming pool operator/instructor for a period of not less than two days (total 16 hours) after the pool(s) have been filled and initially placed in operation. During this period, the Owner's representatives who will be operating the pool(s) shall be thoroughly instructed in all phases of the pool's operation. The CONTRACTOR shall deliver six (6) complete sets of operating and maintenance instructions for the swimming pool, structures, finishes and all component equipment. Prior to leaving the job, the CONTRACTOR shall obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and all necessary operating information provided. The CONTRACTOR shall, in his contract, include the cost of two (2) additional days (total 16 hours) of instruction and operational check out by the qualified representative of the CONTRACTOR during the first season of operation.

B. Written reports of each of these visits outlining the pool's operation, competence and performance of the pool's operation personnel, and other pertinent comments shall be submitted to the Owner and Architect/Engineer within one (1) week after each visit.

C. The CONTRACTOR shall provide specific written procedures to be followed for emptying and refilling the pool as mentioned previously in this section. The procedures must be included in the bound volume of operating instructions and references in the front index with a note headed by the words: "CAUTION -- VERY IMPORTANT".

END OF SECTION

SECTION 131106
SWIMMING POOL TIMING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY OF WORK

A. Introduction

1. Provide all labor, materials, equipment and services necessary to install a complete electronic timing and scoreboard system with multi-sport capability for race swimming, diving, water polo, pace clock, and synchronized swimming.

B. Work included in this section

1. It is the intent of this section to place the entire responsibility for the complete electronic timing and scoreboard system (including all appropriate connections) with multi-sport capability under one vested supplier. The supplier is responsible for providing full integration of this system. Multiple suppliers for a system will not be approved.

C. Related work specified in Electrical sections. Reference Division 26 – Electrical. Work to be completed by other contractors.

1. Ground and bond all pool structures, fittings and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.

2. Obtain permits, inspections, and approvals of all wiring including grounding and bonding of all metal components associated with the pool in accordance with Local, State and National Electrical Codes.

3. Install power, conduits, electrical boxes, ethernet connections and wiring for the Contractor furnished electronic timing and scoreboard system with multi-sport capability for race swimming, diving, water polo, pace clock, and synchronized swimming.

4. Supply junction boxes for all equipment outlined in these specifications and depicted on the timing system drawings.

D. Basis of Design:

1. The complete electronic timing and scoreboard system with multi-sport capability is based upon Colorado Timing System, Inc.

1.3 ACCEPTABLE MANUFACTURERS AND SUPPLIERS

A. Colorado Time Systems, Inc., 1551 East 11th St., Loveland, CO 80537, 970-667-1000. (Basis of Design.)

1.4 SUBMITTALS

A. Submittals shall include the following:

1. Product data

2. Shop drawings detailing system layout

3. Operations and maintenance manuals for system. Manuals shall include a complete parts list.

4. Warranty for each piece of equipment within this section.

1.5 JOB CONDITIONS

A. Manufacturers proposing to submit a quotation for the electronic timing and scoreboard system must confirm that all embedded items are compatible with the installation of their respective systems.

B. Manufacturers shall review the construction documents and shall notify the architect 10 days prior to the bid date of conflicts or additions to the work of other subcontractors for the proper installation of their system.

1.6 WARRANTIES

A. The CONTRACTOR shall warranty the completed installation of all systems in this section for one year.

B. The manufacturer shall warranty the scoreboard, computer consoles, touchpads, pace clocks and starting system for two years.

C. The manufacturer shall warranty the titanium timing system wall plate and deck plates for five years.

PART 2 -PRODUCTS

2.1 SCOREBOARD SYSTEM

A. LED Numeric Scoreboard System (One (1) required - Located at DIVE POOL)

1. Multi-Sport LED Scoreboard system shall display all necessary information for diving in compliance with the appropriate sanctioning body - USA DIVING, NCAA, and NFHS.

   a. Basis of Design: Multi-Sport LED Scoreboard System is based upon Colorado Timing System, Inc.

2. Each line of scoreboard shall use seven segments 10” high LED digits, red color.

3. Each line of scoreboard shall have an internal data selector switch to permit owner/operator selection of data codes to be installed at each line of scoreboard. Data select codes may be manually changed at the scoreboard or logically changed from the timer console. Scoreboards with fixed function displays are unacceptable.

4. Each line of scoreboard can have up to eight operable digits, eight operable decimals, and one operable colon to provide maximum display flexibility and reduced cost. Scoreboards with fixed decimals and colons are unacceptable.

5. Each line of scoreboard shall have an individual internal power supply and individual control circuit to limit loss of data to one line if a malfunction should occur or to permit its use as an independent line of scoreboard.

6. Each line of scoreboard shall have true multi-sport capability through the use of sliding digits to permit reformatting to desired configurations. Digits shall move freely without the use of hand tools.

7. Each line of scoreboard shall be constructed identically (modular) to permit on-site substitution or replacement of failed unit.

8. The scoreboard shall be capable of being used in a time of day mode when not being used in display modes.

9. Power shall be 115VAC, 2 amp, 250 watts per module maximum.

10. Facility name panel(s) shall be provided per Architect.

11. Scoreboard shall display the following minimum requirements:

7 Line Scoreboard	Lead Diver, Current Diver, DD, Round, Award Judges scores up to 10 judges, Award Point to overtake leader

B. Full Color Video Display (two (2) required, as located in plan)

1. Full Color Video Display system shall display all necessary information to time swimming, diving, water polo, and synchronized swimming in compliance with the appropriate sanctioning body - FINA, USA SWIMMING, NCAA, and NFHS.

   a. Basis of Design: Multi-Sport LED Scoreboard System is based upon Colorado Timing System, Inc.

2. Display shall include: Full matrix LED scoreboard with computer controller, flat-wall mounting hardware and data/fiber cable up to 500'.

3. Display shall be a full color LED matrix display. Display shall be comprised of red, blue and green LEDs to form pixels. Display shall be capable of 281 trillion shades of color.

4. Display should be capable of 16-bit video processing, refresh rate of 240Hz, four levels of dimming capability and allow for Gamma correction.

   a. Display intensity shall be adjustable between 562-1500 nits for INDOOR.

5. The display shall have a built-in graphics and animation capability with Windows- based software. Graphics and animation shall have the capacity of being displayed on the entire matrix. All MS Windows fonts shall be compatible with the display.

6. Display must have the ability to show live video or DVD's.

7. Display shall allow for front access points for service.

8. Display shall include 2% spare critical parts.

9. Operation temperature shall be between 14F – 140F (-10c – 60c).

10. Humidity tolerance shall be between 0%-95%.

11. Each indoor pixel shall be comprised of 3 LED's 1R1G1B..

12. Scoreboard Details:

   a. MAIN SCOREBOARD (Located on West End wall of 50M pool)

i. Minimum Viewing Distance: 50 ft to 150 ft.

ii. Pixel Spacing: 10 MM

iii. Active Area: 9.45(H) x 26.25(W)

iv. Pixel configuration shall be: 288 PIXELS HIGH x 800 PIXELS WIDE

b. SECONDARY SCOREBOARD (Located across 50M pool)

i. Minimum Viewing Distance: 50 ft to 150 ft.

ii. Pixel Spacing: 10 MM

iii. Active Area: 9.45(H) x 16.78(W)

iv. Pixel configuration shall be: 288 PIXELS HIGH x 512 PIXELS WIDE

C. Scoreboard Hanging Requirements

1. Scoreboard manufacturer shall provide drawings with hanging information.

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a. Material: Scoreboard hangers shall be **galvanized steel** ~~316L stainless steel~~ for an indoor natatorium.

b. Coordinate scoreboard hanging requirements with structural engineer prior to the submittal process.

2. Anchors

a. Metal studs with 5/8" Magnesiacore panels on walls

1) Refer to structural for specific anchoring fastener requirements to metal stud wall system.

3. Supports

a. Unistrut (LED Board)

1) Material

a) Fittings, unless noted, are made from hot-rolled, pickled and oiled steel plates, strip or coil, and conform to ASTM specifications A575, A576, A635, or A36. The fitting steel also meets the physical requirements of ASTM A1011 SS GR 33. The pick-ling of the steel produces a smooth surface free from scale. Many fittings are also available in stainless steel, aluminum and fiberglass. Consult factory for ordering information.

2) Finishes

a) Fittings are available in: Perma-Green III (GR), Electro-galvanized (EG), conforming to ASTM B633 Type III SC1; Hot-dipped galvanized (HG), conforming to ASTM A123 or A153.

b. Unistrut (Numeric Board)

1) Material

a) Unistrut channels are accurately and carefully cold formed to size from low-carbon strip steel. All spot-welded combination members, except P1001T, are welded 3" (76 mm) maximum on center.

2) Finishes

a) All channels are available in Perma Green III (GR), Pre-galvanized (PG) conforming to ASTM A653 G90, Hot-dipped galvanized (HG) conforming to ASTM A123.

4. Brackets

a) Per ANSI B1.1- Surface roughness per ANSI B46.1- Surface roughness on holes 250 MAX unless otherwise specified. Variations in form from unmachined features are permitted within established – all filets 0.005-0.020 (APPROX. RADIUS) – Screw threads per ANSI B1.1- Pipe threads commercial standards. All edges and corners 0.005-0.020 (approx. radius or chamfer).

b) All materials and components used in the assembly of this item must be RoHS complaint material: 12GA (.105) HRS. The finish shall be ZINC CLEAR CHROMATE PLATED. Manufacturer shall break all sharp edges and corners.

c) All support hardware, brackets, fasteners, hangers, etc. used during installation of the scoreboard shall be Zinc Clear Chromated Plated.

2.2 MULTI-SPORT COMPUTER/TIMING SYSTEM

A. Multi-Sport Computer/Timing System shall be supplied with all necessary software to time swimming, diving, water polo, and synchronized swimming in compliance with the appropriate sanctioning body - USA SWIMMING, NCAA, and NFHS.

1. Basis of Design: Multi-Sport Computer/Timing System is based upon the GEN7 TIMING as manufacturer by Colorado Timing System, Inc.

B. Multi-Sport Computer/Timing System shall be a standalone unit with physical connections to timing inputs. Timer shall be controlled by user interface device (e.g., computer, tablet, etc.) via USB or TCP/IP.

1. Timer PC or tablet interface device shall be supplied with all necessary software to time and score swimming in compliance with the appropriate governing organization(s) - USA SWIMMING, NCAA, and NFHS.

2. Configuration of race courses shall be through graphical user interface. It is unacceptable that race configurations need specific cable connections to system connections such as wall plates defining a specific end of a course.

3. User interface shall display complete race status. The interface shall be capable of functioning as miniature scoreboard displaying information simultaneously for all active lanes including lane number, current length in race or final place, split or finish time, relay judging status indicator, and backup time and backup button status.

4. Timer shall automatically flag timing discrepancies (in the user interface, on the results printouts and in stored memory) greater than a user defined interval between touch pad and backup times.

C. Multi-Sport Computer/Timing System input/output ports must include:

1. Shall accept inputs for up to 4 courses of up to 32 lanes each for a serial in-deck wiring installation and shall be able to time them simultaneously.

2. Up to 8 timers shall be supported to accept inputs of the same in-deck wiring installation for parallel race timing and backup.

3. Shall accept on-deck cable harness inputs for up to 20 lanes near end and/or far end.

4. Shall communicate with meet management peripheral software on a two-way “handshake” basis, enabling the meet manager’s resident computer to query the timer’s memory via the USB port or via the network at any time for any race results.

5. Shall provide backup time via push button provided on a per lane basis should swimmer fail to trigger touch pad or touch pad fail to register. Timer to be capable of accepting up to three backup button times per lane.

6. Shall automatically compare the touch pad hit of an incoming swimmer with the starting swimmer’s time of departure from the optional relay-judging platform. Results display both “plus” and “minus” takeoff times and can be printed and stored in race memory

D. Accuracy of Multi-Sport Computer/Timing System:

1. Shall time to a user-selectable resolution from 1 second to .001 second. It shall take starts and finishes from the near end and/or far end of the pool. It shall accept inputs from the start system; touch pads, up to three manual button backup times per lane, and relay judging platforms.

2. Shall be able to evaluate and report multiple states of timing component input condition, ranging from excellent to failure. It is unacceptable that only two states such as on or off are reported.

3. Shall have touch pad delay feature with ability to program delays from 1 to 99 seconds.

4. Shall permit the operator to correct for an erroneous touch by adding/subtracting a touch pad hit to correct the lengths completed. The interface shall not permit the operator to finish a race in any lane; timers including such a function are unacceptable because they permit the possibility of cheating.

5. Later recall of stored race data shall allow for a re-run of a given race including changes in user decisions.

E. Multi-Sport Computer/Timing System Detection:

1. Shall be capable of detecting timing components such as pushbuttons, touchpads, RJPs, speakers, Speedlight and start systems connected to an in-deck system and capable of detecting touchpads and RJPs connected to an on-deck system.

2. Shall be capable of reporting corrosion in the in-deck wiring installation.

F. Multi-Sport Computer/Timing System shall run off a 12 Volt power supply connected to a standard 110/240 VAC outlet and will automatically switch to (and display on screen of connected interface device) internal battery power source, in case of line power failure without affecting the continuity and accuracy of the timing system.

G. Multi-Sport Computer/Timing System shall interface to single-line and multi-line scoreboard and shall post immediate results to scoreboard in “Lane” or “Place” order (user selectable). The timer shall also have the capability to pull race results from memory and post those results to the scoreboard in “Lane” or “Place” order (user selectable).

H. Multi-Sport Computer/Timing System shall include internal clock calendar with self-sustaining battery to time/date stamp all results.

I. Multi-Sport Computer/Timing System shall meet acceptable safety standards. Shall be UL approved, or equivalent.

J. Multi-Sport Computer/Timing System Storage and Internal Memory:

1. System shall store each and every timing input state change. It is not acceptable that state changes get discarded and are not available for later re-evaluation of a race.

2. All race data, including near and far end splits, shall be stored to internal memory for later recall to facilitate meet management connectivity and printing. Printed reports shall include cumulative and subtractive splits as well as relay judging times (when required).

3. Meet memory shall be capable of being transferred to external storage (via USB) or cloud data backup services (e.g., DropBox, Google Drive).

K. Multi-Sport Computer/Timing System shall have an Automatic Event Sequencer that is capable of holding both standard and user defined event sequences. The event order will be able to be downloaded from meet management software. The desired order is user selectable. EVENT SEQUENCES with appropriate race distance and race description for high school, college meets, and two “User Defined” meets to permit construction of custom meets, USA SWIMMING, NCAA, and NFHS. When recalled from memory, race distance and descriptions are automatically selected for the operator.

L. Multi-Sport Computer/Timing System shall have a user interface software that permits operation of essential functions including Lane Off/On, Finish Arm, Split Arm, & Print Results directly from the main screen to ensure speed and simplicity of operation during critical race times. The interface shall permit the operator to edit a time when required or to disqualify a lane (DQ), automatically posting it to the scoreboard, and provide automatic re-ranking of results. Any corrections generated by the operator (edit or disqualification) shall be clearly identified on the results printouts.

M. Multi-Sport Computer/Timing System shall include electronic beeper and LED signaling to indicate touchpad, backup button and RJP inputs. Timers which do not allow the user to configure (enable/disable) this feature are unacceptable.

N. Multi-Sport Computer/Timing System connectivity shall include:

1. USB (Type A) port for external storage

2. USB (Type B) port for meet management connectivity

3. USB (Type B) port for user interface computer connectivity

4. Ethernet port for network connectivity

5. 3 independent scoreboard output ports

6. Wireless 2.4GHz scoreboard connectivity

7. Connection for in-deck wiring and two connections for on-deck (near and far end) wiring

8. Start system connection directly to timer

9. External DC power port

O. Multi-Sport Computer/Timing System shall be capable of updating internal software/firmware via Internet connection.

P. Multi-Sport Computer/Timing System software shall have the ability to adjust the intensity of LED scoreboard brightness.

2.3 SWIMMING TIMING SYSTEM CONNECTORS

A. General Description

1. The timing system shall employ topology of a single communication bus to which all timing and connectivity nodes are connected and communicate with each other

2. Connection points shall be production items and not a one off or prototypes

3. Exposed connectors shall feature titanium contacts. They shall be wet pluggable and electrically passive if not connected. No maintenance to prevent corrosion of deck plate connector contacts shall be needed.

4. Self-test capabilities to detect compromised timing bus wire terminations and scoreboard bus wire terminations

B. Wall Plates

1. Wall plates shall be provided as required in the quantities as shown on the drawings. Wall plates shall be the termination point for connections between deck cables, timers, start system, and other wall plates.

   a. Basis of Design: Wall plates are based upon TITANIUM SERIAL WALL PLATE as manufactured by Colorado Timing System, Inc.

2. Wall plates must allow for any, or all, of the following connections depending on location and usage:

   a. Connection to the timer.

      1) Connectivity to all timing courses and one scoreboard bus with one cable connection.

      2) Detection of presence or absence of connected timer.

      3) Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts).

   b. Connection to a start system and shall provide the following:

      1) Inputs for start system and speaker.

      2) Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts) and anomalies with the speaker input or start system.

      3) Detection of presence or absence of speaker input or start system.

   c. Connection to a scoreboard and shall provide the following:

      1) Detection of presence or absence of connected scoreboard.

      2) Self-test capabilities to detect compromised timing bus wire terminations.

d. Connection to a bulkhead and shall provide the following:

1) Detection of presence or absence of connected bulkhead.

2) Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts).

3. Junction Boxes (Provided by Electrical Contractor):

a. Wall plate timing system components shall fit into a 12” x 12” x 6” PVC junction box.

b. Acceptable Manufacturer: Cantex (P/N 5133713) or similar box that will fit wall plate assembly of the following dimensions: 12” x 12” x 6” +-0.05”, cover plate width shall be 15” +-0.02” square

c. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

d. Verify routing of conduit with timing system manufacturer prior to install.

C. Deck Plates

1. Deck plates shall be provided as required in the quantities as shown on the drawings. Deck plates to permit plug-in connection for touch pads, A, B, C, backup buttons, electronic relay judging, start light signal, start speakers and a signal to start the timing device at each lane.

a. Basis of Design: Deck plates are based upon TITANIUM SERIAL DECK PLATE as manufactured by Colorado Timing System, Inc.

2. Domed deck plate node with contacts mounted on integrated slopes that cause corrosive pool water which creates water bridges to flow off through gravity, overcoming water surface tension and therefore reducing electrolytic currents and corrosion. No maintenance for corrosion shall be needed.

3. Titanium contacts as exposed connectors.

4. Inputs for button A, B, C, touchpad, start system, speaker, RJP and Speedlight (RJP as separate input, not piggy backed on another input).

5. Speedlight shall be controlled in synchronicity and individually per lane (requires RJPs).

6. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts) and anomalies with the timing components push buttons, touchpad, RJP, Speedlight, speaker or start system.

7. Ability to detect presence or absence of push buttons, touchpad, RJP, Speedlight, speaker or start system.

8. Plate shall have self-test capabilities to detect compromised timing bus wire terminations.

9. Junction Boxes (Provided by Electrical Contractor):

a. In deck system components shall fit into a 4” x 4” x 6” PVC junction box.

b. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

c. Verify routing of conduit with timing system manufacturer prior to install.

D. Start System Deck Plate

1. Start system deck plates shall be provided as required in the quantities as shown on the drawings.

    a. Basis of Design: Start system deck plates are based upon TITANIUM SERIAL START SYSTEM DECK PLATE as manufactured by Colorado Timing System, Inc.

2. Connection to start system that shall provide the following:

    a. Inputs/outputs for start system and speaker.

    b. Detection of presence or absence of speaker input or start system.

    c. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts) and anomalies with the speaker or start system.

3. Junction Boxes (Provided by Electrical Contractor):

    a. In deck system components shall fit into a 4” x 4” x 6” PVC junction box.

    b. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

    c. Verify routing of conduit with timing system manufacturer prior to install.

E. Timer Deck Plate

1. Timer deck plates shall be provided as required in the quantities as shown on the drawings.

    a. Basis of Design: Timer deck plates are based upon TITANIUM SERIAL TIMER DECK PLATE as manufactured by Colorado Timing System, Inc.

2. Connection to timer which shall allow for a pool setup without a wall plate, and shall provide the following:

    a. Connectivity to all timing courses and one scoreboard bus with one cable connection

    b. Detection of presence or absence of connected timer

    c. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts)

    d. In deck system components shall fit into a 4” x 4” x 6” PVC junction box

3. Junction Boxes (Provided by Electrical Contractor):

    a. In deck system components shall fit into a 4” x 4” x 6” PVC junction box.

    b. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

    c. Verify routing of conduit with timing system manufacturer prior to install.

F. Bulkhead Deck Plate

1. Bulkhead deck plates shall be provided as required in the quantities as shown on the drawings.

a. Basis of Design: Bulkhead deck plates are based upon TITANIUM SERIAL BULKHEAD DECK PLATE as manufactured by Colorado Timing System, Inc.

2. Connection to bulkhead that shall provide the following:

a. Detection of presence or absence of connected bulkhead.

b. Self-test capabilities to detect compromised timing bus wire terminations.

c. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts).

3. Junction Boxes (Provided by Electrical Contractor):

a. In deck system components shall fit into a 4" x 4" x 6" PVC junction box.

b. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

c. Verify routing of conduit with timing system manufacturer prior to install.

G. Scoreboard Deck Plate

1. Scoreboard deck plates shall be provided as required in the quantities as shown on the drawings.

a. Basis of Design: Scoreboard deck plates are based upon TITANIUM SERIAL SCOREBOARD DECK PLATE as manufactured by Colorado Timing System, Inc.

2. Connection to scoreboard that shall provide the following:

a. Detection of presence or absence of connected scoreboard cable.

b. Self-test capabilities to detect compromised scoreboard bus wire terminations.

c. Diagnostic capabilities to detect anomalies with connectors (corrosion, shorts).

3. Junction Boxes (Provided by Electrical Contractor):

a. In deck system components shall fit into a 4" x 4" x 6" PVC junction box.

b. All conduit interconnects between timing system boxes (deck plates and wall plates) shall be PVC. Refer to drawings for sizing.

c. Verify routing of conduit with timing system manufacturer prior to install.

2.4 SWIMMING TIMING START SYSTEM

A. Swimming Timing Start System (2 required) shall be provided to start the automatic swim timing system. The start system shall drive speakers mounted under the starting blocks, the relay judging platform strobe lights and deck side start indicators, with microphone.

1. Basis of Design: Swimming Timing Start System is based upon the CHAMPIONSHIP START SYSTEM as manufactured by Colorado Timing System, Inc.

B. System shall drive up to twenty 6-watt (reflex) corrosion resistant speakers located under the individual starting blocks as well as be able to drive individual speed lights on each starting block.

C. System shall have the capability to use either wired or wireless microphones and shall have a volume control on each microphone input.

D. Start system shall have a high impact resistant plastic molded enclosure.

E. System shall have external connections for additional strobe light, speaker output and start output.

F. The system shall run off of an external 12-volt power and have 2 internal gel cell batteries. The internal batteries will automatically be recharged while the starter is plugged in to the external power supply.

G. There shall be a LED warning light on the system showing when the internal batteries are starting to get low on power.

H. Starting Block Speaker:

1. Provided one speaker per championship starting block, plus one spare speaker (16 required). Speaker shall be mounted on starting platform. Speaker shall be corrosion resistant and designed to be used in an aquatic environment and rated for such use.

   a. Basis of Design: The starting block speaker is based upon the CTS MODEL SP-6/45 as supplied by Colorado Timing System, Inc.

2. The loudspeaker shall be a flex driver type horn projector of integrated construction. It shall be rated 6 watts for voice or music material with an on-axis frequency response of 320-6000 Hz (“6dB). The sound pressure level shall average 97dB(1W/1M) for 500 to 5000 Hz.

3. The horn and mounting base shall be tan in color and constructed of impact & UV resistant ABS, which will retain mechanical properties from -20q to +160qF. The driver cone diaphragm shall be moisture resistant. All materials shall resist damage from extreme weather exposure. Electrical connector shall be of 2-conductor banana type, .750 center to center.

4. Provision for mounting shall be clearance slots in the adjustable base and hole location points in the horn flange for adapting unit to be recess mounted.

2.5 DIVING

A. Diving scoring system shall utilize scoreboard to display diving scores and results without modification from swimming configuration.

1. Basis of Design: The diving scoring system is based upon GEN7 DIVING as supplied by Colorado Timing System, Inc.

B. Diving Scoring Software:

1. Diving scoring system software shall support standard and synchronized scoring.

2. Accept seven (7), judges’ input scores and compute award based upon proper formulas for seven (7), judges. Software shall be operable with either remote judges’ terminals or manual input of flash card scores.

3. System must be expandable to use up to eleven judges scoring terminals.

4. Permit display of the lead diver number, current diver number, dive number, degree of difficulty, judges' scores and diver's calculated award and total score.

5. Permit entry of all diving data into non-volatile memory for storage or receive data from meet management computer without additional modifications. Data shall include diver number, round number, dive number, and position. Degree of difficulty shall be automatically calculated based upon dive number per current USA DIVING/NCAA/NFHS regulations. Dive degree of difficulty can also be manually input.

6. Automatically recall the diver with round number, dive number and DD using minimal keystrokes. Systems which require live entry of dive information are unacceptable.

7. Permit storage of diver's point totals and provide ranking of the divers at the end of each round.

8. Permit editing of judges' scores if required by meet officials.

9. Provide an output for computer data handling of diving events.

10. Permit two-point deduction from the judges' scores and zero points for a failed dive. Such changes shall be clearly shown on the printout.

11. Printout shall provide preliminary data, diver ranking by rounds, and results of individual dives with judges' scores.

12. Judges' terminals shall be housed in sealed, water-resistant, shockproof housing.

13. The terminals shall provide a signal to inform the judge that the diving console has requested a score. Signal shall cease when an appropriate score is transmitted. They shall also allow each judge to input a score with a minimum of keystrokes, review that score via a built-in LCD display, and correct a score if needed before transmitting to the Judging Software.

14. The Software shall provide a switchable mode for sending data to the scoreboard display.

    a. Mode- Automatic- In this mode the software must send the judges scoring information to the display with no software operator interaction.

    b. Mode- Hold for Authorization – In this mode the software must receive authorization from a referee terminal or an assistant referee terminal prior to sending the scoring data to the display.

C. Remote Judging Terminal:

1. Interface hub shall plug into the PC via USB 2.0 or greater

2. Judges terminals shall include a quick release mating connector for connection to the Diving Cable Breakout Box.

3. Judges' terminals shall include rugged communications cable to connect to the diving interface box. Cable should be removable for easy cost-effective replacement of the cable.

4. Judges' terminals shall utilize sealed keyboards with a 128x64 Pixel Backlit LCD display suitable for indoor and sunlight readability.

5. Judges terminal LCD must be capable of displaying Divers Name.

6. Judges terminal LCD must be capable of displaying Divers Team or Country Name.

7. Judges terminal LCD must be capable of displaying scores of other judges once the scores have been accepted.

8. Judges terminal LCD must be capable of displaying Dive and Dive Degree of Difficulty

9. Judges terminal LCD must be capable of displaying the terminal number, so they can be easily identified to the judge

10. Judges terminals shall include a request change button to notify the software that the judge's input is requesting permission to correct the submitted score.

11. Judges terminals must be able to be assigned as a Referee's terminal or Assistant Referee's terminal allowing the device to control when the judging data is transmitted to the scoreboard display.

12. Provide seven (7), Judging Terminals (JT-01) with associated cables. Provide one interface hub box (IH-01) with associated cables. Provide two (2) cable breakout box (CB-01) with associated cables.

2.6 WATER POLO

A. Water Polo Scoring

1. Provide water polo program with the Multi-Sport Computer/Timing System. Water polo basic system shall include: water polo software, user interface with toggle for start/stop, scoreboard horn, signage for scoreboard, and manual.

   a. Basis of Design: The water polo program is based upon Colorado Timing System, Inc.

2. Accessory software program shall turn multi-sport computer and multi-sport scoreboard into complete water polo scoring system.

3. Features shall include presentable period times, timeout times, eject times for up to three players, game times, and shot time.

4. Selectable options shall include display of game time in seconds, tenths, and/or hundredths, keeps player fouls "on the fly" and records in memory.

5. Water polo scoreboard display functions shall include game time, shot time, penalty times, three (3) team scores, period number, player fouls and time of day.

6. Interface unit shall permit hand-held switch control of shot clock reset function and toggle switch for the start/stop of game time.

7. Miscellaneous features shall include: 12 or 24-hour time of day display, tenths of hundredths of a second remaining display, total game time display, individual player foul totals display.

8. Game time shall display to .01 seconds when stopped.

9. Multi-Sport Computer/Timing System shall be capable of operating two shot clocks in addition to water polo scoring.

B. Water Polo Table Top Controller

1. Provide water polo table top controller (1 required) for water polo scoring. Controller shall have:

   a. Buttons with tactile dome feedback

b. Large transflective LCD screen that is easily readable in all environments from darkness to bright sunlight

c. Built-In real time clock to keep time of day

d. Configurable defaults allow customizing to your league rules

e. Slide-in keyboard insert

f. Able to operate multiple scoreboards with one controller

g. Supports the external Run/Stop/Reset switch to allow for additional clock operators

h. Include (1 RSR) Stop/Start/Reset switch

C. Portable Deck Clock (Shot Clock/Pace Clock)

1. Two (2) portable shot clock/pace clock shall be provided for water polo course. Shot clocks shall NOT be provided for water polo practice courses.

   a. Basis of Design: The portable deck clock (shot clock) is based upon the DC-1500 as manufactured by Colorado Timing System, Inc.

2. The clock shall include a ruggedized polyethylene enclosure that is water and sun resistant and completely corrosion free. The enclosure shall include a built-in handle to allow for easy carrying from point to point.

3. The deck clock shall be capable of being used as a game/shot clock for many sports or set to pace in time of day.

4. The deck close shall include LED digits with variable intensity settings to allow for visibility in a variety of environments and times of day or night. Time of day or game time shall be displayed at the top of the clock, with 5” digits displaying hours and minutes. 10” digits shall show seconds for pacing or shot time.

5. The deck clock shall in an integrated 2.4GHz wireless adaptor to receive game/shot data from tabletop or handheld controllers. Data can also be received from a Multi-Sport Computer/Timing System with a wireless adapter.

6. The deck clock shall be capable of providing pace in time of day (hours, minutes and seconds) without any controller. Multiple clocks shall automatically synchronize in pace mode.

7. The clock shall include an integrated horn. The horn shall produce both game and shot tones.

D. Wireless Water Polo Scoreboard

1. Provide an integrated Wireless Mini Scoreboard for water polo scoring. Scoreboard to display period/shot, game time, and home/ guest scores with 5” LED digits. Scoreboard shall include a wheeled scoreboard caddy.

   a. Basis of Design: The wireless water polo scoreboard is based upon the MS-0055 as manufactured by Colorado Timing System, Inc.

2. Power: Scoreboard shall have 115-230 V, 2 A 50/60 Hz power.

3. Scoreboard shall include a rugged powder-coated aluminum enclosure. All digits and circuit boards are conformal coated to protect against corrosion. The high gain flush mount patch antenna shall be mounted internally and shall be protected by a Lexan cover to prevent breakage by errant balls and/or weather.

4. The scoreboard shall include an integrated 2.4GHz wireless adapter to receive game/shot data from tabletop or handheld controllers. Data can also be received from a Multi-Sport Computer/Timing System with a wireless adapter.

5. Provide scoreboard caddy for water polo scoreboard.

2.7 SWIMMING TIMING COMPONENTS

A. Gutter Hung Touchpads

1. Provide 18 touchpads (18 required for the Main Course) and 12 touchpads (12 required for the Cross Course) to time swimming, in compliance with the appropriate sanctioning body.

   a. Basis of Design: The gutter hung touchpad is based upon the AQUAGRIP GUTTER HUNG TOUCHPAD as manufactured by Colorado Timing System, Inc.

2. Touchpad shall be constructed of an all-plastic exterior with only electrical connector metal exposed. Touchpad shall be the following dimensions:

   a. Touch pad shall be the TP-78G AQUAGRIP, 78” wide x 22” tall x 0.3” thick. (CROSS COURSE)

   b. Touch pad shall be the TP-90G AQUAGRIP, 90” wide x 22” tall x 0.3” thick. (MAIN COURSE)

3. Touchpad shall have a uniform fine grit and non-abrasive surface that prevents swimmer slippage in any direction.

4. Touchpad markings shall have contrasting colors with a 2” black border and black end-wall cross pattern for portion covered by touchpads.

5. Touchpad brackets shall be custom made to fit the pool. Contractor to provide sufficient number of brackets for support of each touchpad.

   a. Contractor to provide an additional 2 spare touchpad brackets.

6. Touchpad shall have a two-year warranty without a requirement to purchase a protective touchpad cart.

7. Touchpad caddy for storing the number of touch pads supplied shall be (1) CAD-TP/P and (2) CAD-TP96.

B. Relay Judging Platforms

1. Provide one (1) relay judging platform to time swim start reaction in compliance with the appropriate sanctioning body. Platform shall electronically indicate when a swimmer has left the starting block in relation to the incoming swimmer’s touch of the timing pad. Accuracy shall be 1/100th of a second

   a. Basis of Design: The relay judging platform as manufactured by Colorado Timing System, Inc.

2. Relay Judging Platform shall have a non-skid surface to prevent swimmer slippage.

3. Top and front surface shall be sensitive to the swimmer’s push off.

4. Each platform shall be capable of securing to starting blocks.

5. Refer to starting block specification for starting block top size. Relay Judging Platform shall be sized to adequately cover starting block.

6. LED Speed Light

    a. Platforms shall come equipped with speed light, LED lights that flash with the start signal.

C. Push Buttons

1. Provide two (2) back-up buttons for each touchpad provided.

2. Back-up buttons to be plunger style button with a 5’ cable.

D. Swimming Timing Systems Caddies

1. Provide touchpad caddy for storing all touch pads. The correct number of touchpad caddies shall be supplied to store all touchpads. Caddy shall be sized to match timing system touch pad widths. Touchpad caddy shall consist of an aluminum frame with four freewheeling casters. The CONTRACTOR is responsible for assembly. Touchpad caddy shall be CAD-TP/P and CAD/TP96 as manufactured by Colorado Timing Systems, Inc.

2.8 PACE/SHOT CLOCKS

A. Multi-Sport Computer/Timing System Pace Clock Program

1. Accessory software program shall turn multi-sport computer and multi-sport scoreboard into an effective training system and coaching tool.

    a. Basis of Design: GEN7 PACE CLOCK PROGRAM as manufactured by Colorado Timing System, Inc.

2. Accessory software program shall turn multi-sport computer and multi-sport scoreboard into an effective training system and coaching tool.

3. Interface to HYTEK's "Workout Manager" software with direct download to computer timer.

4. Programmable workouts are saved into memory for up to 80 workouts.

5. Workouts display on multi-line scoreboard by lane. E. START/STOP all lanes with one keystroke, or individually.

6. Include programmable "fudge factor" for coaches' election.

B. Slim Pace Clocks

1. Pace clocks shall be provided as required in the quantities as shown on the drawings.

    a. Basis of Design: SLIM PACE CLOCKS as manufactured by Colorado Timing System, Inc.

2. Pace clock shall include thirteen (13”) high visibility LED digits, with variable intensity settings. The pace clock shall include a rugged powder-coated aluminum enclosure, conformal coated to protect against corrosion, a real time of day clock, and shall be suitable for indoor or outdoor use

3. Pace clock shall include twelve (12) operating channels to eliminate interference.

4. Pace clocks have an integrated real time of day chip (RTC). If multiple pace clocks are used in a facility, they will synchronize the time automatically.

5. Pace clock shall include a wireless frequency of 2.4 GHz and have autosensing power capabilities for 120/240 VAC.

6. Pace clock shall have four (13") digits.

    a. Overall Size (H x W x D): 19.25" x 42.25" x 2.8"

    b. Weight: 15 lbs

C. PC-PRO Deck Clock

1. Deck clock (one (1) required.

    a. Basis of Design: PC-PRO-R as manufactured by Colorado Timing System, Inc.

2. Deck clock shall have the capability of being controlled by a hand-held console for pacing functions. Additionally, it shall be capable of being controlled with the Multi-Sport Computer/Timing System.

3. Deck clock shall have an external switch to change from a pacing function to a water polo function.

4. Deck clock shall have the capability of using the Multi-Sport Computer/Timing System to run the water polo functions.

5. Deck clock shall be capable of 15 training modes (Lap Counter, Simple Pace Clock, Pace Clock with Cumulative Splits, Pace Clock with Lap Splits, Relay Exchanges, etc.)

6. Deck clock shall have the capability to be set up as either Master or Slave. Permanent shot clock/pace set as Master must re-transmit Pace Clock data to Slave Pace Clocks set to receive data on the same frequency.

7. Deck clock must be able to receive shot clock data from a Multi-Sport Computer/Timing System.

8. Deck clock shall have the capability to adjust the LED intensity using a Multi-Sport Computer/Timing System or via the control panel.

9. Pace clock shall include a wireless frequency of 60/50Hz and have autosensing power capabilities for 110/220 VAC.

10. Deck clock shall have four (4) 10" LED digits. Unit with digits less than 10" will not be accepted due to inadequate viewing distance.

    a. Overall Size (H x W x D): 13.5" x 36.25" x 4.75"

    b. Weight: 29 lbs

2.9 MATERIAL LIST - GEN7 SERIAL SYSTEM

	GEN7 Serial	
Qty		
1	**GEN7-TMR**	Gen7 Timer
1	**R-920-055**	Power Supply – UL Type A (US & Canada)
2	**R-600-302**	Laptop for user interface
Qty	***Floor plates & Hub***	
4	**TDPI-S2**	Titanium Starter Connect
3	**TDPI-BH3**	Titanium Bulkhead Connect- in deck
2	**TDPI-BH4**	Titanium Bulkhead Connect- on bulkhead order 1 per bulkhead
43	**TDPI-D**	Titanium Domed Deck Plate- intelligent
13	**R-530-085**	Tough gel – order one 2-part tube for every 4 deck nodes
Qty	***Wall plate***	
8	**R-1004-0549**	15x15 metal wall plate w/hardware- holds connect hubs (listed below)
6	**WPI-T1**	Wall plate- Titanium Timer Connect
6	**WPI-SC5**	Wall plate- Titanium Scoreboard Connect
1	**WPI-F4**	Wall plate – Fiber & Legacy Connect- YDS } both do not have to be
5	**WPI-485**	Wall plate – non-titanium 485 data for Gen7 Diving Use with R-015-674-xx cable
Qty	***Connection cables***	
2	**R-015-706-8**	8 meter starter cable (26 feet)
2	**R-015-707-8**	8 meter scoreboard cable (26 feet)
2	**R-015-711-4**	4 meter bulkhead cable (13 feet)
1	**R-015-715-8**	8 meter timer cable (26 feet)
Qty	***Cable installation***	
1	**TDPI-K1**	Kit- scoreboard bus head & tail node installation order 1 per scbd bus
1	**TDPI-K2**	Kit- timing bus head & tail node installation order 1 per timing bus
1000	**R-015-737**	Timing bus cable – 7-conductor sold in feet
1000	**R-015-726**	Scoreboard bus cable – 4-conductor (2 pair) sold in feet

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Verify that all work by others, related to this section, is installed.

B. Carefully examine all the construction documents that affect the work of this section.

C. Prior to starting work, notify the Architect and General Contractor of any defects requiring correction.

D. Protect other materials and installed work against damage while completing work in this section.

3.2 INSTALLATION

A. Furnish and install all custom cables, connecters, scoreboard mounting brackets, and fasteners.

B. Provide scaffolding and labor for mounting scoreboard and pulling cables.

C. Furnish and install equipment in accordance with the manufacturers drawings and instructions.

D. Provide scoreboard mounting, all timing system cable terminations, system checkout, and local operator training at time of installation. Training shall consist of two 8-hour day sessions and attendance at the 1st meet to provide system support.

E. Furnish as-built drawings precisely locating all items.

F. Wiring and grounding shall be installed in strict accordance with the latest edition of the National Electric Code – Article 680.

END OF SECTION

RABA KISTNER

GEOTECHNICAL ENGINEERING STUDY

FOR

PROPOSED CITY OF PHARR AQUATIC FACILITY
PHARR, HIDALGO COUNTY, TEXAS

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Project No. AMA19-006-00
March 6, 2019

Mr. Omar Anzaldua, Jr., P.E., CFM, PMP
City Engineer
City of Pharr
118 S. Cage Boulevard
Pharr, Texas 78577

Re: Geotechnical Engineering Study
Proposed City of Pharr Aquatic Facility
Near the Northwest Corner to the Intersection of
W. Sioux Road and U.S. Expressway 281
Pharr, Hidalgo County, Texas

Dear Mr. Anzaldua:

RABA KISTNER Consultants, Inc. (RKCI) is pleased to submit the report of our Geotechnical Engineering Study for the above-referenced project. This study was performed in accordance with **RKCI** Proposal No. PMA19-010-00, dated January 28, 2019. Written authorization to proceed with this study was received by our office via electronic-mail attachment on Tuesday, January 29, 2019. Further, on the basis of our telephone conversation held with you on Thursday, January 31, 2019, we were asked to conduct two additional borings (one additional boring within the proposed building footprint area and one additional boring within the pavement area). Written authorization to proceed with this additional scope of service was received by our office via electronic-mail attachment on Friday, February 1, 2019, by mean of the *Amended Agreement Form-1*, dated January 31, 2019. The purpose of this study was to drill borings within the subject site, to perform laboratory testing on selected samples to classify and characterize subsurface conditions, and to prepare an engineering report presenting foundation and pavement recommendations and construction guidelines for the proposed aquatic facility.

The following report contains our foundation and pavement recommendations and considerations based on our current understanding of the finished floor elevations, design tolerances and structural and pavement loads. If any of these parameters change, then there may be alternatives for value engineering of the foundation systems, and **RKCI** recommends that a meeting be held with the City of Pharr (CLIENT) and the design team to evaluate these alternatives.

We appreciate the opportunity to be of professional service to you on this project. Should you have any questions about the information presented in this report, please call. We look forward to assisting the City of Pharr during the construction of the project by conducting the construction materials engineering and testing services (quality assurance program).

Very truly yours,

RABA KISTNER CONSULTANTS, INC.

Saul Cruz, EIT
Graduate Engineer

Katrin M. Leonard, P.E.
Associate

STATE OF TEXAS
KATRIN M. LEONARD
95810
LICENSED PROFESSIONAL ENGINEER
March 6, 2019

Attachments

SC/KML

Copies Submitted: Above (1)
The Warren Group Architects, Inc. (1)
Solorio, Inc. (1)

GEOTECHNICAL ENGINEERING STUDY

For

PROPOSED CITY OF PHARR AQUATIC FACILITY
NEAR THE NORTHWEST CORNER OF THE INTERSECTION OF
W. SIOUX ROAD AND U.S. EXPRESSWAY 281
PHARR, HIDALGO COUNTY, TEXAS

Prepared for

CITY OF PHARR
Pharr, Texas

Prepared by

RABA KISTNER CONSULTANTS, INC.
McAllen, Texas

PROJECT NO. AMA19-006-00

March 6, 2019

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ATTACHMENTS

INTRODUCTION

RABA KISTNER Consultants, Inc. (RKCI) has completed the authorized subsurface exploration and foundation and pavement recommendations for the proposed City of Pharr Aquatic Facility to be located near the northwest corner of the intersection of W. Sioux Road and U.S. Expressway 83 in Pharr, Hidalgo County, Texas. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendations for foundation and pavement design and construction considerations.

PROJECT DESCRIPTION

We understand that the proposed project consists of the design and construction of a single-story, irregularly-shaped, about 23,350 ft^2 aquatics building (including a competition pool, a diving pool, and a Jacuzzi) and its associated parking and driveway areas. The proposed aquatics facility is planned to be located within an undeveloped tract of land, situated near the northwest corner of the intersection of W. Sioux Road and U.S. Expressway 83 in Pharr, Hidalgo County, Texas. The proposed aquatics building is expected to create relatively moderate loads to be carried by the foundation system, which is anticipated to consist of a shallow or deep foundation system. The proposed pavement areas are planned to consist of either a flexible (asphalt) and/or rigid (concrete) pavement systems.

For purposes of this geotechnical engineering report, the finished grade elevation (FGE) of the proposed building was assumed to be 18 inches above the ground surface elevation existing at the time of our study, since no site grading information was provided to us at the time of the preparation of this report.

Further, on the basis of the information provided to us by Ms. Maritza Cardenas, RID, NCIDQ, Project Manager with The Warren Group Architects, Inc., the project's architectural firm via electronic-mail transmittal on Tuesday, February 26, 2019, we understand that about 13 school buses a day, for five days a week, are anticipated to service the aquatic facility, for a 20-year design period.

LIMITATIONS

This engineering report has been prepared in accordance with accepted Geotechnical Engineering practices in the region of South Texas for the use of City of Pharr (CLIENT) and its representatives for design purposes. This report may not contain sufficient information for purposes of other parties or other uses and is not intended for use in determining construction means and methods.

The recommendations submitted in this report are based on the data obtained from 25 borings drilled within the subject site, our understanding of the project information provided to us by the CLIENT, and the assumption that site grading will result in only minor changes in the topography existing at the time of our study. If the project information described in this report is incorrect, is altered, or if new information is available, we should be retained to review and modify our recommendations.

This report may not reflect the actual variations of the subsurface conditions across the subject site. The nature and extent of variations across the subject site may not become evident until construction commences. The construction process itself may also alter subsurface conditions. If variations appear

evident at the time of construction, it may be necessary to reevaluate our recommendations after performing on-site observations and tests to establish the engineering impact of the variations.

The scope of our Geotechnical Engineering Study does not include an environmental assessment of the air, soil, rock, or water conditions either on or adjacent to the subject site. No environmental opinions are presented in this report. **RKCI**'s scope of work does not include the investigation, detection, or design related to the prevention of any biological pollutants. The term "biological pollutants" includes, but is not limited to, mold, fungi, spores, bacteria, and viruses, and the byproduct of any such biological organisms.

If final grade elevations are significantly different from the grades existing at the time of our study (more than plus or minus 1 ft), our office should be informed about these changes. If needed and/or desired, we will reexamine our analyses and make supplemental recommendations.

BORINGS AND LABORATORY TESTS

Subsurface conditions at the subject site were evaluated by conducting 25 borings as shown in the following table:

Proposed Structure		Number of Borings	Depth, ft.*	Boring Identification
Aquatics Building	Main Pool and Building Areas	9	20	B-8 through B-12, B-17, B-20, B-21, and B-23
	Competition Pool Area	2	30	B-14 and B-16
		2	20	B-13 and B-15
	Diving Pool Area	1	30	B-19
		1	15	B-18
	Jacuzzi Area	1	15	B-22
Parking and Driveway Areas		4	10	B-1, B-5, B-6, and B-25
		5	5	B-2 through B-4, B-7, and B-24

* below the ground surface elevations existing at the time of our study

The borings (designated as "B-") were drilled on February 8 through February 11, 2019, at the locations shown on the Boring Location Map, Figure 1. The boring locations are approximate and were located in the field by an **RKCI** representative based on the boring locations map titled "Aquatic Facility – Proposed Bore Locations," provided to us by the CLIENT via electronic-mail attachment on Wednesday, January 20, 2019. The borings were drilled to the depths shown in the previous table, below the ground surface elevations existing at the time of our study using a truck-mounted, rotary-drilling rig. The borings were drilled utilizing straight flight augers and were backfilled with the auger cuttings following completion of each day's drilling operations. During the drilling operations, Split-Spoon (with Standard Penetration Test, SPT) and Shelby-tube samples were collected.

The SPT and ST samples were obtained in accordance with accepted standard practices and the penetration test results are presented as "blows per foot" on the boring logs. Representative portions of the samples were sealed in containers to reduce moisture loss, labeled, packaged, and transported to our laboratory for subsequent testing and classification.

In the laboratory, each sample was evaluated and visually classified by a member of our Geotechnical Engineering staff in general accordance with the Unified Soil Classification System (USCS). The geotechnical engineering properties of the strata were evaluated by the following laboratory tests: natural moisture content, Atterberg limits, an unconfined compressive test, a dry unit weight test, a corrosivity test (including electrical resistivity, pH, and sulfate and chloride content determinations), and percent passing a No. 200 sieve determinations.

The laboratory tests are presented in graphical or numerical form on the boring logs illustrated on Figures 2 through 26. A key to the classification of terms and symbols used on the logs is presented on Figure 27. The results of the laboratory and field testing are also tabulated on Figure 28 for ease of reference.

The corrosion potential of the subsurface soils to concrete and uncoated steel was evaluated by conducting laboratory analyses (pH, electrical resistivity, sulfate content and chloride content determinations) on a single soil sample obtained near Boring B-14, from an approximate depth of 1 ft below the ground surface elevation existing at the time of our study.

SPT results are noted as "blows per ft" on the boring logs and on Figure 28, where "blows per ft" refers to the number of blows by a falling 140-lb (pound) hammer required for 1 ft of penetration into the subsurface materials.

Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the written request of the CLIENT.

GENERAL SITE CONDITIONS

SITE DESCRIPTION

The subject site for the proposed aquatic facility is planned to be located within an undeveloped tract of land, situated near the northwest corner of the intersection of W. Sioux Road and U.S. Expressway 83 in Pharr, Hidalgo County, Texas. At the time of our field activities, the project site can be described as an undeveloped tract of land. In general, the topography at the subject site is relatively flat, with a visually estimated vertical relief of about 3 ft across the site. Surface drainage is estimated to be very poor. The subject site is bounded to the north by an existing commercial facility; to the east by U.S. Expressway 83 (Southbound Frontage Road); to the south by W. Sioux Road; and to the west by an undeveloped tract of land.

SITE GEOLOGY

A cursory review of the Geologic Atlas of Texas, (McAllen-Brownsville Sheet, dated 1976), published by the Bureau of Economic Geology at The University of Texas at Austin, indicates that the subject site appears to be located within the Beaumont Formation consisting of clays, silts, sands, and gravel deposits of the Quaternary epoch (Pleistocene Period).

According to the Soil Survey of Hidalgo County, Texas, published by the United States Department of Agriculture - Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station, the project site appears to be located within the Hidalgo soil association consisting of deep, moderately permeable soils that typically have a dark grayish brown sandy clay loam surface layer. The corresponding soil symbol appears to be 28, Hidalgo sandy clay loam, saline, 0 to 1 percent slopes.

SEISMIC COEFFICIENTS

Based upon a review of Section 1613 *Earthquake Loads – Site Ground Motion* of the 2012 International Building Code (IBC), the following information has been summarized for seismic considerations associated with this site.

- Site Class Definition (Chapter 20 of the American Society of Civil Engineers [ASCE] 7): **Class C**. Based on the soil borings conducted for this investigation, the upper 100 feet of soil may be characterized as a very dense soil and soft rock.
- Risk-Targeted Maximum Considered Earthquake Ground Motion Response Accelerations for the Conterminous United States of 0.2-Second Spectral Response Acceleration (5% Of Critical Damping) (Figure 1613.3.1(1)): **S_s = 0.041g**. Note that the value taken from Figure 1613.3.1(1) is based on Site Class B and is adjusted per 1613.3.3 below.
- Risk-Targeted Maximum Considered Earthquake Ground Motion Response Accelerations for the Conterminous United States of 1-Second Spectral Response Acceleration (5% Of Critical Damping) (Figure 1613.3.1(2)): **S_1 = 0.014g**. Note that the value taken from Figure 1613.3.1(2) is based on Site Class B and is adjusted per 1613.3.3 below.
- Values of Site Coefficient (Table 1613.3.3(1)): **F_a = 1.6**
- Values of Site Coefficient (Table 1613.3.3(2)): **F_v = 2.4**

The Maximum Considered Earthquake Spectral Response Accelerations are as follows:

- 0.2 sec, adjusted based on equation 16-37: **S_{ms} = 0.066g.**
- 1 sec, adjusted based on equation 16-38: **S_{m1} = 0.034g.**

The Design Spectral Response Acceleration Parameters are as follows:

- 0.2 sec, based on equation 16-39: **S_{DS} = 0.044g.**
- 1 sec, based on equation 16-40: **S_{D1} = 0.023g.**

Based on the parameters listed above, the critical nature of the structure, Tables 1613.3.5(1) and 1613.3.5(2), and calculations performed using a Java program titled, "Seismic Hazard Curves and Uniform

Hazard Response Spectra" published by the United States Geological Survey (USGS) website, the Seismic Design Category for both short period and 1 second response accelerations is **A**. As part of the assumptions required to complete the calculations, a Risk Category of **II** was selected.

STRATIGRAPHY

On the basis of the borings, the subsurface stratigraphy at this site can be described by a single generalized stratum with similar physical and engineering characteristics. This stratum consists of dark brown to brown to light brown, stiff to hard, sandy lean clay soils, lean clay soils with sand, sandy fat clay soils, fat clay soils with sand, and fat clay soils. This layer was noted in the borings from the ground surface elevations existing at the time of our study, extending down to at least the termination depths of the borings. Measured moisture contents range from about 10 to 27 percent. This stratum is classified as moderately plastic to highly plastic, with measured plasticity indices ranging from 16 to 42 percent. Percent passing a No. 200 sieve tests demonstrate percent fines ranging from 55 to 86 percent. Undrained shear strength values ranging from about 1.2 to 3.2 tons per square foot (tsf) were measured based on the unconfined compression strength tests. Dry unit weight values ranging from about 105 to 114 pounds per cubic foot (pcf) were measured for this layer. SPT N-values ranging from 8 blows to 48 blows per foot of penetration were measured for this stratum. These soils are classified as CL soils and/or CH soils in general accordance with the USCS.

CORROSIVITY POTENTIAL

The corrosivity characteristics of the upper subsurface soils within the subject site was preliminarily evaluated using a pH test, an electrical resistivity test, a sulfate content test, and a chloride content test. These tests were conducted on a single composite soil sample obtained near Boring B-14 from the approximate depth presented on the following table. Results are summarized in the following table:

Composite Sample Location	Approximate Depth, ft *	Electrical Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (mg/kg)
Near Boring B-14	1	1,104	7.92	100	7.53

*below the ground surface elevations existing at the time of our study

The results of the laboratory electrical resistivity tests conducted on the composite soil sample indicate a highly corrosive potential for corrosion to buried metals. Laboratory chloride content test results indicated a moderate corrosive potential for corrosion to buried metals. According to the American Concrete Institute (ACI) document titled "Guide to Durable Concrete" (ACI 201), concrete usually provides protection against rusting of adequately embedded steel because of the highly alkaline environment of the Portland cement paste. The adequacy of that protection is dependent upon the amount of the concrete cover, the quality of the concrete, the details of the construction, and the degree of exposure to chlorides from concrete-making components and external sources. It is recommended that no chloride-containing admixtures be utilized in the concrete mixes for this project. Consideration should also be given to implementing corrosion protection measures for buried metals in direct contact with the soil, such as coating metal structural elements, pipings, and/or fittings. The pH laboratory test results indicate that the surficial native soils are moderately alkaline. On the basis of the laboratory sulfate content test results, the

subsurface soils appear to result in a mild exposure of concrete to corrosion. According to these laboratory test results, the native soils result in a Class 0 severity of potential exposure of concrete to corrosion. The ACI 201 Guide indicates no special cementitious material requirements for sulfate resistance for a Class 0 exposure.

GROUNDWATER

Groundwater was observed only in Borings B-14, B-16, B-19, and B-23 at depths ranging from about 18-1/2 ft to 19 ft below the ground surface elevation existing at the time of our study. The boreholes were left open for the duration of the field exploration phase to allow monitoring of water levels. It is possible for groundwater to exist beneath this site at shallower depths on a transient basis following periods of precipitation. Fluctuations in groundwater levels occur due to variations in rainfall and surface water run-off. The construction process itself may also cause variations in the groundwater level.

Based on the findings in the borings and on our experience in this region, we believe that groundwater seepage encountered during site earthwork activities and shallow foundation construction may be controlled using temporary earthen berm and conventional sump-and-pump dewatering methods.

FOUNDATION ANALYSIS

EXPANSIVE, SOIL-RELATED MOVEMENTS

The anticipated ground movements due to swelling of the underlying soils at the site were estimated for slab-on-grade construction using the empirical procedure, Texas Department of Transportation (TxDOT) Tex-124-E, Method for Determining the Potential Vertical Rise (PVR). PVR values on the order of about 1-3/4 inches were estimated for the stratigraphic conditions encountered in the borings. The PVR values were estimated using a surcharge load of 1 pound per square inch (psi) for the concrete slab and dry moisture conditions within the regional zone of seasonal moisture variation.

The TxDOT method of estimating expansive, soil-related movements is based on empirical correlations utilizing the measured plasticity indices and assuming typical seasonal fluctuations in moisture content. If desired, other methods of estimating expansive, soil-related movements are available, such as estimations based on swell tests and/or soil-suction analyses. However, the performance of these tests and the detailed analysis of expansive, soil-related movements were beyond the scope of the current study. It should also be noted that actual movements can exceed the estimated PVR values due to isolated changes in moisture content (such as due to leaks, landscape watering, etc.) or if water seeps into the soils to greater depths than the assumed active zone depth due to deep trenching or excavations.

PVR REDUCTION RECOMMENDATIONS

As stated previously, for purposes of this geotechnical engineering report, the FGE of the proposed aquatic building was assumed to be 18 inches above the ground surface elevation existing at the time of our study, since no site grading information was provided to us at the time of the preparation of this report.

To reduce expansive, soil-related movements in at-grade construction to about 3/4 inch, we recommend removing the upper 42 inches (3-1/2 ft) of the existing subgrade clay soils and replacing them with properly-compacted, suitable, select fill materials within the aquatic building's footprint area up to its assumed FGE of about 18 inches above the ground surface elevations existing at the time of our study. This will result in a difference in elevation from the ground surface elevation existing at the time of our study to the top of the fill material within the building footprint of 1-1/2 ft. In addition, this difference in elevation will promote good drainage away from the structure.

Keep in mind that the estimated PVR values are computed based on the recommendations for the selection and placement of suitable, select fill materials which are addressed in the *Foundation Construction Considerations* section of the report. It should be noted that once site grading plans are determined for the project, the PVR and settlement reduction recommendation presented previously may need to be revised.

Drainage Considerations Overexcavation and select fill replacement is selected as a method to reduce the potential for expansive, soil-related movements at any site, considerations of surface and subsurface drainage may be crucial to construction and adequate foundation performance of the soil-supported building. Filling excavations in relatively impervious clay soils with relatively pervious select fill material creates a "bathtub" beneath the building, which can result in ponding or trapped water within the fill unless good surface and subsurface drainage is provided.

Water entering the fill surface during construction or entering the fill exposed beyond the building lines after construction may create problems with fill moisture control during compaction and increased access for moisture to the underlying expansive clays both during and after construction.

Several surface and subsurface drainage design features and construction precautions can be used to limit problems associated with fill moisture. These features and precautions may include, but are not limited to, the following:

- Installing berms or swales on the uphill side of the construction areas to divert surface runoff away from the excavation/fill areas during construction;
- Sloping of the top of the subgrade with a minimum downward slope of 1.5 percent out to the base of a dewatering trench located beyond the structure's perimeter;
- Sloping the surface of the fill during construction to promote runoff of rain water to drainage features until the final lift is placed;
- Sloping of a final, well-maintained, impervious clay or pavement surface (downward away from the proposed structure) over the select fill material and any perimeter drain extending beyond the building lines, with a minimum gradient of 6 in. in 5 ft;
- Constructing final surface drainage patterns to prevent ponding and limit surface water infiltration at and around the structure's perimeter;
- Locating the water-bearing utilities, roof drainage outlets, and irrigation spray heads outside of the select fill and perimeter drain boundaries; and
- Raising the elevation of the ground level floor slab.

Details relative to the extent and implementation of these considerations must be evaluated on a project-specific basis by all members of the project design team. Many variables that influence fill drainage considerations may depend on factors that are not fully developed in the early stages of design. For this reason, drainage of the fill should be given consideration at the earliest possible stages of the project.

FOUNDATION RECOMMENDATIONS

The following recommendations are based on the data obtained from our field and laboratory studies, our past experience with geotechnical conditions similar to those at this site, the project information provided to us by others, and our engineering design analyses. The following foundation recommendations are available to support the proposed aquatic building:

- A shallow foundation system, consisting of conventional spread and/or continuous footings with a fill-supported concrete floor slab; or
- A deep foundation system, consisting of drilled, straight-shaft piers.

SITE GRADING

Site grading plans can result in changes in almost all aspects of foundation recommendations. We have prepared the foundation recommendations based on the assumption that the FGE will be about 18 inches above the ground surface elevation existing at the time of our study and the stratigraphic conditions encountered in the borings at the time of our study. If site grading plans differ from the assumed finished grades, we must be retained to review the site grading plans prior to bidding the project for construction. If needed and/or if desired, we will reexamine our analyses and make supplemental recommendations.

SHALLOW FOUNDATION

The proposed aquatic building may be founded on conventional spread and/or continuous footing foundation in conjunction with a fill-supported concrete floor slabs, provided that the shallow foundation system can be designed to withstand the anticipated soil-related movements (see the *Foundation Analyses* section of this report) without impairing either the structural or the operational performance of the proposed aquatic building.

Allowable Soil-Bearing Capacity

Shallow foundation founded on new, properly-compacted, suitable, select fill materials and/or native soils may be proportioned using the design parameters shown in the following table.

Minimum depth below final grade:	24 in.
Minimum beam width:	12 in.
Maximum allowable soil-bearing pressure for continuous footings-grade beams:	1,900 psf
Maximum allowable soil-bearing pressure for spread footings-widened beams:	2,300 psf

where psf = pounds per square feet.

The maximum allowable soil-bearing pressures presented previously will provide a factor of safety of about 3 with respect to the measured soil shear strengths, provided that the subgrade is prepared in accordance with the recommendations outlined in the *Site Preparation* subsection of the *Foundation Construction Considerations* section of this report, and that the site improvement procedure included in the *PVR Reduction Recommendations* subsection of the *Foundation Analyses* section of this report is implemented. Provided that the site improvement procedure recommended in this report is properly-implemented, then it is anticipated that total settlements will be in the order of about 1/2 inch. Differential settlements typically are estimated to be about 1/2 the total estimated settlement for most subsurface conditions.

Furthermore, the design parameters presented on the previous table are contingent upon the fill materials being selected and placed in accordance with the recommendations presented in the *Select Fill* subsection of the *Foundation Construction Considerations* section of this report. Should select fill selection and placement differ from the recommendations presented herein, **RKCI** should be informed of the deviations in order to reevaluate our recommendations and design criteria.

FOUNDATIONS FOR THE PROPOSED UNDERGROUND POOL STRUCTURES

On the basis of the subsurface conditions encountered at the time of our field drilling activities, our field and laboratory testing, and our engineering analyses, the recommended maximum allowable soil-bearing pressure for the underground pool structures are as shown on the following table:

Structure	Bearing Depth Range*	Maximum Allowable Soil-Bearing Pressure, psf
Underground Pools	3 ft to 5 ft	2,500
	5 ft to 10 ft	3,750
	10 ft to 20 ft	4,000

* below the ground surface elevations existing at the time of our study.

The maximum allowable soil-bearing pressure presented previously will provide a factor of safety of 3 with respect to the measured soil shear strength, provided that the subgrades are prepared in accordance with the recommendations outlined in the *Site Preparation* subsection of the *Foundation Construction Considerations* of this report.

Wire Reinforcement Institute (WRI) Criteria

The slab-on-fill shallow foundation may also be designed using WRI design criteria. On the basis of the subsurface stratigraphy encountered, a general effective plasticity index for the proposed aquatic building of 34 percent and a climatic rating (C_w) of 15 should be utilized for the design of the aquatic building's foundation.

DRILLED, STRAIGHT-SHAFT PIERS, DEEP FOUNDATIONS

Alternatively, drilled, straight-shaft piers may be considered for the proposed classroom building addition. We recommend that piers extend to a minimum depth of 12 ft below the ground surface elevation existing at the time of our study or below the final ground surface, whichever is greater. Pier depths should be increased as required to develop sufficient resistance to support the anticipated structural loads. Allowable unit capacities have been calculated for different depths of drilled, straight-shaft piers supporting the proposed aquatic building. These unit capacities are based on the results of the field and laboratory tests conducted on soil samples obtained from the borings drilled within the site. The piers may be designed as both end bearing units and as friction units utilizing the maximum allowable end-bearing pressures and the allowable side shear resistance values tabulated in the following tables.

Approximate Depth (ft) *	Maximum Allowable End-Bearing Pressure (ksf)
12 to 15	7.0
16 to 20	4.8
21 to 25	9.5

*below the ground surface elevations existing at the time of our study.

Approximate Depth Range (ft) *	Allowable Side Shear Resistance (ksf)
0 to 8	0
8 to 15	0.60
15 to 20	0.40
20 to 25	0.80

*below the ground surface elevations existing at the time of our study.

The side shear resistance values presented above should be used for the portion of the shaft extending below a depth of 8 ft. If the drilled, straight-shaft piers are designed as both end bearing units and as friction units, the side shear resistance value should be neglected along the portion of the shaft located one shaft diameter from the bottom of the pier, in order to proportion the drilled piers for axial compression. The allowable values for end bearing and side shear resistance were evaluated using factors of safety of 3 and 2, respectively, with respect to the measured soil shear strength. Based on the 30-ft

maximum depth of exploration, pier depths should not exceed a depth of 25 ft below the ground surface elevations existing at the time of our study.

Pier Shafts

The pier shafts will be subject to potential uplift forces if the surrounding expansive soils within the active zone are subjected to alternate drying and wetting conditions. The maximum potential uplift force acting on the shaft may be estimated by:

$F_u = 30 * D$ (considering the existing soil conditions)

$F_u = 17 * D$ (considering the implementation of the site improvement to reduce the estimated PVR related values to about 3/4 inch)

where:

F_u = uplift force in kips; and
D = diameter of the shaft in feet.

It is recommended that the pier shafts be a minimum of 24 inches in diameter to facilitate reinforcing steel placement and pier shaft observation prior to concrete placement.

Allowable Uplift Resistance

Resistance to uplift forces exerted on the drilled, straight-shaft piers will be provided by the sustained compressive axial force (dead load) plus the allowable uplift resistance provided by the soil. The resistance provided by the soil depends on the shear strength of the soils adjacent to the pier shaft and below the depth of the active zone. The allowable uplift resistance values provided by the soils at this site are tabulated on the following table. These values were evaluated using a factor of safety of 2.

Approximate Depth Range* (ft)	Allowable Uplift Resistance (ksf)
0 to 8	0
8 to 15	0.40
15 to 20	0.25
20 to 25	0.50

*below the ground surface elevations existing at the time of our study.

Reinforcing steel will be required in each pier shaft to withstand a net force equal to the uplift force minus the uplift resistive force and the sustained compressive load carried by the pier. We recommend that each pier be reinforced to withstand this net force or an amount equal to 1 percent of the cross-sectional area of the shaft, whichever is greater.

Pier Spacing

Where possible, we recommend that the piers be spaced at a center-to-center distance of at least three bell diameters on-center. Such spacing will not require a reduction in the load carrying capacity of the individual piers.

If design and/or construction restraints require that piers be spaced closer than the recommended three shaft diameters, **RKCI** must re-evaluate the allowable bearing capacities presented above for the individual piers. Reductions in load carrying capacities may be required depending upon individual loading and spacing conditions.

GRADE BEAMS

For the structure being considered, we recommend that the grade beams, if any, interconnecting the piers be ground-supported on properly-compacted, suitable select fill materials, but designed to span the piers.

FLOOR SLABS

For the structure addition being considered, the floor slabs may be ground supported on properly-compacted, suitable, select fill materials, provided that the anticipated movements discussed under the *Expansive Soil-Related Movements* section of this report will not impair the performance of the floor, frame, or roof systems.

LATERAL RESISTANCE

Resistance to lateral loads and the expected pier behavior under the applied loading conditions will depend not only on the subsurface conditions, but also on the loading conditions, the pier type and size(s), and the engineering properties of the pier. Once the structural loadings are known, as well as the pier sizes and properties, the piers should be analyzed to determine the resulting lateral deflections, maximum bending moments, and ultimate bending moments. This type of analysis is typically performed utilizing a computer analysis program and usually requires a trial and error procedure to appropriately size the piers and meet project tolerances.

To assist the design engineer in this procedure, we are providing the soil parameters tabulated in the following table for use in analysis. These parameters are in accordance with the input requirements of one of the more commonly used computer programs for laterally-loaded piles, the “L-Pile Plus” program. If a different program is used for analysis, different parameters may be required and different limitations may be required than what was assumed in selecting the parameters given on the table tabulated below. Thus, if a program other than “L-Pile Plus” is used, **RKCI** must be notified of the analysis method and the required soil parameters, so that we can review and revise our recommendations, if required.

The soil-related parameters required for input into the “L-Pile Plus” program are summarized in the following table:

Soil Type	Approximate Depth Range (ft) *	c, tsf	ϕ (°)	ε_{50}	k_s, (pci)	k_c, (pci)	γ, (pcf)
Clay Soils (Above the Groundwater Table)	0 to 15	1.2	0	0.005	1,000	400	120
Clay Soils (Above the Groundwater Table)	15 to 20	0.8	0	0.007	500	200	115
Clay Soils (Below the Groundwater Table)	20 to 25	1.5	0	0.005	1,000	400	57

* below the ground surface elevations existing at the time of our study.

Where:

c = undrained shear strength
ϕ = angle of internal friction
ε_{50} = strain at 50 percent
k_s = horizontal modulus of subgrade reaction (static)
k_c = horizontal modulus of subgrade reaction (cyclic)
γ = density (effective unit weight)

The values presented above for subgrade modulus are based on recommended values for the "L-Pile Plus" computer program for the strength of the subsurface conditions encountered in the borings, and are not necessarily based on laboratory test results.

The parameters presented previously **do not** include factors of safety. Consequently, it is recommended that a factor of safety of at least 2 be introduced to the analysis by doubling the applied lateral loads and moments.

LATERAL EARTH PRESSURES

Equivalent fluid density values for computation of lateral soil pressures acting on the retaining wall structures were evaluated for various types of backfill materials that may be placed behind the retaining wall structures. The table below presents at-rest, active, and passive earth pressure coefficients for various backfill soils. The at-rest pressures are recommended for cases where the wall unit will experience little yield.

Soil Type	Estimated Total Unit Weight (pcf)	Lateral Earth Pressure Coefficients			Equivalent Fluid Unit Weight (pcf)			Internal Friction Angle, Φ (°)
		At-Rest (K_0)	Active (K_a)	Passive (K_p)	At-Rest	Active	Passive	
Washed Gravel	135	0.45	0.29	3.40	60	40	460	33
Crushed Limestone	145	0.38	0.24	4.20	55	35	610	38
Clean Sand	120	0.50	0.33	3.00	60	40	360	30
Pit Run Clayey Gravel or Sands	135	0.48	0.32	3.12	65	45	425	31
Clays	120	0.74	0.59	1.70	90	70	205	15

The values tabulated above under "Active Condition" pertain to flexible retaining walls free to tilt outward as a result of lateral earth pressures. For rigid, non-yielding walls the values under "At-Rest Condition" should be used. The "Passive Condition" would pertain to a condition where the wall is gradually pushed into the soil mass.

Backfill Compaction

Placement and compaction of backfill behind the below-grade walls will be critical, particularly at locations where deep backfill will support adjacent near-grade foundations and/or flatwork. If the backfill is not properly compacted in these areas, the adjacent foundations/flatwork can be subject to settlement.

To reduce potential settlement of adjacent foundations/flatwork, the backfill materials should be placed and compacted as recommended in the *Select Fill* subsection of the *Foundation Construction Considerations* section of this report. Each lift or layer of the backfill should be tested during the backfilling operations to document the degree of compaction. Within at least a 5-ft zone of the walls, we recommend that compaction be accomplished using hand-guided compaction equipment capable of achieving the maximum dry density in a series of 3 to 5 passes.

Waterproofing

Consideration may also be given to applying waterproofing coatings to any subfloor walls. Waterproofing of the subfloor walls for capillary moisture is often accomplished by painting the wall exteriors with a bituminous material. For greater seepage protection, membrane waterproofing would be required. Based on our observations of groundwater conditions at this site, it appears that application of a bituminous material will provide adequate waterproofing for the below-grade walls.

AREA FLATWORK

It should be noted that ground-supported flatwork such as walkways, driveways, courtyards, sidewalks, etc., will be subject to the same magnitude of potential soil-related movements as discussed previously (see *Expansive, Soil-Related Movements* subsection of the *Foundation Analyses* section of this report) for this site. Thus, where these types of elements abut rigid building foundation or isolated structure, differential movements should be anticipated. As a minimum, we recommend that flexible joints be provided where such elements abut the main structure to allow for differential movement at these locations. Where the potential for differential movement is objectionable, it may be beneficial to consider methods of reducing anticipated movements to match the adjacent building's performance.

FOUNDATION CONSTRUCTION CONSIDERATIONS

SITE DRAINAGE

Drainage is an important key to the successful performance of any foundation. Good surface drainage should be established prior to and maintained after construction to help prevent water from ponding within or adjacent to the building foundation and to facilitate rapid drainage away from the building foundation. Failure to provide positive drainage away from the structure can result in localized differential vertical movements in soil the supported foundation and floor slab.

Current ordinances, in compliance with the Americans with Disabilities Act (ADA), may dictate maximum slopes for walks and drives around and into new buildings. These slope requirements can result in drainage problems for ground-supported building. We recommend that, on all sides of the proposed building foundation, the maximum permissible slope be provided away from the proposed structure.

Also to help control drainage in the vicinity of the structure, we recommend that roof/gutter downspouts and landscaping irrigation systems not be located adjacent to the structure foundation. Where a select fill overbuild is provided outside of the floor slab/foundation footprint, the surface should be sealed with an impermeable layer (pavement or clay cap) to reduce infiltration of both irrigation and surface waters. Careful consideration should also be given to the location of water bearing utilities, as well as to provisions for drainage in the event of leaks in water bearing utilities. All leaks should be immediately repaired.

Other drainage and subsurface drainage issues are discussed in the *Expansive Soil-Related Movements* section of this report.

SITE PREPARATION

The building area and all areas to support select fill should be stripped of all vegetation and/or organic topsoil down to a minimum depth of 8 inches and extending a minimum of 5 ft beyond the structure's footprint area. Further, we recommend that the site improvement procedures presented in the *PVR Reduction Recommendations* section of this report be implemented to reduce the soil-related movements to about 3/4 inch.

Exposed subgrades should be thoroughly proofrolled in order to locate and densify any weak, compressible zones. A minimum of 5 passes of a fully-loaded dump truck or a similar heavily-loaded piece of construction equipment should be used for planning purposes. Proofrolling operations should be observed by the Geotechnical Engineer or his/her representative to document subgrade conditions and preparation. Weak or soft areas identified during proofrolling should be treated with hydrated lime or Portland cement, or removed and replaced with a suitable, compacted select fill in accordance with the recommendations presented under the *Select Fill* subsection of this section of the report. If the treatment option is selected, the weak or soft areas may be mixed with hydrated lime or Portland cement down to a minimum depth of 8 inches in order to aid in drying the soils and develop a firm working surface. Proofrolling operations and any excavation/backfill activities should be observed by **RKCI** representatives to document subgrade preparation.

Upon completion of the proofrolling operations and just prior to fill placement or slab construction, the exposed subgrade should be moisture conditioned by scarifying to a minimum depth of 6 in. and recompacting to a minimum of 98 percent of the maximum density determined from the American Society for Testing and Materials (ASTM) D698, Compaction Test. The moisture content of the subgrade should be maintained within the range of optimum moisture content to three percentage points above the optimum moisture content until permanently covered.

SELECT FILL

Materials used as select fill for final site grading preferably should be crushed stone or gravel aggregate. We recommend that materials specified for use as select fill meet the TxDOT 2014 Standard Specification for Construction and Maintenance of Highways, Streets, and Bridges, Item 247, Flexible Base, Type A through Type E, Grades 1, 2, 3, and 5.

Alternatively, the following soils, as classified according to the USCS, may be considered satisfactory for use as select fill materials at this site: SC, GC, CL, and combinations of these soils. In addition to the USCS classification, alternative select fill materials shall have a maximum liquid limit of 40 percent, a plasticity index between 7 and 18 percent, and a maximum particle size not exceeding 4 inches or one-half the loose lift thickness, whichever is smaller. In addition, if these materials are utilized, grain size analyses and Atterberg Limits must be performed during placement at a minimum rate of one test each per 5,000 cubic yards of material due to the high degree of variability associated with pit-run materials.

If the above listed alternative materials are being considered for bidding purposes, the materials should be submitted to the Geotechnical Engineer for pre-approval a minimum of 10 working days or more prior to the bid date. Failure to do so will be the responsibility of the General Contractor. The General Contractor will also be responsible for ensuring that the properties of all delivered alternate select fill materials are similar to those of the pre-approved submittal. It should also be noted that when using alternative fill materials, difficulties may be experienced with respect to moisture control during and subsequent to fill placement, as well as with erosion, particularly when exposed to inclement weather. This may result in sloughing of beam trenches and/or pumping of the fill materials.

Soils classified as CH, MH, ML, SM, GM, OH, OL, and Pt under the USCS and not meeting the alternative select fill material requirements, are **not** considered suitable for use as select fill materials at this site. The on-site soils at this site are **not** considered suitable for use as select fill materials.

Select fill should be placed in loose lifts **not** exceeding 8 in. in thickness and compacted to at least 98 percent of the maximum dry density as determined by ASTM D698. The moisture content of the fill should be maintained within the range of two percentage points below the optimum moisture content to two percentage points above the optimum moisture content until the final lift of fill is permanently covered.

The select fill should be properly compacted in accordance with these recommendations and tested by **RKCI** personnel for compaction as specified.

SHALLOW FOUNDATION EXCAVATIONS

Shallow foundation excavations should be observed by the Geotechnical Engineer or his/her representative prior to placement of reinforcing steel and concrete. This is necessary to document that the bearing soils at the bottom of the excavations are similar to those encountered in the borings and that excessive soft materials and water are not present in the excavations. If soft soil pockets are encountered in the foundation excavations, they should be removed and replaced with a compacted non-expansive fill material or lean concrete up to the design foundation bearing elevation.

Disturbance from foot traffic and from the accumulation of excess water can result in losses in bearing capacity and increased settlement. If inclement weather is anticipated at the time construction, consideration should be given to protecting the bottoms of beam trenches by placing a thin mud mat (layer of flowable fill or lean concrete) at the bottom of trenches immediately following excavation. This will reduce disturbance from foot traffic and will impede the infiltration of surface water. All necessary precautions should be implemented to protect open excavations from the accumulation of surface water runoff and rain.

DRILLED PIERS

If implemented, drilled pier excavations must be examined by an **RKCI** representative who is familiar with the geotechnical aspects of the subsurface stratigraphy, the structural configuration, foundation design details, and assumptions prior to placing concrete. This is to observe that:

- The shaft has been excavated to the specified dimensions at the correct depth established by the previously mentioned criteria;
- The shaft has been drilled plumb within specified tolerances along its total length; and
- Excessive cuttings, buildup and soft, compressible materials have been removed from the bottom of the excavation.

Drilled pier excavation observations should be scheduled with the Geotechnical Engineer a minimum of 48 hours prior to pier drilling. Failure to do so will be the responsibility of the General Contractor.

Reinforcement and Concrete Placement

Reinforcing steel should be checked for size and placement prior to concrete placement. Placement of concrete should be accomplished as soon as possible after excavation to reduce changes in the moisture content or the state of stress of the foundation materials. Concrete should not be placed in the pier excavations without the approval of the Engineer. No foundation element should be left open overnight without concreting.

Temporary Casing

Groundwater was observed in Borings B-14, B-16, B-19, and B-23 at depths ranging from about 18-1/2 ft to 19 ft below the ground surface elevation existing at the time of our study. Groundwater seepage and/or side sloughing will be encountered at the time of construction, depending on climatic conditions prevalent at the time of construction. Therefore, we recommend that the bid documents require the foundation contractor to specify unit costs for different lengths of casing and/or slurry drilling techniques which will required.

EXCAVATION SLOPING AND BENCHING

Excavations that extend to or below a depth of 5 ft below construction grade shall require the General Contractor to develop a trench safety plan to protect personnel entering the trench or trench vicinity. The collection of specific geotechnical data and the development of such a plan, which could include designs for sloping and benching or various types of temporary shoring, are beyond the scope of the current study. Any such designs and safety plans shall be developed in accordance with current Occupational Safety and Health Administration (OSHA) guidelines and other applicable industry standards.

EXCAVATION EQUIPMENT

Excavations that extend to or below a depth of 5 ft below construction grade shall require the General Contractor to develop a trench safety plan to protect personnel entering the trench or trench vicinity. The collection of specific geotechnical data and the development of such a plan, which could include designs for sloping and benching or various types of temporary shoring, are beyond the scope of the current study. Any such designs and safety plans shall be developed in accordance with current Occupational Safety and Health Administration (OSHA) guidelines and other applicable industry standards.

UTILITIES

Utilities which project through slab-on-grade, slab-on-fill, “floating” floor slabs, or any other rigid unit should be designed with either some degree of flexibility or with sleeves. Such design features will help reduce the risk of damage to the utility lines.

Our experience indicates that significant settlement of backfill can occur in utility trenches, particularly when trenches are deep, when backfill materials are placed in thick lifts with insufficient compaction, and when water can access and infiltrate the trench backfill materials. The potential for water to access the backfill is increased where water can infiltrate flexible base materials due to insufficient penetration of

curbs, and at sites where geological features can influence water migration into utility trenches. It is our belief that another factor which can significantly impact settlement is the migration of fines within the backfill into the open voids in the underlying free-draining bedding material.

To reduce the potential for settlement in utility trenches, we recommend that consideration be given to the following:

- Backfill materials should be placed and compacted in controlled lifts appropriate for the type of backfill and the type of compaction equipment being utilized and backfilling procedures should be tested and documented.
- Curbs should be installed to a sufficient depth to reduce water infiltration beneath the curbs into the pavement flexible base materials (see also the *Foundation Analyses* section of this report).
- Consideration should be given to wrapping free-draining bedding gravels with a geotextile fabric (similar to Mirafi 140N or CONTECH C-Drain Geocomposite) to reduce the infiltration and loss of fines from backfill material into the interstitial voids in bedding materials.

PAVEMENT RECOMMENDATIONS

Recommendations for both flexible and rigid pavements for a 20-year design period are presented in this report. The CLIENT may select either pavement type depending on the performance criteria established for the proposed project. In general, flexible pavement systems have a lower initial construction cost as compared to rigid pavements. However, maintenance requirements over the life of the pavement are typically much greater for flexible pavements. This typically requires regularly scheduled observation and repair, as well as overlays and/or other pavement rehabilitation at approximately one-half to two-thirds of the design life. Rigid pavements are generally more "forgiving", and therefore tend to be more durable and require less maintenance after construction.

SUBGRADE CONDITIONS

A single generalized subgrade condition has been assumed for this site. The predominant subgrade soils used in developing the pavement sections for this project are the surficial plastic, clay soils. On the basis of our past experience with similar subsurface conditions in this area, a design CBR value of 3 was assigned to evaluate the pavement components. This design CBR value assumes that the subgrade soils will be prepared in accordance with the recommendations stated in the *Subgrade Preparation* subsection of the *Pavement Construction Guidelines* section of this report.

LIME TREATMENT OF SUBGRADE

The subgrade soils at this site are plastic and can be difficult to work with, particularly during periods of inclement weather. The strength properties of the plastic subgrade clays may be increased by treating the upper 8 inches with hydrated lime. A sufficient quantity of lime should be mixed with the subgrade soils to decrease the plasticity index of the soil-lime mixture to 18 or less and to increase the pH of the soil-lime mixture to at least 12.4. For estimating purposes, we recommend that 3 percent lime by weight be used

for lime treatment. For construction purposes, we recommend that the percent of hydrated lime treatment be determined by appropriate laboratory testing.

Typically, the concentration of soluble sulfate on soils becomes a concern when the concentration reaches about 3,000 ppm and higher. The sulfate concentration in soils may vary over short distances, and as such, additional testing is recommended at the time of construction to confirm the concentration of sulfates in the exposed subgrade soils within the subject pavement areas.

DESIGN INFORMATION

The following recommendations for the pavement sections are based on our past experience with similar subgrade soils; an assumed light-duty vehicular traffic loading; a heavy-duty traffic loading supplied by the project's architectural firm; an assumed CBR test value for the subgrade soils; and design procedures published by the American Association of State Highway and Transportation Officials (AASHTO). The pavement design and analyses performed are based directly on the 1993 and 1997 editions of the "Guide for the Design of Pavement Structure" by AASHTO.

The pavement systems for the proposed aquatic facility can be divided into two general areas, each with different loading conditions and performance criteria. These areas are:

- Automobile drives and parking lots (light vehicular traffic); and
- Driveways, bus lanes, and drive-in lanes (heavy vehicular traffic).

For a 20-year design period, Equivalent Single Axle Loads (ESAL's) were estimated for an assumed traffic loading of 1 tractor-trailer truck per day for the light vehicular traffic areas. This corresponds to about 17,500 ESAL's. For the heavy vehicular traffic areas, ESAL's were estimated for a heavy-duty traffic loading supplied by the project's architectural firm of 13 school buses a day, for five days a week, for a 20-year design period. This corresponds to about 108,500 ESAL's. It is recommended that the project Civil Engineer review the above-mentioned levels of traffic and design period to ensure that they are appropriate for the intended use of the proposed aquatic facility.

FLEXIBLE PAVEMENTS

The following equivalent flexible pavement sections are available for this site:

Pavement Section	LTS (in)	FBM (in.)	HMAC (in.)
Automobile Drives and Parking Lots (Light Duty)	8	6	2
Driveways, Bus Lanes, and Drive-in Lanes (Heavy Duty)	8	9	2-1/2

Where: LTS =Lime-Treated Subgrade
FBM = Flexible Base Material
HMAC = Hot-Mix Asphaltic Concrete Surface Course

Garbage Dumpsters

Where flexible pavements are constructed at any site, it is recommended that reinforced concrete pads be provided in front of and beneath trash receptacles. The dumpster trucks should be parked on the concrete pads when the receptacles are lifted. It is suggested that such pads also be provided in drives where the dumpster trucks make turns with small radii to access the receptacles. The concrete pads at this site should be a minimum of 6-1/2 inches thick and reinforced with conventional steel reinforcing bars, and underlain by 8 inches of lime-treated subgrade.

RIGID PAVEMENTS

The rigid pavement sections below are available for this site.

Pavement Area	Lime-Treated Subgrade (in.)	Reinforced Concrete (in.)
Automobile Drives and Parking Lots (Light Duty)	8	5-1/2
Driveways, Bus Lanes, and Drive-in Lanes (Heavy Duty)	8	6-1/2

We recommend that the concrete pavements be reinforced with welded wire mats or bar mats. As a minimum, the welded wire mats should be 6 x 6 in., W4.0 x W4.0, and the bar mats should be No. 3 reinforcing bars spaced 18 in. on center in both directions. The concrete reinforcing should be placed approximately 1/3 the slab thickness below the surface of the slab, but not less than 2 in. The reinforcing should not extend across expansion joints.

Joints in concrete pavements aid in the construction and control the location and magnitude of cracks. Where practical, lay out the construction, expansion, control and sawed joints to form square panels, but not to exceed American Concrete Institute (ACI) 302.69 Code recommendations. The ratio of slab length-to-width should not exceed 1.25. Recommended joint spacings are 15 ft longitudinal and 15 ft transverse.

All control joints should be formed or sawed to a depth of at least 1/4 the thickness of the concrete slab. Sawing of control joints should begin as soon as the concrete will not ravel, generally the day after placement. Control joints may be hand formed or formed by using a premolded filler. We recommend that all longitudinal and transverse construction joints be dowelled to promote load transfer. Expansion joints are needed to separate the concrete slab from fixed objects such as drop inlets, light standards and buildings. Expansion joint spacings are not to exceed a maximum of 75 ft and no expansion or construction joints should be located in a swale or drainage collection locations.

If possible, the pavement should develop a minimum slope of 0.015 ft/ft to provide surface drainage. Reinforced concrete pavement should cure a minimum of 7 days before allowing any traffic.

PAVEMENT CONSTRUCTION CONSIDERATIONS

SUBGRADE PREPARATION

Areas to support pavement should be stripped of all vegetation and/or organic topsoil down to a minimum depth of 8 inches and extend a minimum of 2 ft beyond the pavement perimeters. Upon completion of site stripping activities, the exposed subgrade should be thoroughly proofrolled in accordance with the *Site Preparation* subsection recommendations provided in the *Foundation Construction Considerations* section of this report. Likewise, upon completion of the proofrolling activities and just prior to select fill or flexible base placement, the exposed subgrade should be scarified and recompacted as recommended in such subsection.

DRAINAGE CONSIDERATIONS

As with any soil-supported structure, the satisfactory performance of a pavement system is contingent on the provision of adequate surface and subsurface drainage. Insufficient drainage which allows saturation of the pavement subgrade and/or the supporting granular pavement materials will greatly reduce the performance and service life of the pavement systems.

Surface and subsurface drainage considerations crucial to the performance of pavements at this site include (but are not limited to) the following:

1) Any known natural or man-made subsurface seepage at the site which may occur at sufficiently shallow depths as to influence moisture contents within the subgrade should be intercepted by drainage ditches or below grade French drains.
2) Final site grading should eliminate isolated depressions adjacent to curbs which may allow surface water to pond and infiltrate into the underlying soils. Curbs should completely penetrate flexible base materials and should be installed to sufficient depth to reduce infiltration of water beneath the curbs.
3) Pavement surfaces should be maintained to help minimize surface ponding and to provide rapid sealing of any developing cracks. These measures will help reduce infiltration of surface water downward through the pavement section.

ON-SITE CLAY FILL

The pavement recommendations presented in this report were prepared assuming that on-site soils will be used for site grading in the proposed pavement areas. If used, we recommend that on-site soils be placed in loose lifts not exceeding 8 in. in thickness and compacted to a minimum of 98 percent of the maximum dry density as determined from ASTM D698. The moisture content of the subgrade should be maintained within the range of two percentage points below the optimum moisture content to two percentage points above the optimum moisture content until permanently covered. We recommend that on-site fill materials be free of roots, vegetation, and/or other organic or degradable material. We also recommend that the maximum particle size not exceed 4 in. or one half the lift thickness, whichever is smaller.

SELECT FILL

If implemented, select fill materials utilized for achieving finished subgrade elevations in pavement areas should be in accordance with the *Select Fill* subsection recommendations provided in the *Foundation Construction Considerations* section of this report.

LIME TREATMENT OF SUBGRADE

Lime treatment of the subgrade soils should be in accordance with the TxDOT 2014 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, Item 260, Lime Treatment (Road-Mixed). Lime-treated subgrade soils should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content within the range of two percentage points below the optimum moisture content to two percentage points above the optimum moisture content as determined by ASTM D1557.

FLEXIBLE BASE COURSE

The flexible base course should consist of material conforming to TxDOT 2014 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Item 247, Flexible Base, Type A through Type E, Grades 1, 2, 3, and 5.

The flexible base course should be placed in lifts with a maximum compacted thickness of 8 in. and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. The moisture content of the base course materials should be maintained within the range of three percentage points below the optimum moisture content to three percentage points above the optimum moisture content until permanently covered.

ASPHALTIC CONCRETE SURFACE COURSE

The asphaltic concrete surface course should conform to TxDOT 2014 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Item 341, Dense-Graded Hot-Mix Asphalt, Type D. The asphaltic concrete should be compacted to a minimum of 92 percent of the maximum theoretical specific gravity (Rice) of the mixture determined according to Test Method Tex-227-F. Pavement specimens, which shall be either cores or sections of asphaltic pavement, will be tested according to Test Method Tex-207-F. The nuclear-density gauge or other methods which correlate satisfactorily with results obtained from project roadway specimens may be used when approved by the Engineer. Unless otherwise shown on the plans, the Contractor shall be responsible for obtaining the required roadway specimens at their expense and in a manner and at locations selected by the Engineer.

PORTLAND CEMENT CONCRETE

The Portland cement concrete pavement should be air entrained to result in a 4 percent plus/minus 1 percent air, should have a maximum slump of 5 inches, and should have a minimum 28-day compressive strength of 3,500 psi. A liquid membrane-forming curing compound should be applied as soon as practical after broom finishing the concrete surface. The curing compound will help reduce the

loss of water from the concrete. The reduction in the rapid loss in water will help reduce shrinkage cracking of the concrete.

CONSTRUCTION RELATED SERVICES

CONSTRUCTION MATERIALS ENGINEERING AND TESTING SERVICES

As presented in the attachment to this report, *Important Information About Your Geotechnical Engineering Report*, subsurface conditions can vary across a project site. The conditions described in this report are based on interpolations derived from a limited number of data points. Variations will be encountered during construction, and only the geotechnical design engineer will be able to determine if these conditions are different than those assumed for design.

Construction problems resulting from variations or anomalies in subsurface conditions are among the most prevalent on construction projects and often lead to delays, changes, cost overruns, and disputes. These variations and anomalies can best be addressed if the geotechnical engineer of record, **RABA KISTNER Consultants, Inc.**, is retained to perform the construction materials engineering and testing services during the construction of the project. This is because:

- **RKCI** has an intimate understanding of the geotechnical engineering report's findings and recommendations. **RKCI** understands how the report should be interpreted and can provide such interpretations on site, on the CLIENT's behalf.
- **RKCI** knows what subsurface conditions are anticipated at the site.
- **RKCI** is familiar with the goals of the CLIENT and the project's design professionals, having worked with them in the development of the project's geotechnical design workscope. This enables **RKCI** to suggest remedial measures (when needed) which help meet others' requirements.
- **RKCI** has a vested interest in client satisfaction, and thus assigns qualified personnel whose principal concern is client satisfaction. This concern is exhibited by the manner in which contractors' work is tested, evaluated and reported, and in selection of alternative approaches when such may become necessary.
- **RKCI** cannot be held accountable for problems which result due to misinterpretation of our findings or recommendations when we are not on hand to provide the interpretation which is required.

BUDGETING FOR CONSTRUCTION TESTING

Appropriate budgets need to be developed for the required construction materials engineering and testing services. At the appropriate time before construction, we advise that **RKCI** and the project designers meet and jointly develop the testing budgets, as well as review the testing specifications as it pertains to this project.

Once the construction testing budget and scope of work are finalized, we encourage a preconstruction meeting with the selected General Contractor to review the scope of work to make sure it is consistent with the construction means and methods proposed by the General Contractor. **RKCI** looks forward to the

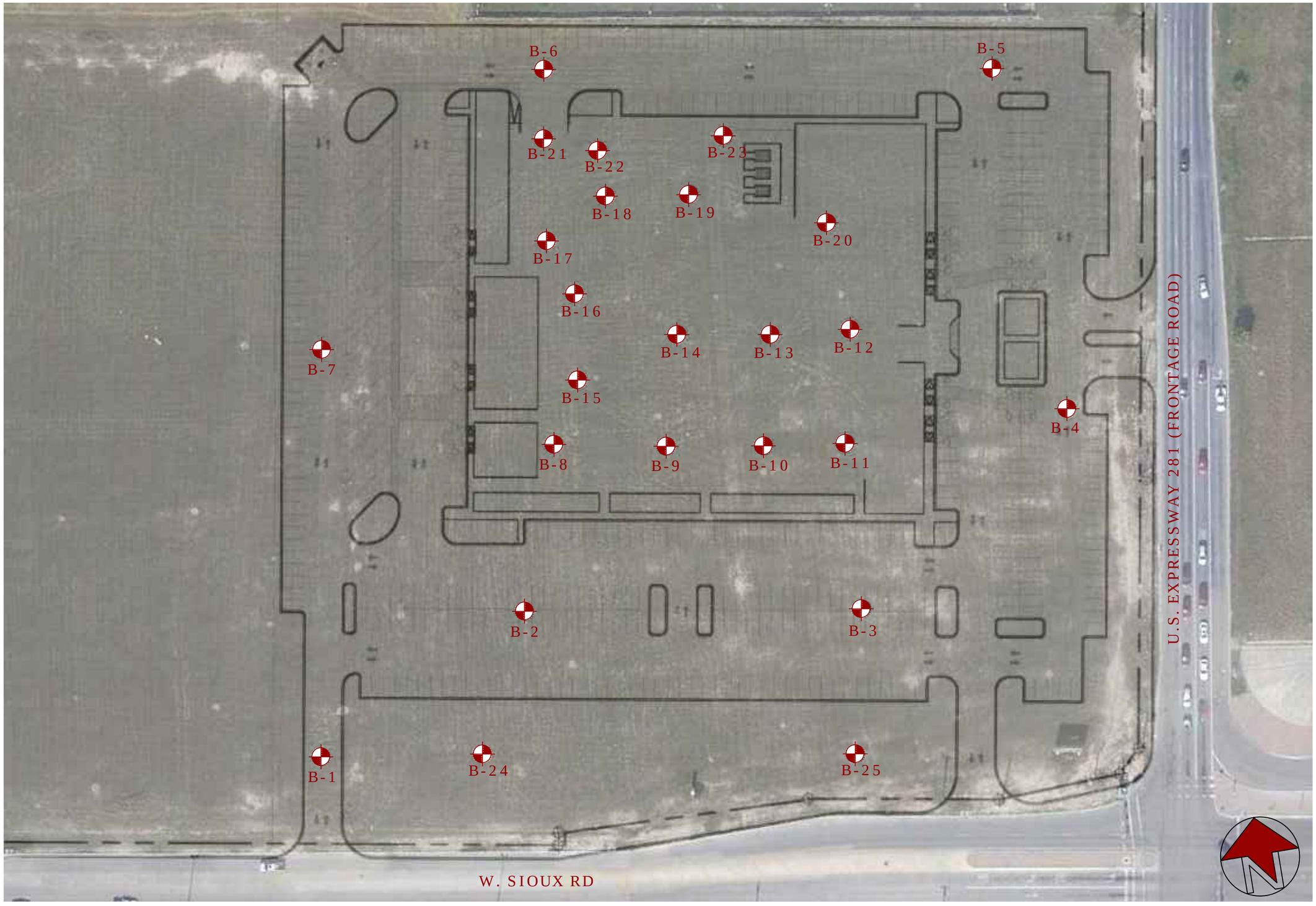
opportunity to provide continued support on this project, and would welcome the opportunity to meet with the Project Team to develop both a scope and budget for these services.

* * * * * * * * * * * * * * * * * * *

The following figures are attached and complete this report:

Figure 1	Boring Location Map
Figures 2 through 26	Logs of Borings
Figure 27	Key to Terms and Symbols
Figure 28	Results of Soil Sample Analyses

ATTACHMENTS



RABA KISTNER CONSULTANTS
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TBPE Firm F-3257

BORING LOCATION MAP
PROPOSED CITY OF PHARR AQUATIC FACILITY

NWC OF W. SIOUX ROAD & U.S. EXPRESSWAY 281
PHARR, HIDALGO COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:	AMA19-006-00
ISSUE DATE:	03-06-18
DRAWN BY:	DV
CHECKED BY:	SC
REVIEWED BY:	KML

FIGURE
1

O:\Active Projects\McAllen\2019\AMA19\AMA19-006-00 Prop. Aquatics Facility – City of Pharr\Drawings\Figure 1 – 11x17.dwg

LOG OF BORING NO. B-1

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
0			**SANDY LEAN CLAY (CL)** stiff to very stiff, dark brown to brown, with calcareous nodules	9			23	
5				13				
				20				
10				28				
			Boring terminated at a depth of about 10 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
15								
20								
25								
30								
35								

DEPTH DRILLED:	10.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	2

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-2

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown, with calcareous nodules	10		PLASTIC LIMIT ● WATER CONTENT ● LIQUID LIMIT	23	
				24				
5			Boring terminated at a depth of about 5 ft.			10 20 30 40 50 60 70 80		
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
10								
15								
20								
25								
30								
35								

DEPTH DRILLED:	5.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	3

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-3

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
			LEAN CLAY with SAND (CL) stiff to very stiff, brown, with calcareous nodules	10				
				21			29	
5			Boring terminated at a depth of about 5 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
10								
15								
20								
25								
30								
35								

DEPTH DRILLED:	5.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/9/2019	**DATE MEASURED:**	2/9/2019	**FIGURE:**	4

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-4

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
			LEAN CLAY with SAND (CL) stiff to very stiff, brown, with black ferrous stains	9		PLASTIC LIMIT ● WATER CONTENT ● LIQUID LIMIT	23	
				23				
5			Boring terminated at a depth of about 5 ft.			10 20 30 40 50 60 70 80		
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
10								
15								
20								
25								
30								
35								

DEPTH DRILLED:	5.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	5

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-5

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			LEAN CLAY with SAND (CL) stiff to very stiff, dark brown to brown, with calcareous nodules and black ferrous stains	8			22	
				11				71
5				13				
				20				
10			Boring terminated at a depth of about 10 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
15								
20								
25								
30								
35								

DEPTH DRILLED:	10.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	6

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-6

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			LEAN CLAY with SAND (CL) stiff to very stiff, dark brown to brown, with roots extending down to a depth of about 2 ft	8			24	
				11				
5				9				
				22				
10			Boring terminated at a depth of about 10 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
15								
20								
25								
30								
35								

DEPTH DRILLED:	10.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	7

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-7

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft					
			LEAN CLAY with SAND (CL) stiff to very stiff, dark brown to brown, with roots extending down to a depth of about 2 ft	8			26	
				23				
5			Boring terminated at a depth of about 5 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
10								
15								
20								
25								
30								
35								

DEPTH DRILLED:	5.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	8

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-8

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to hard, dark brown, with calcareous nodules	11			23	
				32				69
5			**FAT CLAY with SAND (CH)** very stiff to hard, brown	25			34	
					113			76
10			**FAT CLAY (CH)** hard to stiff, brown, with calcareous nodules	31				
15								
				11				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	9

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-9

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to hard, dark brown to brown	10				57
				23			29	
5			- with calcareous nodules below a depth of about 5 ft	30				55
							30	
10			**FAT CLAY (CH)** very stiff, brown, with black ferrous stains	26				
15								
				19				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/9/2019	**DATE MEASURED:**	2/9/2019	**FIGURE:**	10

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-10

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Existing Grade, ft

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
0			**SANDY LEAN CLAY (CL)** stiff to very stiff, dark brown	10				59
				13			28	
5					112			
			FAT CLAY (CH) very stiff to hard, brown, with calcareous nodules	25			38	
10								85
15				26				
				32				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	11

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-11

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to hard, dark brown, with roots extending down to a depth of about 2 ft	8			21	
				19				70
5			- becomes brown in color below a depth of about 5 ft	9			25	
10			**FAT CLAY with SAND (CH)** very stiff, brown, with calcareous nodules	23				81
				24				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	12

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-12

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
			LEAN CLAY with SAND (CL) stiff to very stiff, dark brown to brown	8		PLASTIC LIMIT ◇ WATER CONTENT ● LIQUID LIMIT ×	19	
				17		10 20 30 40 50 60 70 80		71
5			**SANDY FAT CLAY (CH)** hard to very stiff to hard, brown, with calcareous nodules		114		33	
				33				56
10								
15				27				
				31				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	13

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-13

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
0			**SANDY LEAN CLAY (CL)** stiff to hard, brown	9				62
				24			24	
5			- becomes brown in color below a depth of about 5 ft	29				
					111			63
10			**FAT CLAY (CH)** very stiff, brown, with calcareous nodules	25			30	
15								
				20				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	14

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-14

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft					
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown to brown, with calcareous nodules	10			21	
			- becomes brown in color below a depth of about 2 ft	23				68
5				24			25	
				18				55
10			**FAT CLAY with SAND (CH)** very stiff to stiff to very stiff, brown, with calcareous nodules and black ferrous stains		105			
15								
20				14				
25				26				
30				29				
			Boring terminated at a depth of about 30 ft.					
			NOTES: During the drilling operations, groundwater was encountered at a depth of about 19 ft.					
35								

DEPTH DRILLED:	30.0 ft	**DEPTH TO WATER:**	19 ft	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/9/2019	**DATE MEASURED:**	2/9/2019	**FIGURE:**	15

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-15

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			LEAN CLAY with SAND (CL) stiff to hard, dark brown, with calcareous nodules	7			21	
				21				74
5			- becomes brown in color below a depth of about 5 ft				27	
			FAT CLAY (CH) very stiff to stiff, dark brown, with black ferrous stains	23				
10			- with gypsum crystals below a depth of about 10 ft					85
15				25				
				12				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	16

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-16

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft					
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown	12				61
				24			27	
5				25				58
			FAT CLAY (CH) hard to very stiff to hard, brown, with calcareous nodules		114		42	
10				25				
15							33	
20			- with black ferrous stains below a depth of about 20 ft	34				
25				43				
				33				
30			Boring terminated at a depth of about 30 ft.					
			NOTES: During the drilling operations, groundwater was encountered at a depth of about 18.5 ft. Upon completion of the drilling operations, groundwater was measured at a depth of about 17 ft.					
35								

DEPTH DRILLED:	30.0 ft	**DEPTH TO WATER:**	18.5 ft	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	17

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-17

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown, with black ferrous stains	10			22	
				24				69
5			**LEAN CLAY with SAND (CL)** hard to stiff, brown, with black ferrous stains				26	
				29				
10			- with gypsum crystals below a depth of about 10 ft					79
15				22				
				15				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	18

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-18

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown, with calcareous nodules	8			24	
				20				70
5			**SANDY FAT CLAY (CH)** hard to very stiff, brown, with calcareous nodules	36			29	
				28				65
				26				
15			Boring terminated at a depth of about 15 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
20								
25								
30								
35								

DEPTH DRILLED:	15.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	19

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-19

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft					
			SANDY LEAN CLAY (CL) stiff to hard, dark brown	8				59
				13			29	
5			- becomes brown in color, and with calcareous nodules below a depth of about 5 ft	26				55
10			**FAT CLAY (CH)** hard to very stiff, light brown, with black ferrous stains	34			41	
15								
20				15				
25				39				
				29				
30			Boring terminated at a depth of about 30 ft.					
			NOTES: During the drilling operations, groundwater was encountered at a depth of about 19 ft. Upon completion of the drilling operations, groundwater was measured at a depth of about 16 ft.					
35								

DEPTH DRILLED:	30.0 ft	**DEPTH TO WATER:**	19 ft	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	20

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-20

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
0			**SANDY LEAN CLAY (CL)** stiff to hard, dark brown, with roots extending down to a depth of about 2 ft	11				64
			- becomes brown in color, and with calcareous nodules below a depth of about 2 ft	28			24	
5				48				59
			FAT CLAY (CH) very stiff, light brown, with calcareous nodules				34	
10				20				
15								
				30				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	21

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-21

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to hard, dark brown	8			19	
				23				67
5			- becomes brown in color, and with black ferrous stains below a depth of about 5 ft	43				
			FAT CLAY (CH) hard to stiff, brown to dark brown, with black ferrous stains				36	
10			- with calcareous nodules below a depth of about 10 ft	21				86
15								
				14				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	22

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-22

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to hard, dark brown, with black ferrous stains	9			21	
				25				65
5			- becomes brown in color, and calcareous nodules below a depth of about 5 ft	33			28	
				35				
10			**FAT CLAY (CH)** very stiff, light brown	23				
				29				
15			Boring terminated at a depth of about 15 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
20								
25								
30								
35								

DEPTH DRILLED:	15.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	23

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-23

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 (PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT) 10 20 30 40 50 60 70 80		
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown	8				62
				18			26	
5			- becomes brown in color, and with calcareous nodules below a depth of about 5 ft	21				57
			FAT CLAY (CH) very stiff to stiff, brown				38	
10				29				
15			- with gypsum crystals below a depth of about 15 ft					
				12				
20			Boring terminated at a depth of about 20 ft.					
			NOTES: During the drilling operations, groundwater was encountered at a depth of about 19 ft.					
25								
30								
35								

DEPTH DRILLED:	20.0 ft	**DEPTH TO WATER:**	19 ft	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/8/2019	**DATE MEASURED:**	2/8/2019	**FIGURE:**	24

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-24

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
			SANDY LEAN CLAY (CL) stiff to very stiff, dark brown	9		PLASTIC LIMIT ● WATER CONTENT ● LIQUID LIMIT	23	
				28		10 20 30 40 50 60 70 80		
5			Boring terminated at a depth of about 5 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
10								
15								
20								
25								
30								
35								

DEPTH DRILLED:	5.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/11/2019	**DATE MEASURED:**	2/11/2019	**FIGURE:**	25

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-25

Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0; PLASTIC LIMIT; WATER CONTENT; LIQUID LIMIT; 10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Existing Grade, ft					
			LEAN CLAY with SAND (CL) stiff to very stiff, dark brown to brown, with roots extending down to a depth of 2 ft	11			16	
				15				73
5				23				
				19				
10			Boring terminated at a depth of about 10 ft.					
			NOTES: Upon completion of the drilling operations, the boring was observed dry.					
15								
20								
25								
30								
35								

DEPTH DRILLED:	10.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-006-00
DATE DRILLED:	2/9/2019	**DATE MEASURED:**	2/9/2019	**FIGURE:**	26

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

KEY TO TERMS AND SYMBOLS

MATERIAL TYPES

SOIL TERMS


CALCAREOUS


CALICHE


CLAY


CLAYEY


GRAVEL


GRAVELLY


PEAT


SAND


SANDY


SILT


SILTY


FILL

ROCK TERMS


CHALK


CLAYSTONE


CLAY-SHALE


CONGLOMERATE


DOLOMITE


IGNEOUS


LIMESTONE


MARL


METAMORPHIC


SANDSTONE


SHALE


SILTSTONE

OTHER


ASPHALT


BASE


CONCRETE/CEMENT


BRICKS / PAVERS


WASTE


NO INFORMATION

WELL CONSTRUCTION AND PLUGGING MATERIALS


BLANK PIPE


SCREEN


BENTONITE


CEMENT GROUT


BENTONITE & CUTTINGS


CONCRETE/CEMENT


CUTTINGS


GRAVEL


SAND


VOLCLAY

SAMPLE TYPES


AIR ROTARY


GRAB SAMPLE


CORE


GEOPROBE SAMPLER


ROTOSONIC -DAMAGED


MUD ROTARY


NO RECOVERY


NX CORE


PITCHER


ROTOSONIC -INTACT


SHELBY TUBE


SPLIT BARREL


SPLIT SPOON


TEXAS CONE PENETROMETER


DISTURBED

STRENGTH TEST TYPES


POCKET PENETROMETER


TORVANE


UNCONFINED COMPRESSION


TRIAXIAL COMPRESSION UNCONSOLIDATED-UNDRAINED


TRIAXIAL COMPRESSION CONSOLIDATED-UNDRAINED

NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

PROJECT NO. AMA19-006-00

RABA KISTNER

REVISED 04/2012

FIGURE 27a

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

Terms used in this report to describe soils with regard to their consistency or conditions are in general accordance with the discussion presented in Article 45 of SOILS MECHANICS IN ENGINEERING PRACTICE, Terzaghi and Peck, John Wiley & Sons, Inc., 1967, using the most reliable information available from the field and laboratory investigations. Terms used for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in American Society for Testing and Materials D2487-06 and D2488-00, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics; 2005.

The depths shown on the boring logs are not exact, and have been estimated to the nearest half-foot. Depth measurements may be presented in a manner that implies greater precision in depth measurement, i.e 6.71 meters. The reader should understand and interpret this information only within the stated half-foot tolerance on depth measurements.

RELATIVE DENSITY

Penetration Resistance Blows per ft	Relative Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
> 50	Very Dense

COHESIVE STRENGTH

Resistance Blows per ft	Consistency	Cohesion TSF
0 - 2	Very Soft	0 - 0.125
2 - 4	Soft	0.125 - 0.25
4 - 8	Firm	0.25 - 0.5
8 - 15	Stiff	0.5 - 1.0
15 - 30	Very Stiff	1.0 - 2.0
> 30	Hard	> 2.0

PLASTICITY

Plasticity Index	Degree of Plasticity
0 - 5	None
5 - 10	Low
10 - 20	Moderate
20 - 40	Plastic
> 40	Highly Plastic

ABBREVIATIONS

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
BTEX = Total BTEX
TPH = Total Petroleum Hydrocarbons
ND = Not Detected
NA = Not Analyzed
NR = Not Recorded/No Recovery
OVA = Organic Vapor Analyzer
ppm = Parts Per Million

Qam, Qas, Qal = Quaternary Alluvium
Qat = Low Terrace Deposits
Qbc = Beaumont Formation
Qt = Fluviatile Terrace Deposits
Qao = Seymour Formation
Qle = Leona Formation
Q-Tu = Uvalde Gravel
Ewi = Wilcox Formation
Emi = Midway Group
Mc = Catahoula Formation
El = Laredo Formation
Kknm = Navarro Group and Marlbrook Marl
Kpg = Pecan Gap Chalk
Kau = Austin Chalk

Kef = Eagle Ford Shale
Kbu = Buda Limestone
Kdr = Del Rio Clay
Kft = Fort Terrett Member
Kgt = Georgetown Formation
Kep = Person Formation
Kek = Kainer Formation
Kes = Escondido Formation
Kew = Walnut Formation
Kgr = Glen Rose Formation
Kgru = Upper Glen Rose Formation
Kgrl = Lower Glen Rose Formation
Kh = Hensell Sand

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

SAMPLING METHODS

RELATIVELY UNDISTURBED SAMPLING

Cohesive soil samples are to be collected using three-inch thin-walled tubes in general accordance with the Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D1587) and granular soil samples are to be collected using two-inch split-barrel samplers in general accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586). Cohesive soil samples may be extruded on-site when appropriate handling and storage techniques maintain sample integrity and moisture content.

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-in.-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows Per Foot	Description
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

FILE NAME: AMA19-006-00.GPJ 3/6/2019

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-1	0.0 to 1.5	9	14	44	21	23	CL				
	2.5 to 4.0	13	14								
	5.0 to 6.5	20	14								
	8.5 to 10.0	28	15								
B-2	0.0 to 1.5	10	15	44	21	23	CL				
	3.5 to 5.0	24	12								
B-3	0.0 to 1.5	10	11								
	3.5 to 5.0	21	14	48	19	29	CL				
B-4	0.0 to 1.5	9	17	43	20	23	CL				
	3.5 to 5.0	23	11								
B-5	0.0 to 1.5	8	13	40	18	22	CL				
	2.5 to 4.0	11	20						71		
	5.0 to 6.5	13	20								
	8.5 to 10.0	20	21								
B-6	0.0 to 1.5	8	20	43	19	24	CL				
	2.5 to 4.0	11	23								
	5.0 to 6.5	9	20								
	8.5 to 10.0	22	19								
B-7	0.0 to 1.5	8	14	47	21	26	CL				
	3.5 to 5.0	23	14								
B-8	0.0 to 1.5	11	17	43	20	23	CL				
	2.5 to 4.0	32	13						69		
	5.0 to 6.5	25	16	54	20	34	CH				
	7.0 to 9.0		16					113	76	3.12	UC
	10.0 to 11.5	31	19								
	15.0 to 17.0		20							2.25	PP
	18.5 to 20.0	11	19								
B-9	0.0 to 1.5	10	14						57		
	2.5 to 4.0	23	12	48	19	29	CL				
	5.0 to 6.5	30	11						55		
	7.0 to 9.0		16	49	19	30	CL			2.25	PP
	10.0 to 11.5	26	20								
	15.0 to 17.0		20							2.25	PP
	18.5 to 20.0	19	20								
B-10	0.0 to 1.5	10	11						59		
	2.5 to 4.0	13	16	49	21	28	CL				
	5.0 to 7.0		15					112		1.79	UC
	7.5 to 9.0	25	17	58	20	38	CH				
	10.0 to 12.0		20						85	2.20	PP

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RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

FILE NAME: AMA19-006-00.GPJ 3/6/2019

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-10	15.0 to 16.5	26	22								
	18.5 to 20.0	32	21								
B-11	0.0 to 1.5	8	13	41	20	21	CL				
	2.5 to 4.0	19	15						70		
	5.0 to 6.5	9	17	45	20	25	CL				
	7.0 to 9.0		19							2.25	PP
	10.0 to 11.5	23	19						81		
	15.0 to 17.0		21							1.90	PP
	18.5 to 20.0	24	19								
B-12	0.0 to 1.5	8	16	39	20	19	CL				
	2.5 to 4.0	17	12						71		
	5.0 to 7.0		15	54	21	33	CH	114		3.17	UC
	7.5 to 9.0	33	16						56		
	10.0 to 12.0		20							2.25	PP
	15.0 to 16.5	27	20								
	18.5 to 20.0	31	19								
B-13	0.0 to 1.5	9	14						62		
	2.5 to 4.0	24	12	44	20	24	CL				
	5.0 to 6.5	29	13								
	7.0 to 9.0		15					111	63	1.98	UC
	10.0 to 11.5	25	20	53	23	30	CH				
	15.0 to 17.0		22							2.00	PP
	18.5 to 20.0	20	20								
B-14	0.0 to 1.5	10	10	40	19	21	CL				
	2.5 to 4.0	23	12						68		
	5.0 to 6.5	24	14	40	15	25	CL				
	7.5 to 9.0	18	18						55		
	10.0 to 12.0		21					105		1.21	UC
	15.0 to 17.0		19							2.25	PP
	20.0 to 21.5	14	21								
	25.0 to 26.5	26	19								
	28.5 to 30.0	29	17								
B-15	0.0 to 1.5	7	17	38	17	21	CL				
	2.5 to 4.0	21	13						74		
	5.0 to 7.0		16	45	18	27	CL			2.25	PP
	7.5 to 9.0	23	18								
	10.0 to 12.0		20						85	2.25	PP
	15.0 to 16.5	25	20								
	18.5 to 20.0	12	17								

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RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

FILE NAME: AMA19-006-00.GPJ 3/6/2019

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-16	0.0 to 1.5	12	17						61		
	2.5 to 4.0	24	12	44	17	27	CL				
	5.0 to 6.5	25	14						58		
	7.0 to 9.0		14	63	21	42	CH	114		2.65	UC
	10.0 to 11.5	25	20								
	15.0 to 17.0		18	55	22	33	CH			2.25	PP
	20.0 to 21.5	34	17								
	25.0 to 26.5	43	20								
	28.5 to 30.0	33	24								
B-17	0.0 to 1.5	10	15	43	21	22	CL				
	2.5 to 4.0	24	11						69		
	5.0 to 7.0		12	46	20	26	CL			2.25	PP
	7.5 to 9.0	29	16								
	10.0 to 12.0		18						79	2.25	PP
	15.0 to 16.5	22	20								
	18.5 to 20.0	15	19								
B-18	0.0 to 1.5	8	15	45	21	24	CL				
	2.5 to 4.0	20	12						70		
	5.0 to 6.5	36	14	50	21	29	CH				
	7.0 to 9.0		14							2.25	PP
	10.0 to 11.5	28	20						65		
	13.5 to 15.0	26	19								
B-19	0.0 to 1.5	8	14						59		
	2.5 to 4.0	13	15	48	19	29	CL				
	5.0 to 6.5	26	15								
	7.0 to 9.0		18						55	2.25	PP
	10.0 to 11.5	34	19	62	21	41	CH				
	15.0 to 17.0		20							2.25	PP
	20.0 to 21.5	15	21								
	25.0 to 26.5	39	20								
	28.5 to 30.0	29	21								
B-20	0.0 to 1.5	11	14						64		
	2.5 to 4.0	28	11	43	19	24	CL				
	5.0 to 6.5	48	11						59		
	7.0 to 9.0		12	55	21	34	CH			2.25	PP
	10.0 to 11.5	20	18								
	15.0 to 17.0		19								
	18.5 to 20.0	30	18								
B-21	0.0 to 1.5	8	16	38	19	19	CL				

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RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Pharr Aquatic Facility
NWC of W. Sioux Road & U.S. Expressway 281
Pharr, Hidalgo County, Texas

FILE NAME: AMA19-006-00.GPJ 3/6/2019

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-21	2.5 to 4.0	23	17						67		
	5.0 to 6.5	43	14								
	7.0 to 9.0		12	56	20	36	CH			2.25	PP
	10.0 to 11.5	21	21						86		
	15.0 to 17.0		27								
	18.5 to 20.0	14	19								
B-22	0.0 to 1.5	9	14	39	18	21	CL				
	2.5 to 4.0	25	12						65		
	5.0 to 6.5	33	12	46	18	28	CL				
	7.5 to 9.0	35	15								
	10.0 to 11.5	23	18								
	13.5 to 15.0	29	19								
B-23	0.0 to 1.5	8	15						62		
	2.5 to 4.0	18	13	44	18	26	CL				
	5.0 to 6.5	21	17						57		
	7.0 to 9.0		19	60	22	38	CH			2.25	PP
	10.0 to 11.5	29	19								
	15.0 to 17.0		19							2.25	PP
	18.5 to 20.0	12	20								
B-24	0.0 to 1.5	9	14	41	18	23	CL				
	3.5 to 5.0	28	13								
B-25	0.0 to 1.5	11	11	32	16	16	CL				
	2.5 to 4.0	15	14						73		
	5.0 to 6.5	23	16								
	8.5 to 10.0	19	17								

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

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SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: CITY OF PHARR/PSJA AQUATIC FACILITY

Substitution Request Number:

From: Columbia Lockers/PSiSC

To:

Date: 06/26/19

A/E Project Number:

Re:

Contract For:

Specification Title: Solid Plastic Lockers

Description: Manufacturers

Section: 10 51 26

Article/Paragraph: 2.1 A

Proposed Substitution:

Columbia Lockers/PSiSC Manufacturer:

Address: 825 Garland St Columbia SC 29201 Phone: 803.636.7017

Trade Name: Columbia Lockers/PSiSC Model No.:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Columbia Lockers/PSiSC

Signed by: Jim Williams

Firm: Columbia Lockers/PSiSC

Address: 825 Garland St Columbia SC 29201

Telephone: 803.636.7017

A/E's REVIEW AND ACTION

☑ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

Knowledge for Creating and Sustaining the Built Environment

SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: PSJA Aquatic Facility

Substitution Request Number:

From: Jim Libke - TK Products

To: The Warren Group Architects

Date: 7-8-19

Laura Warren

A/E Project Number: 971805

Re:

Contract For:

Specification Title: Fluid Applied Weather Barriers

Description: Vapor Permeable

Section: 072726 Page: 4

Article/Paragraph: 2.1

Proposed Substitution: TK-AirMax 2104 Vapor Permeable

Manufacturer: TK PRODUCTS Address: 11400 W. 47th St. Minnetonka, MN 55343 Phone: 800-441-2129

Trade Name: AirMax Model No.: 2104 VP

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: JIM LIBKE

Signed by:

Firm: TK PRODUCTS

Address: 11400 W. 47TH STREET

MINNETONKA, MN 55343

Telephone: 800-441-2129 OFFICE/ 612-868-3277 CELL

A/E's REVIEW AND ACTION

☑ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☒ Drawings ☒ Product Data ☐ Samples ☒ Tests ☐ Reports ☐ _____

Knowledge for Creating and Sustaining the Built Environment

SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: PSJA Aquatic Facility
Pharr, TX 78577

Substitution Request Number: 001
From: Amy McNair
Date: June 25, 2019

Re: Vapor Barriers
A/E Project Number:
Contract For:

Specification Title: Cast In Place Concrete
Description: Vapor Barrier
Section: 033000 Page: S101
Article/Paragraph: General Notes

Proposed Substitution: Tex-Trude Xtreme Vapor Barrier 15 mil
Manufacturer: Tex-Trude, LP Address: 2001 Sheldon Road, Channelview, TX Phone: 281.452.5961
Trade Name: Xtreme Vapor Barrier 15 mil Model No.: 15 mil

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Amy McNair

Signed by: *Amy McNair*

Firm: Tex-Trude

Address: 2001 Sheldon Rd., Channelview, TX 77530

Telephone: 713-481-3442

A/E's REVIEW AND ACTION

☑ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date: 7/10/2019

Supporting Data Attached: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

Note to Architects: Please incorporate Xtreme Vapor Barrier to your master specification.

Knowledge for Creating and Sustaining the Built Environment

SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: City of Pharr Aquatic Facility

Substitution Request Number: (For Architect to fill in)

From: DH Pace

To: * Add Architect, EOR or GC

Date: 7/8/2019

A/E Project Number: * Add if known

Re: Coiling Doors

Contract For: * Add scope of contract

Specification Title: Overhead Coiling Doors

Description: Coiling Service Doors & Coiling Counter Doors

Section: 08 33 00 & 08 33 01-1 Page:

Article/Paragraph:

Proposed Substitution: Cookson

Manufacturer: CornellCookson Address: 1901 South Litchfield Road, Goodyear, AZ 85338 Phone: (800) 294.4358

Trade Name: Commercial Coiling Doors Model No.: ESC 10 (counter door) & ESD 20 (insulated service)

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: * Add submitters name (typically the Project Manager for the Subcontractor)

Signed by:

Firm: * Add submitters company name

Address: * Add submitters company address

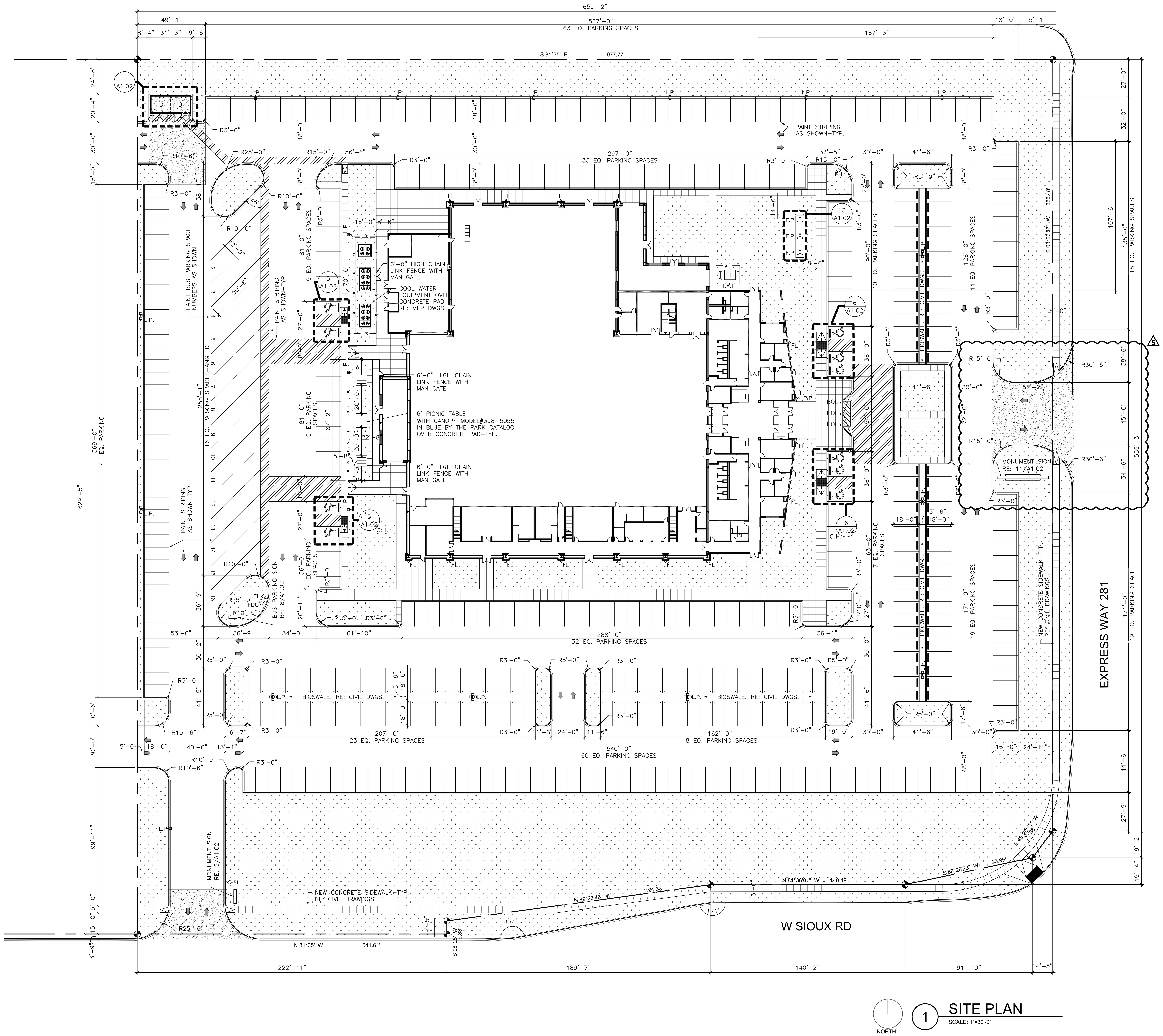
Telephone: * Add submitters company phone number

A/E's REVIEW AND ACTION

☑ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date: 7/10/2019

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____



1 SITE PLAN
SCALE: 1"=30'-0"

SHEET NOTES

1. SITE PLAN CURBS DIMENSIONED TO FRONT OF CURB.
2. REFER CIVIL DRAWINGS FOR DEMOLITION SCOPE.
3. REFER CIVIL DRAWINGS FOR NEW CONCRETE PAVING, SIDEWALKS, AND SITE DIMENSIONAL CONTROL PLAN.
4. REFER CIVIL DRAWINGS FOR GRADING ELEVATIONS/SPOT ELEVATIONS.
5. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR TRANSFORMER AND GENERATOR PAD CONSTRUCTION DETAILS.

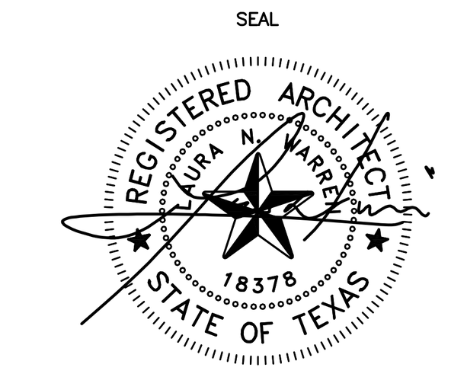
SHEET LEGEND

	LANDSCAPE AND IRRIGATED AREA. RE: LANDSCAPE DRAWINGS.
	CONCRETE PAVING. RE: CIVIL DRAWINGS.
D	DUMPSTER
T	TRANSFORMER PAD RE: ELEC. DWGS.
L.P.	LIGHT POLE RE: ELECTRICAL DRAWINGS
BOL.	PIPE BOLLARD RE: 3/A1.02
F.P.	45' TALL FLAG POLE
	6'-0" HIGH CHAIN LINK FENCE
F.H.	FIRE HYDRANT RE: CIVIL DRAWINGS
F.D.C.	FIRE DEPARTMENT CONNECTION RE: CIVIL DRAWINGS
	PRE-CAST CONCRETE WHEEL STOP WHERE NOTED
FL	FLOODLIGHT RE: ELECTRICAL DRAWINGS
P.P.	PUSH PLATE

TWG
THE WARREN GROUP ARCHITECTS, INC.
1801 SOUTH SECOND ST.
SUITE 330
McALLEN, TX 78503
9 5 6 . 9 9 4 . 1 9 0 0
t w g a r c h . c o m

REVISION	DATE	APPROVED BY	DESCRIPTION
1 ADD1	6/17/2019	TWG	ADDITIONAL INFORMATION PROVIDED
2 ADD2	6/21/2019	TWG	ADDITIONAL INFORMATION PROVIDED
3 ADD3	6/26/2019	TWG	ADDITIONAL INFORMATION PROVIDED
4 ADD4	7/3/2019	TWG	ADDITIONAL INFORMATION PROVIDED
5 ADD5	7/10/2019	TWG	ADDITIONAL INFORMATION PROVIDED

SEAL



EXP 10-31-19

PROPOSED

CITY OF PHARR/PSJA AQUATIC FACILITY

3001 N. CAGE BLVD
PHARR, TEXAS 78577

PROJECT 971805
DATE 06/07/2019
REVISED 07/10/2019

A1.01 ADD5

SITE PLAN

ARCHITECTURAL ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS ARE USED

℄	CENTERLINE
ACOUST	ACOUSTICAL
ACT	ACOUSTICAL CEILING TILE
ACP	ACOUSTICAL CEILING PANEL
ADA	AMERICANS WITH DISABILITIES ACT
AESS	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL
AFF	ABOVE FINISH FLOOR
ALT	ALTERNAT(–E,–IVE)
ANSI	AMERICAN NATIONAL STANDARD INSTITUTE
APPROX	APPROXIMAT(–E,–LY)
ARCH	ARCHITECT (–URAL)
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AVG	AVERAGE
BLDG	BUILDING
BM	BENCH MARK
BOL	BOLLARD
BFF	BELOW FINISH FLOOR
CH	CEILING HEIGHT
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
COL	COLUMN
COLS	COLUMNS
CONC	CONCRETE
COORD	COORDINATE
CPT	CARPET
CJ	CONTROL JOINT
CT	CERAMIC TILE
DEMO	DEMOLISH OR DEMOLITION
DET	DETAIL(–S)
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION(–S)
DL	DOCK LEVELER
D.L.P.	DOUBLE HEAD LIGHT POLE
DR	DOOR
DS	DOWN SPOUT
DWG(S)	DRAWING(–S)
(E)	EXISTING
EA	EACH
EEW	EMERGENCY EYE–WASH
EEWS	EMERGENCY EYE–WASH AND SHOWER
EF	EACH FACE OR EXHAUST FAN
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
ELEV	ELEVATION
ELEC	ELECTRIC(–AL)
EMERG	EMERGENCY
EOD	EDGE OF DOCK
EQ	EQUAL(–LY)
EQUIP	EQUIPMENT
EXT	EXTERIOR
EW	EACH WAY
EP	ELECTRICAL POWER & METER CAN
(F)	FIXTURE
FA	FIRE ALARM
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FACTORY FINISH, FINISH FLOOR
FH	FIRE HYDRANT
FLR	FLOOR
FRT	FIRE–RETARDANT TREATED
FTG	FOOTING
FURN	FURNITURE
GA	GAUGE
GDL	GROUND LEVEL
GYP	GYPSUM
HB	HOSE BIB
HC	(HANDICAP) ACCESSIBLE
HGT,HT	HEIGHT
HORIZ	HORIZONTAL
HVAC	HEATING, VENTILATION & AIR CONDITIONING
IN	INCH(–ES)
JB,J–BOX	JUNCTION BOX
JST	JOIST
JT	JOINT
LAV	LAVATORY
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MTL	METAL
MIN	MINIMUM
N	NORTH
N/A	NOT APPLICABLE
NEC	NATIONAL ELECTRICAL CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NOP	KNOCK–OUT PANEL
OC	ON CENTER
OTS	OPEN TO STRUCTURE
PERF	PERFORAT(–E, –ED, –ES, –ATION)
PL	PROPERTY LINE, PLATE
PLAM	PLASTIC LAMINATE
PLBG	PLUMBING
PLYWD	PLYWOOD
PNL	PANEL
PROJ	PROJECT(–TION)
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
P.J.	PANEL JOINT
RAD	RADIUS
RE:	REFER, REFERENCE
REQ	REQUIRED
RL	RISER LINE (STAIRS)
RR	RESTROOM
SCH	SCHEDULE
SHT	SHEET
S.L.P.	SINGLE HEAD LIGHT POLE
SPECS	SPECIFICATIONS
SQ	SQUARE
SQ FT	SQUARE FEET
SQ IN	SQUARE INCHES
STD	STANDARD
STOR	STORAGE
STRUCT	STRUCTURE
S/W	SIDEWALK
SYM	SYMMETRICAL
TEMP	TEMPORARY
T.C.	TRENCH COVER
VCT	VINYL COMPOSTION TILE
VERT	VERTICAL
W/	WITH
W/O	WITHOUT
XFMR	TRANSFORMER

SYMBOLS

ANNOTATION

BUILDING ELEVATION REFERENCE

BUILDING SECTION REFERENCE

WALL SECTION REFERENCE

DETAIL REFERENCE

PLAN NORTH

NORTH ARROW

A / D B / C

INTERIOR ELEVATION REFERENCE

STRUCTURAL GRID

+0"

ELEVATION OF ARCHITECTURAL ELEMENT

ROOM

ROOM/SPACE IDENTIFIER
ROOM NAME
ROOM NUMBER

TITLE
SCALE

TITLE MARK
REFERENCE NUMBER

BREAK MARK

MATCH LINE SEE SHEET A-XXX

REFERENCE TO SHEET WHERE WORK THIS SIDE OF MATCHLINE IS DRAWN

PARTITION TYPE

WINDOW TYPE REFERENCE

DOOR TYPE REFERENCE

DOOR REFERENCE NUMBER

ACCESSORY KEY

EQUIPMENT KEY

REVISION NUMBER

CEILING HEIGHT MARKER

ELECTRICAL

2'x4' RECESSED FLUORESCENT FIXTURE

2'x4' RECESSED FLOURESCENT FIXTURE W/ EMERGENCY BALLAST

2'x2' RECESSED FLOURESCENT FIXTURE

1'x4' RECESSED FLOURESCENT FIXTURE W/ EMERGENCY BALLAST

LED RECESSED WALL WASHER

2 LAMP SURFACE MOUNTED FLUORESCENT FIXTURE

2 LAMP SURFACE MOUNTED FLUORESCENT FIXTURE W/ EMERGENCY BALLAST

ERL

RECESSED, EXTERIOR GRADE CAN LIGHTING

EMERGENCY LIGHT (BATTERY POWERED)

T

TRANSFORMER

EMERGENCY EXIT SIGN

PLUMBING – CIVIL

L.P.

LIGHT POLE WITH A 36" HIGH CONCRETE BASE

FH

FIRE HYDRANTS

IRR

IRRIGATION PIPE

NOTE: NOT ALL SYMBOLS ARE USED. SEE OTHER SPECIFIC SYMBOL LEGENDS ON EACH DRAWING WHERE OCCURS.

GENERAL NOTES

THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND A201 LATEST EDITION OF THE AMERICAN INSTITUTE OF ARCHITECTS, ARE HEREBY MADE PART OF CONTRACT DOCUMENTS TO THE SAME EXTENT AS IF BOUND HEREIN.

THE CONTRACTOR SHALL PROVIDE ADEQUATE CONTRACTOR'S LIABILITY AND "ALL RISK" INSURANCE TO COVER 100% OF THE COST OF THE PROJECT. PROVIDE WORKMEN'S COMPENSATION AS REQUIRED BY LAW AND PROVIDE OTHER INSURANCE REQUIRED BY GENERAL CONDITIONS, LANDLORD, LAW OR CODE.

ALL SUBCONTRACTORS MUST BE PRE–APPROVED BY CITY OF PHARR ENGINEER, MR. OMAR ANZALDUA JR., PE, CFM, PMP, AND THE WARREN GROUP ARCHITECTS INC.

GENERAL CONTRACTOR AND SUBCONTRACTORS SHALL PROVIDE, PRIOR TO CONSTRUCTION, UNIT PRICES FOR ALL WORK SHOWN. THESE PRICES SHALL BE VALID FOR THE DURATION OF THE PROJECT AND USED FOR ALL SUBMISSIONS REGARDING ADDITIONS OR DELETIONS TO SCOPE OF WORK.

UNLESS OTHERWISE STIPULATED, THE GENERAL CONTRACTOR SHALL PROVIDE AND PAY FOR ALL MATERIALS, LABOR, TAXES, WATER, TOOLS, EQUIPMENT, LIGHT, POWER, TRANSPORTATION AND OTHER FACILITIES NECESSARY FOR THE EXECUTION AND COMPLETION OF THE WORK.

THE CONTRACTOR AND HIS SUB–CONTRACTORS SHALL KEEP WORK AREA IN A CLEAN AND ORDERLY MANNER, REMOVING DEBRIS ON A ROUTINE BASIS.

CONTRACTOR REVIEW:

GENERAL CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSION FOR ACCURACY AND CONFIRMING THAT WORK IS BUILDABLE, AS SHOWN, BEFORE SUBMITTING FINAL PRICING AND PROCEEDING WITH CONSTRUCTION. FAILURE TO REPORT A CONFLICT IN THE CONTRACT DOCUMENTS SHALL BE DEEMED EVIDENCE THAT THE CONTRACTOR HAS ELECTED TO PROCEED IN THE MORE EXPENSIVE MANNER.

CONTRACTOR IS RESPONSIBLE TO PERFORM ALL WORK IN ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES HAVING JURISDICTION.

PROJECT TEAM

OWNER:

City of Pharr
Contact: Omar Anzaldua Jr., PE, CFM, PMP
Address: 118 S. Cage Blvd. 4th Floor
Pharr, Texas 78577
956.402.4221 Office
956.540.9122 Cell
omar.anzaldua@pharr–tx.gov

ARCHITECT:

The Warren Group Architects, Inc.
Contact: Laura Nassri Warren, AIA.
1801 S. 2nd St. Suite 330
McAllen, Texas 78503
956.994.1900
956.994.1962 fax
lwarren@twgarch.com

CONSULTANTS:

POOL CONSULTANT:

Cousilman–Hunsaker
Darren Bevard, P.E.
Staci Pye
2425 North Central Expressway
Suite 359
Richardson, TX 75080
972.370.3740 Office
darrenbevard@chh2o.com
StaciPye@chh2o.com

CIVIL ENGINEER:

Perez Consulting Engineering
Jorge D. Perez, P.E., R.P.L.S
808 Dallas Ave.
McAllen, Texas 78501
956.631.4482 Office
jdp@perezce.com

MEP ENGINEER:

MEP Solutions, Inc.
Contacts: Luis Javier Pena, PE
Abram L. Dominguez, PE
600 E Beaumont Ave. Suite 2
McAllen, Texas 78501
956.664.2727
956.664.2726 fax
jpena@mepsolutionsengineering.com
adominguez@mepsolutionsengineering.com

STRUCTURAL ENGINEER:

Solorio Inc.
Contact: Simon Solorio, P.E.
108 W. 18th Street
Mission, Texas 78572
956.631.1500
simon@solorio.com

LANDSCAPE AND IRRIGATION:

Earth Irrigation and Landscaping
Wille Gossett
1101 E. Violet Ave.
McAllen, Texas 78504
956.631.6686 Office
956.631.6688 Fax
willieg@earthirrigation.com

MATERIALS

CAST IN PLACE CONCRETE

PRECAST CONCRETE

STEEL

METAL STUDS

GLASS

CONCRETE MASONRY UNITS

LANDSCAPE AREA

WOOD BLOCKING

ROUGH WOOD

FINISH WOOD

PLYWOOD

RIGID INSULATION

BATT INSULATION

CODE CHECK

GENERAL - PROJECT IDENTIFICATION

LIST OF APPLICABLE CODES (TITLES & EDITIONS)
–TEXAS ACCESSIBILITY STANDARDS (TAS), 2012 EDITION.
–INTERNATIONAL BUILDING CODE (IBC), 2012 EDITION.
–INTERNATIONAL ENERGY CONSERVATION CODE(IECC), 2015 EDITION.
–INTERNATIONAL FIRE CODE (IFC), 2012 EDITION.
–NFPA 101, 2012 EDITION
–TEXAS ADMINISTRATIVE CODE –TITLE 25 – CHAPTER 265 – SUBCHAPTER L STANDARDS FOR PUBLIC POOLS AND SPAS
–MAHC – MODEL AQUATIC HEALTH CODE
–NFHSA – NATIONAL FEDERATION OF STATE HIGH SCHOOL ASSOCIATIONS
–USAS – USA SWIMMING
–NCAA – NATIONAL COLLEGIATE ATHLETIC ASSOCIATION
–UIL – UNIVERSITY INTERSCHOLASTIC LEAGUE

LIST OF APPLICABLE ORDINANCES AND JURISDICTIONS
CITY OF PHARR CODE OF ORDINANCES, CURRENT EDITION.

PROJECT DESCRIPTION

APPROXIMATE SITE AREA:	9.19 ACRES
FIRST LEVEL:	65,398 S.F.
SECOND LEVEL:	7,398 S.F.
TOTAL BUILDING GROSS AREA:	72,796 S.F.
SECOND LEVEL ALTERNATE:	1,212 S.F.

ZONING / ORDINANCE REQUIREMENTS

PARKING REQUIRED :	349 SPACES
PARKING PROVIDED :	444 SPACES

ACCESSIBILITY DESIGN CRITERIA (TAS-ADA)

EXTERIOR ACCESSIBLE PARKING SPACES ADA– TABLE 208.2	
REQUIRED	9 ACC SPACES
PROVIDED	10 SPACES

BUILDING DESIGN CRITERIA - 2012 IBC CODE

USE GROUP (OCCUPANCY) CLASSIFICATION(S)

MAIN:	ASSEMBLY WITH FIXED SEATING (A–4)
ACCESSORY CLASSIFICATION	BUSINESS (B) EDUCATION (E)
TYPE OF CONSTRUCTION	TYPE II–B UNPROTECTED, SPRINKLERED

ALLOWABLE BUILDING HEIGHT AND AREA:

ALLOWABLE BUILDING AREA IBC 2012 EDITION, TABLE 507.3	UNLIMITED
ACTUAL AREA	74,008 S.F.
ALLOWABLE BUILDING HEIGHT IBC 2012 EDITION, TABLE 504.2	2 STORIES – 75FT.
ACTUAL BUILDING HEIGHT:	1 STORY – 68'–3"

OCCUPANCY LOADS: (PER TABLE 1004.1.2)

ASSEMBLY (A–4)	1,511 OCCUPANCY LOAD
BUSINESS (B)	96 OCCUPANCY LOAD
EDUCATION (E)	43 OCCUPANCY LOAD

PLUMBING FIXTURE REQUIREMENTS:

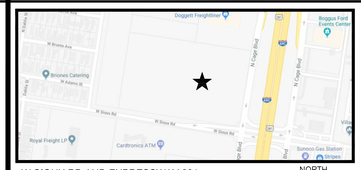
WATER CLOSETS:	REQUIRED:	PROVIDED:
A–4	30	30
B	3	3
E	1	1
TOTAL	34	36 (6 URINALS)
LAVATORIES		
A–4	9	22
B	3	3
E	1	1
TOTAL	13	26
SHOWERS		
A–4	–	16

NOTES:
1. ALL REQUIRED PERMITS MUST BE OBTAINED FROM THE CITY OF PHARR FIRE DEPARTMENT BEFORE THE BUILDING IS OCCUPIED.
2. EXIT DOORS TO BE OPERABLE FROM INSIDE WITHOUT USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT.

INDEX OF DRAWINGS

ARCHITECTURAL DRAWINGS

VICINITY MAP



W SIOUX RD AND EXPRESSWAY 281
PHARR, TEXAS 78577

NORTH

THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND A201 LATEST EDITION OF THE AMERICAN INSTITUTE OF ARCHITECTS, ARE HEREBY MADE PART OF CONTRACT DOCUMENTS TO THE SAME EXTENT AS IF BOUND HEREIN.

ALL CONSTRUCTION SHALL COMPLY WITH AMERICAN'S WITH DISABILITIES ACT, PUBLIC LAW 101–336 AND TAS COMPLIANT.

GENERAL CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS FOR ACCURACY AND CONFIRMING THAT WORK IS BUILDABLE, AS SHOWN, BEFORE SUBMITTING FINAL PRICING FOR THE WORK IN QUESTION OR RELATED WORK.

INDEX OF DRAWINGS

CIVIL DRAWINGS

LANDSCAPE DRAWINGS

STRUCTURAL DRAWINGS

POOL CONSULTANT DRAWINGS

M.E.P. DRAWINGS

THE WARREN GROUP ARCHITECTS, INC.
1801 SOUTH SECOND ST.
SUITE 330
McALLEN, TX 78503
9 5 6 . 9 9 4 . 1 9 0 0
t w g a r c h . c o m

REVISION	DATE	APPROVED BY	DESCRIPTION
1 ADD1	5/17/2019	TWG	ADDITIONAL INFORMATION PROVIDED
2 ADD2	6/21/2019	TWG	ADDITIONAL INFORMATION PROVIDED
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4 ADD4	7/3/2019	TWG	ADDITIONAL INFORMATION PROVIDED
5 ADD5	7/10/2019	TWG	ADDITIONAL INFORMATION PROVIDED

SEAL

REGISTERED ARCHITECT
LAURA N. WARREN
18378
STATE OF TEXAS

EXP 10–31–19

PROPOSED

CITY OF PHARR/PSJA AQUATIC FACILITY

3001 N. CAGE BLVD
PHARR, TEXAS 78577

PROJECT	971805
DATE	06/07/2019
REVISED	07/10/2019

G0.01 ADD5
GENERAL NOTES,
ABBREVIATIONS & SYMBOLS

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER & MODEL #	LAMPS/TEMP/VA	VOLTAGE
A	2X4 EDGE LIT FLAT PANEL FIXTURE	LITHONIA #EPANL 2X4 4800LM 40K MIN1 ZT MVOLT WILLIAMS #LP24 L50 8 40 DIM UNV METALUX #24FP4740C SIGNIFY #2FXP48L840-4-DS-UNV-DIM	LED 4000K 47	120/277
AE	2X4 EDGE LIT FLAT PANEL FIXTURE EMERGENCY BATTERY PACK	LITHONIA #EPANL 2X4 4800LM 40K MIN1 ZT MVOLT E10WCP WILLIAMS #LP24 L50 8 40 EM/10WRM DIM UNV METALUX #24FP4740C-EL14W SIGNIFY #2FXP48L840-4-DS-UNV-DIM-EMLED	LED 4000K 47	120/277
B	2X4 EDGE LIT FLAT PANEL FIXTURE	LITHONIA #EPANL 2X4 3000LM 40K MIN1 ZT MVOLT WILLIAMS #LP24 L50 8 40 DIM UNV METALUX #24FP3140C SIGNIFY #2FXP38L840-4-DS-UNV-DIM	LED 4000K 39	120/277
BE	2X4 EDGE LIT FLAT PANEL FIXTURE EMERGENCY BATTERY PACK	LITHONIA #EPANL 2X4 3000LM 40K MIN1 ZT MVOLT E10WCP WILLIAMS #LP24 L50 8 40 EM/10WRM DIM UNV METALUX #24FP3140C-EL14W SIGNIFY #2FXP38L840-4-DS-UNV-DIM-EMLED	LED 4000K 39	120/277
C	6" RECESSED DOWNLIGHT	LITHONIA #LDN6 40/10 L06 AR MVOLT WILLIAMS # 6DR-TL L10 8 40 DIM UNV O W CS HALO COMMERCIAL #PD610ED010-PDM6A840-61VC SIGNIFY #6RN / P6RDL10840CLZ10U	LED 4000K 13	120/277
CE	6" RECESSED DOWNLIGHT EMERGENCY BATTERY PACK	LITHONIA #LDN6 40/10 L06 AR MVOLT EM WILLIAMS # 6DR-TL L10 8 40 EM/10W DIM UNV O W CS HALO COMMERCIAL #PD610ED010IEM-PDM6A840-61VC SIGNIFY #6RNEM / P6RDL10840CLZ10U	LED 4000K 13	120/277
D	6" RECESSED DOWNLIGHT	LITHONIA #LDN6 40/20 L06 AR MVOLT WILLIAMS # 6DR-TL L20 8 40 DIM UNV O W CS HALO COMMERCIAL #PD620ED010-PDM6A840-61VC SIGNIFY #6RN / P6RDL20840CLZ10U	LED 4000K 23	120/277
DE	6" RECESSED DOWNLIGHT EMERGENCY BATTERY PACK	LITHONIA #LDN6 40/20 L06 AR MVOLT EM WILLIAMS # 6DR-TL L20 8 40 EM/10W DIM UNV O W CS HALO COMMERCIAL #PD620ED010IEM-PDM6A840-61VC SIGNIFY #6RNEM / P6RDL20840CLZ10U	LED 4000K 23	120/277
F	4' STRIPLIGHT	LITHONIA #ZL1N L48 3000LM FST MVOLT 40K WH METALUX #4SNLED-33SL-LW-UNV-L840-CD1 WILLIAMS #75R 4 L30 8 40 DIM UNV SIGNIFY #FSS430L840-UNV-DIM	LED 4000K 33	120/277
FE	4' LED STRIPLIGHT EMERGENCY BATTERY PACK	LITHONIA #ZL1N L48 3000LM FST MVOLT 40K 80CRI E7W WH METALUX #4SNLED-33SL-LW-UNV-EL7W-L840-CD1 WILLIAMS #75R 4 L30 8 40 EM/7WRM DIM UNV SIGNIFY #FSS430L840-UNV-DIM-EMLED	LED 4000K 33	120/277
G2	2' RECESSED PERIMETER LIGHTING	MARK ARCHITECTURAL #SPRLED LOP 2FT RLP FL 80CRI 40K 400LMF MVOLT CORONET #FLAWLESS LED 2 40 LTG1 UNV	LED 4000K 7	120/277
G3	3' RECESSED PERIMETER LIGHTING	MARK ARCHITECTURAL #SPRLED LOP 3FT RLP FL 80CRI 40K 400LMF MVOLT CORONET #FLAWLESS LED 3 40 LTG1 UNV	LED 4000K 10	120/277
G4	4' RECESSED PERIMETER LIGHTING	MARK ARCHITECTURAL #SPRLED LOP 4FT RLP FL 80CRI 40K 400LMF MVOLT CORONET #FLAWLESS LED 4 40 LTG1 UNV	LED 4000K 14	120/277
H3	3' LED SYSTEM STANDARD OUTPUT 120 DEGREE SYMMETRIC	CORONET #RUSH REC LED 3' 40 LTG1 UNV MARK ARCHITECTURAL #SL2L-LOP-3FT-FLP-TG-80CRI-40K-600LMF-MIN10-277-ZT	LED 4000K 21	120/277
H4	4' LED SYSTEM STANDARD OUTPUT 120 DEGREE SYMMETRIC	CORONET #RUSH REC LED 4' 40 LTG1 UNV MARK ARCHITECTURAL #SL2L-LOP-4FT-FLP-TG-80CRI-40K-600LMF-MIN10-277-ZT	LED 4000K 28	120/277
H4E	4' LED SYSTEM STANDARD OUTPUT 120 DEGREE SYMMETRIC EMERGENCY BATTERY PACK	CORONET #RUSH REC LED 4' 40 LTG1 UNV EM MARK ARCHITECTURAL #SL2L-LOP-4FT-FLP-TG-80CRI-40K-600LMF-MIN10-277-E10WLCP-ZT	LED 4000K 28	120/277
K	4' LED HIGH BAY INDOOR DIRECT/INDIRECT LUMINAIRE CLEAR ACRYLIC	LUX DYNAMICS #LUX-WAVE-8-D-HO2-850-4'-U10-CA4' METALUMEN #NATA DI 22L40K-NC M-L2 4	LED 5000K 724	120/277
KE	4' LED HIGH BAY INDOOR DIRECT/INDIRECT LUMINAIRE CLEAR ACRYLIC EMERGENCY BATTERY PACK	LUX DYNAMICS #LUX-WAVE-8-D-HO2-850-4'-U10-CA4' EM METALUMEN #NATA DI 22L40K-NC M-L2 4 EM	LED 5000K 724	120/277

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LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER & MODEL #	LAMPS/TEMP/VA	VOLTAGE
M	THE MARINER 4' VAPOR TIGHT LINEAR EMERGENCY BATTERY PACK	SOLAS RAY LIGHTING #LQ-H4-112-50-X-XX DURAGUARD #LV4AOQ F 112 U 4K XX XX	LED 4000K 127	120/277
ME	THE MARINER 4' VAPOR TIGHT LINEAR EMERGENCY BATTERY PACK	SOLAS RAY LIGHTING #LQ-H4-112-50-X-XX-BB DURAGUARD #LV4AOQ F 112 U 4K XX XBU	LED 4000K 127	120/277
NE	4' STAIRWAY FIXTURE EMERGENCY BATTERY PACK DIMS TO 10% UNOCCUPIED	LITHONIA #WL4 30L LP840 MSD7 DIM10 EL14L METALUX #4SWLED-LD4-32SL-LW-UNV-EL14W-L840-CD1-SVPD2 ILP CVL4-30WLED-UNIV-40-USBD/HL SIGNIFY #SF4C33A40UDZT-US-EMLED	LED 4000K 30	120/277
P	2'X4' EDGE LIT FLAT PANEL FIXTURE DRYWALL GRID ADAPTER	LITHONIA #EPANL 2X4 4800LM 40K MIN1 ZT MVOLT DGA24 WILLIAMS #LP24 L50 8 40 DFK-2448W DIM UNV METALUX #24FP4740C-DF-4W-U SIGNIFY #2FXP48L840-4-DS-UNV-DIM-FMA24	LED 4000K 47	120/277
Q	2'X4' EDGE LIT FLAT PANEL FIXTURE DRYWALL GRID ADAPTER	LITHONIA #EPANL 2X4 3000LM 40K MIN1 ZT MVOLT DGA24 WILLIAMS #LP24 L50 8 40 DFK-2448W DIM UNV METALUX #24FP3140C-DF-4W-U SIGNIFY #2FXP38L840-4-DS-UNV-DIM-FMA24	LED 4000K 39	120/277
QE	2'X4' EDGE LIT FLAT PANEL FIXTURE EMERGENCY BATTERY PACK DRYWALL GRID ADAPTER	LITHONIA #EPANL 2X4 3000LM 40K MIN1 ZT MVOLT E10WCP DGA24 WILLIAMS #LP24 L50 8 40 DFK-2448W EM/10WRM DIM UNV METALUX #24FP3140C-EL14W-DF-4W-U SIGNIFY #2FXP38L840-4-DS-UNV-DIM-EMLED-FMA24	LED 4000K 39	120/277
SA	SINGLE HEAD ARM MOUNTED AREA LIGHT TYPE R3 DISTRIBUITION 30' POLE, 24" PEDESTAL	LITHONIA #RSX2 LED P2 40K R3 LSI #SLM LED 18L SIL 3 UNV DIM 40 70CRI XX	LED 4000K 114	120/277
SB	FOUR HEAD ARM MOUNTED AREA LIGHT TYPE R5 DISTRIBUITION 30' POLE, 24" PEDESTAL	LITHONIA #RSX2 LED P2 40K R5 LSI #SLM LED 18L SIL 5W UNV DIM 40 70CRI XX	LED 4000K 456	120/277
SC	ARCHITECTURAL WALL SCONCE TYPE FORWARD THROW DISTRIBUTION FINISH AS SELECTED BY ARCHITECT	LITHONIA #WST LED P3 40K VF MVOLT RAYON #T630LED 40 UNI12 40 T3 BZ McGRAW-EDISON #IST-AF-1000-LED-E1-T4FT-XX SIGNIFY #101L-32L-700-NW-G1-4-UNV-XX	LED 4000K 50	120/277
SD	TESIS IN-GROUND LUMINAIRE RECESSED HOUSING POLYMER	ERCO #33640.000 HYDREL #M9710C-SS-P1-30K-MVOLT-NSP-FLC20-34S-BL	LED 4000K 20	120/277
SF	M9700C IN-GRADE LUMINAIRE	HYDREL #M9700C LED P2 40K WWD LUMASCAPE # LS3080 30 S 840 A X XX XX 24 0 01 ND	LED 4000K 35	120/277
SH	16" SITE IN-GROUND LUMINAIRE GRAZING LIGHT WALLWASHER	ERCO #32848.023 TARGETTI #JE-R-10-WG-24-30K-L	LED 3000K 24	120/277
SJ	THREE HEAD ARM MOUNTED AREA LIGHT TYPE R3 DISTRIBUITION 30' POLE, 24" PEDESTAL	LITHONIA #RSX2 LED P2 40K R3 LSI #SLM LED 18L SIL 3 UNV DIM 40 70CRI XX	LED 4000K 342	120/277
SK4	LED LINEAR FLOOD LIGHT WALL WASH DISTRIBUTION, ADJUSTABLE SURFACE MOUNT 18" EXTENDED ARM WITH STRUT, HALF VISOR	HYDREL #4750L 4FT 800LMF 40K MVOLT WWD KM EA18 CSL25 ZT BL	LED 4100K 57	120/277
SL	4' LINEAR LED FLOOD LIGHT	HYDREL #4750L 4FT 2000LMF 40K VNSP	LED 4000K 64	120/277
X	UNIVERSAL EXIT LIGHT WITH BATTERY PACK,	LITHONIA #LQMSW3R120/277ELN MULE #MX-B-R-U SURE-LITES #LPX7 EELP #XE2RW-EM	LED'S FURNISHED	120/277

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A ELECTRICAL LIGHTING FIXTURE SCHEDULE
SCALE: N.T.S.

HVLS FAN SCHEDULE

UNIT	HVLS-1, HVLS-2
SPACE SERVED	SPECTATOR AREA
AIRFLOW AT 100% SPEED (CFM)	86,400
AIRFLOW AT 80% SPEED (CFM)	69,000
AIRFLOW AT 60% SPEED (CFM)	50,500
AIRFLOW AT 40% SPEED (CFM)	34,300
AIRFLOW AT 20% SPEED (CFM)	18,800
FAN TYPE	DIRECT DRIVE
FAN MOTOR HP	3/4
MAX RATED CURRENT (A)	1.0
VOLTAGE	460/3/60
MAX DIAMETER (FT)	14
NUMBER OF FAN BLADES	5
MAX OP WEIGHT (LB)	168
NOTES	ALL

NOTES:
1. FAN CFM AIRFLOW SHALL BE RATED PER AMCA 230-15.
2. PROVIDE NEMA 4X VFD REMOTE MOUNTED MOTOR CONTROLLER. FAN MOUNTED MOTOR CONTROLLERS ARE NOT ACCEPTABLE.
3. PROVIDE REMOTE MOUNTED TOUCHSCREEN NETWORK INTERFACE WITH BACNET CAPABILITY FOR BAS INTERFACE.
4. PROVIDE DIRECT DRIVE MOTOR. GEAR DRIVEN SYSTEMS ARE NOT ALLOWED.
5. SEE SPECIFICATION FOR CONSTRUCTION AND OTHER REQUIREMENTS.

B ELECTRICAL HVLS FAN SCHEDULE
SCALE: N.T.S.

K:\01-Projects\19009-Pharr Aquatic Facility\Dwgs\MEP\E3.01.dwg Jul 10, 2019 - 1:59pm

MEP SOLUTIONS ENGINEERING
MECHANICAL, ELECTRICAL, PLUMBING ENGINEERS
600 E. BEAUMONT AVE. SUITE 2 McALLEN, TX 78501 (956) 664-2727
TEXAS BOARD OF PROFESSIONAL ENGINEERS REGISTRATION # F-9748

TWG
THE WARREN GROUP ARCHITECTS, INC.
1801 SOUTH SECOND ST.
SUITE 330
McALLEN, TX 78503
956.994.1900
twgarch.com

	REVISION	DATE	APPROVED BY	DESCRIPTION
1	ADD1	6/17/2019	TWG	ADDITIONAL INFORMATION PROVIDED
2	ADD2	6/21/2019	TWG	ADDITIONAL INFORMATION PROVIDED
3	ADD3	6/26/2019	TWG	ADDITIONAL INFORMATION PROVIDED
4	ADD4	7/3/2019	TWG	ADDITIONAL INFORMATION PROVIDED
5	ADD5	7/10/2019	TWG	ADDITIONAL INFORMATION PROVIDED

STATE OF TEXAS
ABRAM L. DOMINGUEZ
97393
LICENSED PROFESSIONAL ENGINEER
07.10.2019

PROPOSED

CITY OF PHARR/PSJA AQUATIC FACILITY

3001 N. CAGE BLVD
PHARR, TEXAS 78577

PROJECT	971805
DATE	06/07/2019
REVISED	07/10/2019

E3.01

ELECTRICAL LIGHTING FIXTURE SCHEDULE

Steel Truss over pool and diving pool

1. Galvanizing not required for these trusses

OPEN WEB STEEL JOISTS

1. ALL STEEL FOR JOISTS SHALL CONFORM TO THE STEEL JOIST INSTITUTE REQUIREMENTS FOR K-SERIES OPEN WEB JOISTS, AND VS-SERIES STEEL JOISTS, MINIMUM 50,000 PSI YIELD POINT.
2. ALL STEEL JOISTS SHALL RECEIVE MANUFACTURER'S STANDARD BASE PAINT, APPLIED BY DIPPING OR SPRAYING, BEFORE LEAVING THE SHOP
3. ALL STEEL JOISTS BEARING ON STEEL SHALL HAVE A MINIMUM 2 1/2" BEARING LENGTH AND SHALL BE WELDED TO THE STEEL WITH 2 WELDS AT EACH END, EACH 2 1/2" LONG. JOIST BEARING LESS THAN 2 1/2" SHALL BE DESIGNED BY THE JOIST SUPPLIER TO RESIST THE INCREASED STRESS. THE JOIST SUPPLIER SHALL SPECIFY SPECIAL JOIST SEATS AND ANCHORAGE REQUIREMENTS FOR DEFICIENT BEARING.
4. PROVIDE 2"x2"x1/4" ANGLE BOTTOM CHORD EXTENDS AT STEEL JOIST END AT COLUMN LINES OR AT JOIST NEAREST COLUMN LINES.
5. CHECK ARCHITECTURAL PLANS IF BOTTOM CHORD EXTENSIONS ARE REQUIRED.
6. BOTTOM CHORD EXTENDED ENDS SHALL NOT BE INSTALLED UNTIL AFTER ROOF HAS BEEN COMPLETELY INSTALLED.
7. ROOF TOP A/C UNITS SHALL HAVE AN OPERATING WEIGHT NOT TO EXCEED 500 LBS. AND SHALL BE LOCATED OVER A MINIMUM OF 2 JOISTS. ROOF TOP UNITS WEIGHING MORE THAN 500 LBS. SHALL BE LOCATED AS SHOWN ON THE MECHANICAL PLANS.
8. STEEL JOISTS TO BE DESIGNED PER DESIGN CRITERIA.
9. ALL STEEL JOISTS SHALL BE MANUFACTURED BY SMI, Seyco Joist or Acero Tecnología, S.A. de C.V., UNLESS OTHERWISE APPROVED BY THE ENGINEER.
10. PROVIDE ANGLES FOR SUPPORT AROUND OPENINGS AT METAL DECK.
11. STEEL JOIST SUPPLIER TO VERIFY THAT THE SPECIFIED JOIST MEET ALL THE MINIMUM REQUIREMENTS OF SJI BEFORE PROVIDING A BID.
12. MECHANICAL EQUIPMENT: SEE MECHANICAL PLANS. PIPES AND MECHANICAL EQUIPMENT SHALL BE SUPPORTED BY THE TOP CHORD OF THE STEEL JOISTS ONLY.
13. WHERE STEEL JOIST PASS THROUGH CMU WALLS, PROVIDE HALF INCH GAP BETWEEN THE CMU AND STEEL JOIST. PROVIDE ELASTOMERIC MATERIAL BETWEEN THE STEEL JOIST AND CMU.
14. PROVIDE CLOSURE ANGLE 3x3x3/8 AT ALL PERIMETER CONDITIONS TO FRAME OUT ALL ROOF PENETRATIONS UNLESS NOTED OTHERWISE.
15. JOISTS SHALL ALSO BE DESIGNED FOR AN ADDITIONAL 500 LB CONCENTRATED LOAD PLACED AT ANY POINT. THE MAXIMUM DEFLECTION SHALL BE L/600.

PROJ. NO.: 18323

STATE OF TEXAS
SIMON G. SOLORIO JR.
83066
REGISTERED
PROFESSIONAL ENGINEER

6/7/2019

CITY OF PHARR
AQUATIC FACILITY

Addendum 4

THE WARREN GROUP
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Structural Engineering

ADD- 4-01