City of Portland, Oregon - Bureau of Development Services
1900 SW Fourth Avenue • Portland, Oregon 97201 | 503-823-7300 | www.portlandoregon.gov/bds

Deferred Submittal Requirements and Application

Minimum Submittal Requirements (check all boxes and sign below):

For a full list of deferred submittal guidelines, please visit: www.portlandoregon.gov/bds/article/754963

- ☑ A copy of this application
- ☑ Plans stamped and signed by a Design Engineer or Architect registered in Oregon. One PDF copy of plans for electronic submittals or three copies for paper submittals.
- ☑ Calculations and product information. One PDF copy for electronic submittals or two copies for paper submittals.
- ☑ Prior to submitting the deferred submittal, the Engineer of Record and/or Architect of Record responsible for the building shall review the deferred submittal plans and supporting materials and add a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance with the design of the building. The notation shall be made on the deferred submittal drawings. Review stamps on letters of transmission are not acceptable.
  Exception: the notation is not required on deferred submittals for fire spinklers or roof trusses in residential construction when an Engineer or Architect of Record is not involved with the design of the building.
- ☐ Plan views and elevations identifying the location(s) as approved by the Engineer and/or Architect of Record must be submitted as appropriate but are required when the deferred submittal items include exterior elements.

I certify this deferred submittal application meets the minimum submittal requirements as outlined above.

Applicant Signature: _____ **Date:** 12/2/20

Applicant Submittal Information:

Applicant name: Zac Horton

Address: 2000 SW 1st Ave #420

City: Portland State: OR Zip Code: 97201

Phone: 503-438-9654 Email: zac@fasterpermits.com

Value of deferred submittal: $ 100,000 Issued main building permit #: 19-135162-CO, REV-01, REV-02

Job Site Address: 1525 SW Park Ave.

Description/Scope of work: Replace existing swimming pool with new pool

Contractor Name: Same as main CCB: _____

Engineer/Architect of Record for the building information (Not required for roof trusses in residential construction when an Engineer or Architect of Record is not involved with the design of the building)

Name: Seth Davis, Froelich Engineers Phone: (425) 442-6262

Design Engineer for the deffered items

Name: Haley A. Conrad, Water Technology, Inc. Phone: (920) 887-7375

Fees

An invoice with permit fees will be sent to the applicant once minimum submittal requirements have been verified. Deferred submittal (DFS) fees are collected in addition to the standard building review fee paid on the main building permit. DFS fees cover the cost of the additional processing and review time associated with the design build element. The DFS fee for processing and reviewing deferred plan submittals is 10 percent of the building permit fee calculated using the value of the deferred portion of the project with a minimum fee of $195 for 1 & 2 family dwelling projects or $510 for commercial and all other projects.

The Bureau of Development Services (BDS) fee schedule is also available on the BDS web site at www.portlandoregon.gov/bds/article/102792

Helpful Information

Bureau of Development Services
1900 SW 4th Avenue, Portland, OR 97201

Submit your plans to:
Development Services Center (DSC), First Floor,
For Hours Call 503-823-7310 | Select option 1
or visit www.portlandoregon.gov/bds

Important Telephone Numbers

BDS main number	503-823-7300
DSC automated information line	503-823-7310
Building code information	503-823-1456
BDS 24 hour inspection request line	503-823-7000
Residential information for one and two family dwellings	503-823-7388
City of Portland TTY	503-823-6868

Information is subject to change.

REQUEST FOR "APPLICANT PAID OVERTIME" *EFFECTIVE July 1, 2018*

The Bureau of Development Services (BDS) reviews plans based on project "due dates" that are determined by project type, scope and the date that the plans were taken in for review.

Some BDS permit plan review groups will accept requests for "Applicant Paid Overtime" (APOT) to review projects earlier than the projected due date. However, it is important to be aware that ALL ASSIGNED REVIEWS MUST BE APPROVED BEFORE A PERMIT CAN BE ISSUED AND WORK CAN BEGIN. This may mean that although APOT was paid to expedite the review done by a specific group, there may still be other reviews that must be completed before a permit can be issued. Applicant paid overtime for one section does NOT guarantee that a permit will receive priority processing by any other section, nor does it guarantee that the permit will be issued sooner than scheduled.

The hourly rate for each group is noted below. Time is billed in 1/4 hr increments with a 1/2 hr minimum. Applicant paid overtime requests are currently accepted by the following groups:

- Engineering $188.66/hr
- Septic $145.69/hr
- Life Safety $154.19/hr
- Site Development $188.66/hr
- Land Use Services $119.38 - $162.31/hr
- Permitting Services (Preissuance) $124.05 - 150.81/hr

Please note that requesting APOT does not guarantee that an overtime review will be performed, as not all reviewers are available to work overtime hours. Overtime fees will only be billed for those reviews performed by staff working beyond their normally scheduled hours. You will be notified if the review time will exceed (5) hours by any of the groups marked below.

By signing below, the permit applicant or authorized representative agrees to pay additional plan review fees for the following sections: (Please mark below the groups you are requesting applicant paid overtime from)

☑ Engineering
☑ Call if over (5) hrs Date_____

☑ Life Safety
☑ Call if over (5) hrs Date_____

☑ Septic
☑ Call if over (5) hrs Date_____

☑ Site Development
☑ Call if over (5) hrs Date_____

☑ Permitting Services (Preissuance)
☑ Call if over (5) hrs Date_____

☑ LUS
☑ Call if over (5) hrs Date_____

_____ 11/30/2020

Signature of Permit Applicant or Authorized Representative Date

Zac Horton

Print Name

19-135162-DFS-01-CO

Permit Number:_____

SECTION 000101
PROJECT TITLE PAGE

PROJECT MANUAL
FOR
SOUTHPARK SQUARE ROOF DECK RENOV. & POOL REPAIR

HOLLAND RESIDENTIAL

1525 SW PARK AVENUE
PORTLAND , OREGON 97201

DATE: 12.02.2020

PREPARED BY:
WATER TECHNOLOGY, INC.

END OF SECTION

19-135162-DFS-01-CO

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POOL GENERAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project administrative requirements that relate to Division 13 11 Pools.

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

B. The following contain requirements that relate in Division 13 11:

1. Mechanical/Electrical/Equipment Coordination: General Conditions, Supplementary General Conditions and Division 01 General Requirements
2. Earth Work and Pool Excavation: Division 31
3. Concrete Deck Work: Division 03
4. Mechanical: Plumbing Systems - Division 22, HVAC Systems and Equipment - Division 23
5. Electrical: Division 26

C. Applicable requirements of the following Codes and Standards apply to Work in Division 13 11:

1. Association of Pool and Spa Professionals (APSP)
   a. Minimum Standard for Public Swimming Pools
2. National Electrical Code (NEC)
3. National Sanitation Foundation (NSF): Seal of Approval Program
4. American Society for Testing and Materials (ASTM): Specifications referenced herein
5. Governmental Health and Building Codes
6. ADA Accessibility Guidelines for Buildings and Facilities
7. American National Standards Institute

1.03 REFERENCES

A. Refer to individual Division 13 11 sections.

1.04 DESCRIPTION OF WORK

A. Work of Division 13 11 includes, but is not limited to, the following:

1. Layout of all pool(s) and pool related work required under Division 13 11.
2. Project benchmarks and control points.
3. Excavation and stone fill as required for pool tank structure and pipe trenching. Refer to Division 01 and 31 for special conditions.
4. Pool vessels, as detailed on Contract Drawings and Shop Drawings.

5. Pool mechanical systems, including piping, recirculation system, filtration system, activity mechanical systems and water chemical treatment system.
6. Heating system for swimming pool. Coordinate venting and interlocking for pool heater(s) with HVAC Contractor.
7. Waterslide and water activity mechanical systems including all piping.
8. Interior pool finishes.
9. Pool deck equipment and accessory equipment shown and/or specified, including required anchors embedded within the pool deck and coordination with Deck Contractor.
10. Coordination of all electrical interlocks for pool and pool related equipment.
11. Miscellaneous pool testing, safety and control equipment.
12. Low voltage wiring for pool and pool related equipment is installed and connected by the Swimming Pool Contractor unless required otherwise by code. Where code requires that low voltage wiring is installed by a licensed electrical contractor, low voltage wiring is specified in Electrical Documents.

B. Definitions
1. The term "pool" as used in Division 13 11 shall refer to the following:
   a. Pool A – Leisure Pool
   b. Pool B - Whirlpool/Spa
2. The term "concrete" as used in Division 13 11 refers to concrete for swimming pool construction only.
3. The term "Architect/Engineer" as used in Division 13 11 refers to the swimming pool designer only.
4. The term "Contractor" as used in Division 13 11 refers to the swimming pool contractor only.
5. The term “Low Voltage Wiring” as used in Division 13 11 includes wiring <= 24V. All Low Voltage Wiring is Provided with the Equipment. Low voltage wiring is shown in Low Voltage Wiring Diagram included in the pool drawings except where specified by Electrical Consultant.
6. The term “Control Wiring” as used in Division 13 11 refers to connections from individual equipment components to the Building Management System (BMS).

C. Applicable Code, Permit and Inspection Responsibilities.
1. State and/or County Health Department permit fees by Owner.
2. Local Departments of Health inspection fees by Contractor.
3. Other permits/fees required paid by Contractor.
4. Scheduling of Required Inspections – Contractor
5. Documentation and Submission of accepted modifications to approved plans to
   Permit Authorities – Contractor.

D. Related Work Not in Division 13 11 Specified Elsewhere

1. Pool deck construction, including finishes, sealants, and drains.
2. Potable water or fresh water: Fresh water connection to auto fill and waste water connections (see Contract Drawings).
3. Pool electrical work: Electrical connections shall be by the General Construction Contract Electrical Sub-Contractor. The Pool Contractor shall provide the filter pumps, motors, solenoids, relays, water level probes (with housing), motorized valves, etc., as shown on Contract Drawings and required by pool systems equipment manufacturer. The Electrical Contractor shall install and wire electrical equipment furnished by the Pool Contractor and shall provide motor starters and disconnect switches as indicated or required by Codes. The Electrical Contractor shall provide grounding and bonding per NEC Article 680.
4. Control Wiring for all electrical and HVAC equipment shall be by the control system sub-contractor.
5. Heating system for pools, heater by the Pool Contractor; venting and controls by Division 23.
6. Surge Tank Ventilation System
    a. All surge tank ventilation, plumbing, and equipment shall be purchased and installed by the General Construction Contract Mechanical Sub-Contractor.
    b. All plumbing shall be Schedule 40 PVC.
    c. Exhaust fan shall be of non-corrosive materials, Plastec 20 model PLA 20, or equal.
    d. Pool Contractor to coordinate surge tank penetrations with Mechanical Contractor.
    e. The Electrical Contractor shall provide all wiring, bonding, and grounding per NEC Article 680.

1.05 QUALITY ASSURANCE

A. Qualifications of Pool Contractor:
1. Work of Division 13 11 shall be performed by a Pool Contractor who has a minimum of five (5) projects with a proven five (5) year record of competence and experience in the construction of similar facilities of this size and complexity.
2. Pool Contractor prequalification is required prior to bid. This must be received by the Architect fourteen (14) days prior to the bid date on the appropriate AIA form. (AIA A305)
3. Pool Contractor shall meet all Local and State Certifications and License requirements prior to bidding. Copies of the required Certificates and Licenses shall be made available upon request.

B. Performance Criteria: Certain sections of Division 13 11 contain performance criteria rather than product descriptions. It shall be the obligation of the Pool Contractor to ensure that all criteria are satisfied and the burden of proof of conformance shall rest with the Pool Contractor. The Architect/Engineer shall

require complete calculations, past performance records and, if required, inspection trips of similar facilities to substantiate conformance with these criteria. The Architect/Engineer shall be sole judge of conformance, and the Pool Contractor is cautioned that he will be required to provide a finished product meeting all stated criteria and meeting or exceeding Department of Public Health requirements.

C. All work of Division 13 11 shall be performed by the qualified Pool Contractor or a Subcontractor to the qualified Pool Contractor unless otherwise pre-approved in writing by the Architect/Engineer. A representative of the Pool Contractor shall oversee work subcontracted by the Pool Contractor.

D. The following shall be performed during construction of the project.

1. Refer to General Conditions, Division 01, and other Division 13 11 sections for further requirements.

1.06 SUBMITTALS

A. Submittals Required

1. Refer to General Conditions, Division 01, and individual Division 13 11 sections for number required.
2. The Contractor shall submit for approval to the Architect/Engineer complete lists, including descriptions, catalogs, product cut sheets, etc., and where applicable dimensioned shop drawings of all material, fixtures and equipment to be furnished and installed as part of Division 13 11.
3. Submittals shall adequately and completely describe the equipment, including where necessary or requested complete construction and installation dimensions, complete capacity and performance data, all accessories and auxiliary equipment and all pertinent details of manufacture.
4. Submittals shall be provided complete and bound in a 3-ring binder or as pre-approved by Architect/Engineer.
    a. Contractor’s Option – In lieu of paper copies indicated above, submit in Adobe PDF electronic file format via email file size (10 MB max.). Create PDFs at native size and right-side up; illegible, partial, unlabeled or unorganized submittal sections will be returned rejected. Contractor shall make their own copies from the original returned by the Architect.

B. Product Data: Provide manufacturer's/installer's written installation instructions.

C. Shop Drawings

1. The drawings accompanying this Specification are diagrammatic in nature and show the general arrangement of all equipment, piping, ductwork, services, etc. Because of the small scale of the drawings, it is not possible to show all offsets, fittings and accessories that may be required. The Contractor shall carefully investigate the structural and finish conditions of his work and shall arrange such work accordingly; furnishing all fittings, pipe and accessories that may be required to meet such

conditions. Where conditions necessitate a rearrangement, the Contractor shall obtain the Architect/Engineer's approval.

2. Shop drawings for equipment shall be submitted, and Engineer's review of shop drawing shall be obtained before proceeding with fabrication. Shop drawings shall not be "doctored" reproductions of Architect/Engineer's drawings.

D. Samples: Submit samples of materials, finishes, and trim as requested by the Architect/Engineer.

E. Schedule of Values

1. Provide Architect/Engineer with a copy of the Schedule of Values developed for this project relevant to Division 13 11 for approval.

F. Valve Charts: Submit two (2) copies of valve charts for each piping system, consisting of Isometric Drawings or piping layouts showing and identifying each valve and describing its function to the Architect/Engineer for approval.

1. Upon completion of the Work, one (1) copy of each chart sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung in a conspicuous location in the equipment room.

G. Furnish to the Architect/Engineer the following:

1. Refer to individual Division 13 11 sections for additional requirements.
2. Submittals
    a. Shotcrete Nozzle Man Qualifications and Certifications
    b. Pool Finish Experience/Qualification Requirements
    c. Concrete Mix Design
    d. Non-shrink Grouts
    e. PVC and Pre-formed Plastic Adhesive Waterstop
    f. Expansion/Construction Joint Materials
    g. Caulking/Sealants
    h. Pumps and Strainers
    i. Heater(s)
    j. Chemical Controller(s)
    k. Chemical Feeders
    l. Bulk Chemical Storage Tanks
    m. Valves
    n. Gauges
    o. Flow Meters
    p. Thermometers
    q. Pool Water Test Kit
    r. Inlets
    s. Grating
    t. Pre-fabricated Submerged Outlets
    u. Under Water Pool Lighting
    v. Deck Equipment
    w. Safety Equipment
    x. Maintenance Equipment

y. Piping Materials (pipe, fittings, solvents, cements)
z. Wall Sleeves and Seals for Piping
aa. Tile Setting Materials and Joint Fillers

3. Shop Drawings
   a. Reinforcing Steel
   b. Water Activities
   c. Filters
   d. Stainless Steel Gutter
   e. Precast Pool Coping Stone
   f. UV Disinfection System
   g. Concrete Pump Pit & Surge Tank Penetration Drawings
4. Test Results
   a. Water Treatment Analysis
   b. Compaction
   c. Piping Pressure Testing
5. Samples
   a. Special Aggregate – Factory and Field Applied
   b. Tile
   c. Gratings
6. Guarantees/Warranties
   a. Standard 1-Year
   b. Standard 5-Year on Quartz Aggregate Finish
   c. Standard 2-Year on Pool Finish Application
   d. Special Equipment – Standard Manufacturer's Warranty
   e. Future 3-Days of Instruction and Operational Checkout
7. Close Out Documents
   a. O & M Manuals
   b. Record Drawings
   c. Owner's Certification of Instruction
   d. Extra Materials

1.07 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

B. Along with the Shop Drawings, the Contractor shall submit, in duplicate, a certificate properly attested, stating the material, equipment, and construction comply with the requirements of the Contract Documents, for all equipment and materials proposed as a Substitute for the specified equipment and materials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01 of the Specifications for additional requirements.

B. Deliver all materials and equipment to the work site in original packages, fully identified with manufacturer's label. Store off ground and protect from weather with a suitable covering.

C. Protect plastic pipe from exposure to chemicals (aromatic hydrocarbons, halogenated hydrocarbons and other esters and ketones) that might attack the material. Protect all pipes from mechanical damage and long exposure to sunlight during storage.

1.09 WARRANTIES

A. Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to General Requirements and Division 01 of the Specifications for additional requirements.

B. All standard manufacturer's warranties shall apply to all equipment and products provided by this Contractor.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 EQUIPMENT BASES AND SUPPORTS

A. Provide for major equipment, reinforced concrete housekeeping bases poured directly on structural floor slabs (or as required by equipment manufacturer) 4 inches thick minimum; unless noted otherwise on plans, extended 4 inches beyond machinery bedplates. Provide templates, anchor bolts, vibration isolators, and accessories required for mounting and anchoring equipment. Anchorage system shall be in accordance with the equipment manufacturer's specifications and local code requirements. Consult with equipment manufacturer for length and installation of anchor bolts.

3.02 CLEAN UP AND PROTECTION

A. After work of Division 13 11 has been completed, clean up work areas and remove all equipment, excess materials, and debris. Protect pool from damage until substantial completion. Remove and replace equipment and finishes that are chipped, cracked, abraded, improperly adhered, or otherwise damaged.

B. At turnover to Owner, Contractor shall be responsible for, but not limited to, the following:

1. Vacuuming and cleaning all pool floors, steps and walls.
2. Cleaning all depth marker tiles, pool tile and gutter grating.
3. Cleaning and waxing of all pool deck equipment, water features and stainless steel products per Manufacturer’s instructions.
4. See also Division 01 Specification requirements.

END OF SECTION

SECTION 13 11 14

POOL START-UP, MAINTENANCE & OPERATIONS TRAINING

PART 1 GENERAL

1.01 SECTION INCLUDES
- A. Pool start-up and chemical balancing of water.
- B. Training of the Owner's personnel in pool operations procedures.

1.02 RELATED DOCUMENTS
- A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 DESCRIPTION OF WORK
- A. Water treatment and balancing.
- B. Operations and maintenance instruction and manuals.

1.04 SUBMITTALS
- A. Operations and Maintenance (O&M) Manual
  1. Pool Contractor shall deliver to the Architect/Engineer water sample location, analysis test results, SI calculation, and chemical adjustment calculations as required per Part 3.02.
  2. Pool Contractor shall deliver to the Architect/Engineer, bound together in a three-ring binder a complete manual, four (4) complete sets of operating and maintenance instructions for the swimming pool structure(s), finishes, and all component equipment. O&M Manual shall include, but is not limited to, the following:
     - a. Table of contents.
     - b. All equipment cut sheets.
     - c. Accurate parts lists.
     - d. Pool start-up, emptying, and winterization instructions.
     - e. Pool cleaning instructions.
     - f. Pool maintenance requirements, divided into the following:
       - i. Daily
       - ii. Weekly
       - iii. Monthly
       - iv. Seasonally
       - v. Annually
     - g. Narrative on the pool operation through all sequences.
     - h. A DVD of complete start-up and shut-down procedures and training session.
     - i. Trouble shooting information and procedures.
     - j. A schematic of piping as installed.

k. Valve charts for each piping system, consisting of isometric drawings or piping layouts showing and identifying each valve and describing its function.
l. Copy of Measurement Certification of Permanent Racing Course
m. Record Drawings
n. Warranties

PART 2 MATERIALS

2.01 NOT USED

PART 3 EXECUTION

3.01 OPERATIONS & MAINTENANCE INSTRUCTION

A. Provide an experienced swimming pool operator-instructor (NSPF Certified Pool Operator, or equivalent certification) for a period of not less than three (3) days (two (2) full days operations and start-up, and one (1) full day shut-down assistance) after the pool has been filled and initially placed into operation.
   1. During this period, the Owner's designated representative(s) shall be thoroughly instructed in all phases of the pool's operation, including start-up, emptying, and winterizing procedures.
   2. Prior to this instructor leaving the Site, instructor shall obtain written certification from the Owner's designated representative acknowledging that the instruction period has been completed and all necessary operating information provided.

B. Include the cost of three (3) additional days of instruction and operational checkout/verification by an experienced swimming pool operator-instructor during the first year’s operation. Written reports of each of these three (3) visits outlining the pool's operation, competence and performance of the pool's operating personnel and other pertinent comments shall be submitted to the Owner and Architect/Engineer within one week after each visit.

C. Provide a DVD documenting training and operational requirements, including start-up, emptying, and winterizing procedures.

D. In addition to initial pool instruction listed, the Pool Contractor shall perform the first season pool closing (winterizing) and the following season pool start-up, including all labor and materials required.

3.02 WATER TREATMENT AND BALANCING

A. Obtain a chemical analysis of the source/pool make-up water supply from a location as close as possible to the actual pool autofill. Conduct laboratory testing for the following parameters:
   1. Total Alkalinity [Parts per Million (ppm)]
   2. pH
   3. Calcium Hardness [ppm]
   4. Free Chlorine [ppm] & Combined Chlorine [ppm]

5. Total Dissolved Solids (TDS) [ppm]
6. Iron (Must test to a lower detectable limit of <=0.05 ppm)
7. Manganese (Must test to a lower detectable limit of <=0.01 ppm)
8. Copper (Must test to a lower detectable limit of <=0.1 ppm)

B. The following are ideal ranges for the water analysis test results. If results fall outside these ranges the Contractor shall make chemical adjustments to the water during the pool filling process until values within the ideal ranges are obtained.
1. Total Alkalinity: 80-100 ppm (for high pH disinfectants) 100-120 ppm (for low pH disinfectants)
2. pH: 7.4-7.6
3. Calcium Hardness: 200-400 ppm (Pools), 150-250 ppm (Spas)
4. Free Chlorine: 2.0-4.0 ppm & Combined Chlorine: 0.0-0.2 ppm
5. Total Dissolved Solids: Acceptable Start-up Range is not applicable (Maintain future TDS levels to within 1200 ppm above the start-up measurement)
6. Temperature: Ideal Range is +-2 degrees F from the desired pool operating water temperature.
7. Iron: <=0.05 ppm
8. Manganese: <=0.01 ppm
9. Copper: <=0.1 ppm

C. Contractor shall calculate the Langlier Saturation Index (LSI) using values from the water analysis. The formula for LSI is shown below. Calculations may be made easier using through use of Orenda Technologies Mobil App, or a similar calculator. The LSI values shall fall within an acceptable “balanced” range of -0.3 to +0.3. If the LSI is outside this range OR test values are outside the ideal range listed above, the Pool Contractor shall prepare to add chemicals to the pool water volume as required until all parameters are within the ideal ranges previously listed, and the LSI is considered “balanced”, Contractor is responsible for calculating required chemical additions and for adding all adjustment chemicals up until the time of project completion. Owner is responsible for providing the chemicals.

LSI Equation:
(pH) + (Temperature ºF) + (Calcium Hardness) + [(Total Alkalinity) – (CYA correction factor @ current pH)] – (TDS factor) = LSI

Equivalent Factors - Langelier Saturation Index (LSI)

Temperature (°F)	Temperature Factor	Calcium Hardness (PPM)	Calcium Hardness Factor	Alkalinity (PPM)	Alkalinity Factor	Cyanuric Acid (if present)	Cyanurate Correction Factor	Total Dissolved Solids	TDS Factor
32	0.0	5	0.3	5	0.7	**pH**	**Factor**	< 1000 ppm	12.10
37	0.1	25	1.0	25	1.4	7.0	0.23	1000 ppm	12.19
46	0.2	50	1.3	50	1.7	7.2	0.27	2000 ppm	12.29
53	0.3	75	1.5	75	1.9	7.4	0.31	3000 ppm	12.35
60	0.4	100	1.6	100	2.0	7.6	0.33	4000 ppm	12.41
66	0.5	150	1.8	150	2.2	7.8	0.35		
76	0.6	200	1.9	200	2.3	8.0	0.36		
84	0.7	300	2.1	300	2.5	Note: Only use if CYA is used in your pool. Only applies to >7.0pH. If so, select correction factor based on pool pH.		Note: most calculators assume **12.1** for under 1000ppm, or **12.2** for anything over 1000.	
94	0.8	400	2.2	500	2.6				
105	0.9	800	2.5	800	2.9				

D. Contractor shall provide a submittal to the Engineer/Architect after receiving the water analysis. Submittal shall include the following:
   1. Water sample location and analysis test results,
   2. SI Calculation,
   3. Chemical adjustment calculations indicating the following:
      a. Pool Volume
      b. Chemical Parameters requiring adjustment
      c. Chemicals required to make the adjustments
      d. Calculations showing amounts of each chemical addition that is required

E. Contractor shall provide list of required balancing chemicals with quantities to the Owner for Owner purchase immediately after receiving the approved submittal from the Engineer/Architect. The Owner shall be responsible for payment of water required to fill each pool one time for leak testing and a second time for the final pool start-up process. The Contractor shall be responsible for payment of any additional water and chemicals required due to draining and refilling of pools as needed for pool or pool piping repairs.

F. Contractor shall make chemical adjustments to the pool water during the pool startup process based on calculations provided in the approved submittal. It is critical to keep the pool water clean and balanced during the initial fill and while the pool plaster finish is curing. Follow all recommendations of the National Pool Plasterers Council for initial adjustments required during the plaster cure time. See additional requirements in Pool Finish Specification Section/s.

G. Stabilize pool water to within a range of 5 to 15 ppm maximum of cyanuric acid.

H. Heat pool water to within 5 degrees Fahrenheit of the desired pool operating temperature. Once this temperature is attained, the Pool Contractor shall enter the chemical controller settings for all chemical parameters. Do not enter chemical controller settings prior to reaching the desired pool operating temperature range.

END OF SECTION

SECTION 13 11 17

PREFABRICATED SWIMMING POOL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section includes the following:

1. Prefabricated Wall System
2. Prefabricated Gutter System
3. Prefabricated Inwall Steps
4. Prefabricated Side Drains
5. PVC Floor Underlayments
   a. PEM (Soft Floor)
   b. Fleece
6. PVC Floor Membrane
   a. Alkor200
   b. Alkor Evolution
   c. Alkor200 Anti-slip
7. Inlets
   a. Wall
   b. Floor
8. Accessories
   a. Floating Line Anchors
   b. Handrails
   c. Lane Markings
   d. Wall Targets

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 DESCRIPTION OF WORK

A. General

1. Provide pool manufacturer’s standard and/or custom components and assemblies integrated into a complete system that form a pool capable of withstanding imposed structural loads, thermally imposed movement, and deterioration from weather, site, and service conditions at a minimum as specified in this section.

B. Structural Performance

1. Provide wall panels, structural supports, structural connections capable of withstanding the effects of soil (backfill) pressures, and hydrostatic & other loads and resulting stresses within the limits without leakage and under the conditions indicated:
2. Lateral Backfill Loads:

a. Include lateral loads including lateral soil pressure, pool decks, other significant adjacent structures, and overburden created by compaction efforts performed in conformance with compaction techniques specified in this section.

3. Hydrostatic Loads
   a. Include lateral loads induced by the presence of water within the pool.
4. Lateral Live Loads
   a. Include loads induced by contact of swimmers with the structure under intended use conditions.
5. Seismic Loads
   a. Include lateral loads that may be induced into the structure from seismic activity. Consult applicable building codes and geotechnical information as required.
6. Load Combinations
   a. Design pool system to withstand the following load combinations:
      i. Lateral Backfill
      ii. Hydrostatic
      iii. Hydrostatic + Lateral Backfill + Lateral Live
      iv. Hydrostatic + Lateral Backfill + Lateral Live + Seismic
7. Deflection Limits
   a. Design assemblies to withstand design loads with deflections no greater than the following

i. Deflections listed are per typical design. If lesser deflection is required, please consult Myrtha for feasibility assessment.
ii. Structural Bracing: Horizontal deflection of 1/250 of the height, not to exceed 4mm.

C. Water Penetration for wall and floor Systems
1. Provide wall and floor assemblies manufactured and installed with no water penetration (leakage) through the system(s). PVC shall be continuous across connections between wall panels, between wall panels and floor membrane, and across joints between sections of floor membrane.

D. Definitions
1. Base Frame
   a. Structural steel member bolted to bottom panel flange and concrete foundation designed to provide adjustable interface between wall panels and concrete foundation.
2. Side Drain
   a. Drain typically placed at lowest portions of pool typically used to drain the pool but may also be used in conjunction with filtration. Often termed ‘Main Drain’.
3. Buttress

a. Structural steel member bolted to panel support or base frame and foundation designed to transfer applied loads to the foundation.

4. Floating Line Anchor
   a. Steel component at pool perimeter used to secure the ends of floating lines. May be one of several availably types depending on pool design.
5. Floor Underlayment
   a. Material placed between the foundation and the PVC floor membrane, which may be designed to cushion the floor, buffer imperfections in the floor finish, provide a sub-membrane drainage layer, etc.
6. Gutter
   a. Component of wall system designed to convey water from the pool along it's perimeter to the filtration system.
7. Gutter Mounted
   a. An accessory supported by steel brackets attached to the gutter system designed to reduce the need for deck equipment. May consist of handrails, line anchors, stanchion sockets, or other accessories.
8. Inlet
   a. Water distribution device located at finished pool wall or floor used to distribute water from filtration system into the pool.
9. Liquid PVC
   a. PVC dissolved in a solution that, when exposed to air, will bond to PVC and harden to form a seal.
10. Panel Support
    a. Steel member bolted to the wall panels at panel seams.
11. Primary Components
    a. Structural or critical elements of pool assembly.
    b. Primary components include, but are not necessarily limited to, base frames, wall panels, panel supports, buttresses, gutters, and gutter supports, concrete anchors, and PVC membrane.
12. PVC Membrane
    a. Flexible sheet PVC of typically small thickness formed into rolls for use in various applications.
13. PVC Rope
    a. Strips of PVC used in conjunction with a heat welding process to provide a primary seal in many applications.
14. PVC Cold Weld
    a. Process of bonding two stainless steel panels together providing a water tight seal.
15. PVC Welding

a. Process of bonding two or more PVC elements by using a special heat tool to melt adjacent layers of PVC then applying pressure to allow the melted layers to bond and cool.

16. Secondary Components
    a. Less critical elements of pool assembly and fasteners.
    b. Secondary components include, but are not necessarily limited to, fasteners, accessories, grilles, PVC sealants and seaming materials, and tile and tile components.
17. Structural Supports
    a. Base Frames, panel supports, buttresses, etc. designed to provide structural stability to wall system.
18. Wall Panels
    a. Fabricated sheet steel components, which when properly connected and supported, provide pool wall surface and waterproofing.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized experience in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer and the following:
    1. Has successfully completed five (5) projects similar in type.
        a. Exception: In lieu of the required number of projects, installer may engage one or more manufacturer-endorsed master installers with a minimum completion of 20 successful projects similar in type.

B. Manufacturer Qualifications
    1. A firm experienced in manufacturing pools similar to those indicated for this Project and with a record of successful in-service performance.
    2. Has successfully manufactured a minimum of 30 projects with a minimum of 50 bodies of water which have been installed within the past 5 (five) years.

C. ISO Registration
    1. Firm shall provide ISO 9001 (or better) certificate or provide evidence of successful-audited QA/QC program.
    2. Manufacturer shall present certificate of ISO 9001 (or better) registration or the following:
        a. Manufacturer will employ an independent testing agency chosen by Contractor to perform source quality-control testing and special inspections, and to prepare test reports.
            i. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
            ii. Manufacturer shall allow testing agency access to places where structural/primary components are being fabricated

or produced, and cooperate with testing agency and provide samples of materials as may be requested for additional testing and evaluation.

b. Manufacturer shall correct deficiencies in or remove and replace primary components that inspections and test reports indicate do not comply with requirements.

c. Additional testing, at manufacturer's expense, will be performed to determine compliance of corrected Work with requirements.

d. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Engineering Responsibility

1. Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

E. Source Limitations

1. Obtain all prefabricated pool systems through one source from a single manufacturer.

F. Product Options

1. The overall appearance of the pool is obtained through specific information such as overall geometry, components, colors, materials, and performance characteristics as provided on drawings and specifications. The evaluation of completed construction is subject to inspection for purposes of verification by reasonable methods including, but not limited to, post manufacture testing, field testing, and/or performance evaluation.

G. Aesthetic Effects

1. Do not modify intended aesthetic effects, as judged by Architect or aquatic consultant, except with Architect or aquatic consultant’s written approval.

2. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

H. Pre-Installation Conference

1. Conduct conference at Project site to comply with requirements in Division 1.

1.05 SUBMITTALS

A. Submittals Required

1. Refer to General Requirements and Division 01.

2. Product Data: Include material descriptions, performance characteristics, and finishes for each type of the following system components.

a. Wall Panels

b. Radius Wall Panels

c. Finger Wall

d. Structural Supports

e. Gutters

f. Connections & Interface Components
g. Drains
h. Inlets
i. Floor Underlayments
j. Floor Membrane
k. Accessories

B. Shop Drawings
1. Include plans indicating the type of system & structural components and the type and number of accessories provided.

C. Samples
1. For the following items, include coupons or sample components. Prepare samples from the same material to be used for the work.
a. Wall Panels
b. Exposed Membrane
c. Exposed PVC Profiles
d. Tile (Single tiles, or single sheets for mosaics)
e. Exposed Grilles and Grates

D. Product Certificates
1. Signed by manufacturer of pool system certifying that products furnished comply with requirements.

E. Engineering Reports
1. If requested by Architect/Engineer, manufacturer can submit static calculations and loads specific to the panel assembly.

F. Installer Certificate
1. Signed by manufacturer certifying that installation contractor complies with requirements.

G. Manufacturer Certificate
1. Signed by manufacturer certifying that they comply with requirements.

H. Project References
1. Including project location, description of facility and bodies of water manufactured, and representative photographs.

I. Qualification Data
1. For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, and addresses of architects and owners, and other information specified.

J. Warranty Certificate
1. Manufacturer shall submit warranty certificate.

1.06 SUBSTITUTIONS
A. Refer to General Requirements and Division 01.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Refer to General Requirements and Division 01.

B. Packaging
   1. Deliver components and other manufactured items so as not to be damaged or deformed.
   2. Package small components together in crates or containers to prevent loss of small items.
   3. Package hazardous and/or sensitive materials together and clearly labeled to indicate use of caution or extra attention is required.
   4. Finished panels shall be covered with continuously applied adhesive-fixed protective layer to prevent damage to panel surface.
   5. Bundle and secure components to prevent scattering and damage to other materials during shipment.

C. Storage
   1. All pool components shall be stored and staged with sufficient site safety and security to ensure damage or losses from vandalism, theft, and weather do not occur.
   2. Stack non-structural materials on platforms or pallets, covered with tarpaulins or other suitable weather tight and ventilated covering. Store underlayment and boxed items to ensure dryness. Do not store wall panels, PVC membrane, PVC profiles, or other soft-finish items in contact with other materials that might cause staining, denting, or other surface damage, or in direct sunlight.
   3. Store hazardous materials as follows:
      a. Store in a climate controlled environment within temperature ranges specified by product manufacturer
      b. Keep out of direct sunlight
      c. Store away from open flame or sources of heat
      d. Comply with applicable safety regulations governing hazardous material storage and handling.

D. Handling
   1. Unload, store, and erect manufactured pool components to prevent bending, warping, twisting, and surface damage.

1.10 WARRANTIES

A. General Warranty
   1. 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. Special Warranty on Prefabricated Pool System
   1. Written warranty, executed by manufacturer agreeing to repair or replace pool system components provided by manufacturer that have failed and/or directly result in leakage of the pool.
   2. Warranty Period

a. Water-tightness and structural integrity-fifteen years from date of Substantial Completion. Plastic grille structural integrity-one year from date of Substantial Completion, (see manufactures warranty).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following

1. Myrtha Pools (Commercial Division of A&T Europe, S.p.A)

2.02 STRUCTURAL COMPONENTS

A. Primary components shall be fabricated by cold working from either AISI 304/L or 316/L or 441 stainless steel sheet or standard shapes.

B. Secondary components shall be grade AISI 304 stainless steel (minimum) and may be fabricated by hot-working as required.

C. Anchor Rods, Bolts, Nuts, and Washers

1. Grade AISI 304 stainless steel minimum.

D. Chemical Anchors

1. Chemical anchor capsules in accordance with ASTM E 1512.

2.03 PVC COATED STEEL MATERIALS

A. Stainless Steel Sheet: Grade AISI 304/L or 316/L or 441 stainless steel.

B. PVC-Coated Stainless Steel Plate

1. All PVC coated stainless steel components shall be constructed from PVC coated stainless steel sheet (or blanks) manufactured by hot calandering PVC to the stainless steel sheet. The bonded PVC shall withstand tensile (de-lamination) force of 27 lb on a sample if 1” at 180° angle de-lamination.

2.04 PVC MEMBRANE

A. Floor Membrane

1. PVC floor membrane shall be a reinforced PVC geo-membrane (chemically coated fabric) with the following properties:

a. Minimum thickness of 1.5mm in accordance with ASTM D 374.

b. Minimum resistance to tearing of 90 lb/90 lb in accordance with ASTM D 1004.

c. Minimum resistance to peeling of 130/130 N/mm in accordance with ASTM D 638

2.05 GENERAL FABRICATION

A. Design components and field connections required for erection to permit easy assembly.

1. Mark a minimum of one of each part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate elements to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

B. Primary Components
1. Shop-fabricate all aspects of primary structural components and panels.
2. Punch/bend all elements including punching of holes for filtration components, through-panel fasteners, lights and accessories, bolted connections and bending of flanges for bolted connections and recesses.
3. Field cutting/modification of primary components is not permitted.

2.06 STRUCTURAL SYSTEM

A. Structural Elements
1. Manufacturer's standard structural primary system, designed to withstand required loads and specified requirements.
2. Primary system includes base frame, wall panels, panel supports, buttresses, gutter supports and gutters.
3. Provide structural elements with required splice members. Factory drill or punch for field-bolted assembly.
   a. Slight variations in pool depth, locations of accessories, and locations of change in floor slope may be acceptable if necessary to meet manufacturer's standard, as approved by Architect/Engineer.
4. Base Frames
   a. ‘C’-shaped sections fabricated from cold-worked steel (14ga (2mm) steel sheet minimum).
   b. Frame construction shall ensure tight horizontal tolerance and allow for vertical adjustment to compensate for variations in finished concrete.

B. Wall Panels
1. Panels fabricated from cold-worked PVC laminated steel (14ga (2mm) steel sheet minimum).
2. Panel construction shall provide for flanged-bolted connections with compatible steel with no through-panel fasteners below tile line.
3. Flange bolt spacing shall not exceed 6” without utilizing flange stiffening element.
4. Wall panels will have a protective plastic film on the interior face (water side) of the panel that will be removed during the installation process, before the pool is filled with water.
5. Wall panels will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.

C. Panel Supports
   1. Panel supports fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Flanges, connection plates, and stiffening elements shall be fabricated by cold-working (no steel welding is permitted).

D. Buttresses
   1. Structural braces fabricated from 14ga (2mm) steel sheet minimum. In lieu of fabrication from cold-worked sheet, buttresses may be fabricated from hot or cold formed standard angle, c, zee or other standard section provided all additional flanges, connection plates, and stiffening elements are fabricated by cold-working (no steel welding is permitted).

E. Gutter Supports
   1. Brackets fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Gutter supports shall be fabricated integrally with panel supports or separately provided gutter support construction provides for bolted connection to panel supports.

F. Gutter
   1. Channels fabricated from cold-worked PVC laminated steel (14ga (1.5mm) steel sheet minimum).
   2. Gutter construction shall provide for flanged-bolted connections with compatible steel between gutter segments.
   3. Gutter splice plates are not permitted.
   4. Gutters/gutter supports for tile finished gutters shall be constructed with permanent adjustment system to level gutter at skim line prior to installation of tile (floating of tile on gutter or adjustment of coping over 1/8” to obtain level skim is not permitted).
   5. Gutters will have a protective plastic film on the interior face (water side) of the gutter that will be removed during the installation process, before the pool is filled with water.
   6. Gutters will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.

G. Gutter Drain Flanges
   1. Flanges fabricated from hot or cold formed steel.
   2. Flanges may be secured to gutter or gutter drain manifold by steel welding.
   3. Flanges shall be fabricated to connect to standard PVC flanges.
   4. Gutter drains placed in accordance with the architect’s/engineer’s drawings.
   5. No flanges in the gutters are permitted; this would obstruct the free flowing of water into the drain.

H. Structural Anchoring
   1. Provide anchoring to foundation as follows:
      a. Rods: AISI 304 Stainless Steel in Epoxy filled holes in accordance with anchor manufacturer’s written instruction.

I. Connection Hardware
1. Provide stainless steel bolts, nuts, washers, screws, etc. for fasteners in permanent contact with stainless steel elements, whether through head contact or by penetration through the steel. Bolts/nuts shall be fabricated to prevent seizing (standard bolts with field-applied anti-seize solution are not acceptable).

2.07 ACCESSORIES
A. Line Anchors
1. Shall be designed and fabricated to withstand forces specified by floating line manufacturer or by recognized swimming authority.
2. Line anchor construction shall utilize third party bracing elements (not solely supported by wall panel) and/or utilize pool structural system to provide resistance to service forces (line anchors secured only to wall panels are not permitted).
B. Gutter Mounted Elements
1. Shall be designed and fabricated to withstand forces specified by accessory manufacturer and/or recognized swimming authority in addition to those service conditions specified by governing code officials.
2. Exposed steel shall be polished stainless steel, to a minimum 500 grit.
C. Side Drains
1. Shall be fabricated from cold worked PVC laminated steel (14ga (2mm) minimum) and/or rigid PVC to facilitate PVC membrane welding at drain edges or fabricated from sheet steel having 16ga (2mm) minimum thickness be equipped with a steel flange, counter flange, two gaskets, compatible fasteners designed to prevent seizing.
2. Drains shall be designed and fabricated to facilitate monolithic concrete slab or block-out type installations and concrete bonding.
3. Drains shall be equipped with grounding lugs or holes for connecting grounding wiring.
D. Side Drain Grating
1. Shall meet the current code ASME A112.19.8-2007.
E. Grab Rail Anchors
1. Grab rails not penetrating PVC shall be anchored with metallic anchors mounted in concrete. Anchors shall be designed and fabricated to withstand required loads and facilitate simple removal and replacement of the grab rail without damage or part replacement.
2. Grab rail and grab rail anchor sizes shall be coordinate to ensure compatibility.
F. Grab Rails
1. Shall be fabricated from polished stainless steel having outside diameters as noted on drawings.
2. Grab rail and grab rail anchor sizes shall be coordinate to ensure compatibility.

G. Gutter Grilles
   1. Grilles fabricated in multiple-interchangeable segments.
   2. Grilles shall be fabricated with buffers or slats parallel to pool edge to limit deck splash-over.

H. PEM (Soft Floor Mesh)
   1. PVC mesh [Poly Extruded Matting] is a heat and pressure bonded, non-woven, flexible plastic material with superior tear strength (350psi: ASTM D-624-91), low brittleness in cold weather climates (ASTM D-746-79), significant tensile strength (2190psi: ASTM D-412-92), and contains admixtures to prevent microbial growth.

PART 3 EXECUTION

3.01 COORDINATION

A. Coordinate size and location of concrete footings, stem walls, and floors. Concrete, reinforcement, and formwork requirements are specified in Division 13 Section "Pool Concrete."

B. Facilitation of storage and staging of hazardous and non-hazardous materials in conformance with ‘Delivery Storage & Handling’ requirements.

3.02 PROJECT CONDITIONS

A. Site Conditions
   1. Installation contractor shall confirm in writing suitability of project site to proceed with installation. Items to be confirmed shall include but are not necessarily limited to:
      a. Accessibility to pool area.
      b. Safety of pool excavation.

B. Weather Limitations
   1. Proceed with installation only when weather conditions permit installation according to manufacturer's written instructions and warranty requirements. Various phases of installation may have differing requirements.

C. Field Measurements
   1. Prior to commencement of installation, site conditions shall be approved in writing by installation contractor as specified in Section 3.01 ‘Examination’. As projects may be phased, installation contractor shall only approve those portions of the project ready for pool installation.

D. Concrete Surfaces
   1. At all times concrete floor shall be protected from oil, paint, solvents, etc., as many of these items will damage PVC membranes. Installation contractor and manufacturer shall be notified in writing if such items do come in contact with concrete floor. These items shall be remedied as required by manufacturer at Contractor’s expense.

E. Field Measurements

1. Construction of the pool foundation and floor shall be coordinated and confirmed as follows:
    a. A survey shall be conducted of the formwork for the foundation for the complete pool system (including footings and floor slab) by a qualified independent surveyor. A drawing and/or report of their findings shall be submitted for review. Along with other applicable information, statement of compliance with construction documents is required. Surveyor shall specifically consider the following:
        i. World and relative placement of pool foundation
        ii. Vertical and horizontal line
        iii. Elevation
        iv. Allowable construction tolerance

F. Survey
1. Upon completion of the concrete pool foundation, a final survey will be conducted by installation contractor.
2. A drawing and/or report of their findings shall be submitted for review.
3. Deficiencies in any of the areas listed below shall be identified along with other applicable information.
4. The installation contractor along with the manufacturer shall note in writing any possible recommendations for correction of deficient conditions and advise of possible delays and additional costs that may result as soon as possible, specifically considering the following:
    a. World and relative placement of pool foundation
    b. Horizontal line
    c. Elevation
    d. Concrete finish

3.03 PREPARATIONS

A. Clean Concrete as follows:
1. Mud and dirt shall be swept or washed from concrete floor.
2. Oil, paint, and solvents shall be cleaned and surfaces treated per manufacturer’s recommendations as required.

3.04 TANK INSTALLATION

A. Install pool system according to manufacturer's written instructions and installation drawings.
B. Install grounding for steel components according to applicable articles and governing codes.
C. Prior to component installation, all primary components shall be inspected for damage or defect. Do not install damaged or defective components. Notify pool manufacturer immediately of any damaged or defective components.
D. Do not field cut, drill, or alter primary members without written approval from pool system manufacturer.

E. Set primary and secondary components in locations and to elevations indicated and according to manufacturer's written specification. Maintain structural stability of pool during installation.

F. Base Frame
   1. Connect all base frame elements and set into position prior to leveling to ensure all components are manufactured to the required overall dimensions.
   2. For straight wall pools, attach base frame to concrete as required to ensure both finished line and elevation are maintained throughout installation.
   3. For radius walls, install elevation adjusting bolts after installing wall panels. Do not permanently fix base frame to concrete until all primary components are connected.

G. Wall Panels, Panel Supports, Buttresses, and Gutter Supports.
   1. Stage wall panels as required around pool perimeter to protect panel surface at all times.
   2. Remove protective panel covering from connecting flanges to prevent covering from being trapped between connecting flanges.
   3. Connect wall panels to base frame, panel supports and adjacent wall panels per manufacturer's recommendations with as few bolts as required to prevent gapping between panels. Gutter supports may be installed at this time.
   4. Connect buttresses to panel supports and panel supports to foundation to ensure walls are properly braced during installation.
   5. After wall segments are installed from end-to-end, install remaining fasteners and tighten per manufacturer's recommendations.
   6. Perform final adjustment of wall verticality (and horizontal line if necessary).

H. Final tighten anchors.

   Gutters & Gutter Supports
   1. Connect remaining gutter supports to panel supports.
   2. Attach gutter segments to wall panels/gutter supports/adjacent gutter segments per manufacturer's recommendations with as few bolts as required to prevent gapping between gutter segments.
   3. Final tighten gutter segment-to-gutter segment flanges.
   4. Final tighten remaining fasteners.
   5. For curved wall pools, once all primary elements are connected and tightened, adjust base frame elevation adjusting bolts to level pool structure. Level should be measured from tile recess. Once structure is level and plumb, spot measurements from the finished pool line to the traced pool line should be recorded. Contractor must be informed in writing of line deviations in excess of 25mm (1"). Once line is confirmed, the base frame should be anchored to foundation as required.

6. Once all gutter segments are fixed place, adjust all skimming sections of gutters to constant water level.

3.04 WALL PANEL SEALING

A. General
   1. Install uniform-watertight PVC seals.
   2. Wall panel sealing shall be performed according to manufacturer's written instructions.
   3. Mechanical (welded PVC) and chemical seals shall be applied within temperature and climatic ranges specified by manufacturer.

B. Mechanical Seals
   1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent. Rinse surfaces.
   2. Install PVC rods and/or strips to minimize joints and splices.
   3. Rods and strips shall be welded to panel to ensure good bond, free of exposed scorching, and free of substrate blisters and wrinkles.
   4. Exposed edges of strips and rods shall be chemically sealed as specified in the following item 3.04.D 'Chemical Seals'.

C. Chemical Seals
   1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent. Rinse surfaces.
   2. Avoid application of harsh chemicals and primers on exposed-finished PVC.
   3. Ensure substrate remains dry throughout application and curing of chemical seal.
   4. Apply liquid PVC in thin layers to prevent forming of bubbles in curing PVC. Seal layers shall be free of such bubbles.
   5. Sealant layers applied within four hours over previous layers do not require additional cleaning before application of additional layers. After four hours, sealed surfaces shall be cleaned with cloth or sponge and mild detergent and water.

3.04 PVC MEMBRANE INSTALLATION

A. Install membrane according to manufacturer's written instructions and installation drawings.

B. Prior to permanent fixing or welding, PVC membrane shall be inspected for visible defects or blemishes. Do not install damaged or defective membrane. Notify pool manufacturer immediately of any damaged or defective membrane.

C. PVC membrane shall be stretched both longitudinally and transversely to prevent wrinkles from forming. Wrinkled PVC membrane shall be removed and replaced.

D. Seams
   1. All seams in membrane and connections between membrane and wall panels shall be heat continuously welded a minimum of 38mm (1½"). Heat welding devices explicitly designed for PVC membrane welding shall

be utilized for welding. Welds shall be spot checked per manufacturer's written instruction prior to final seam sealing.

2. PVC weld seams shall not extend into flanged accessory connections. Utilize secondary PVC section to provide uniform surface for flanged connections.
3. Exposed PVC membrane edges shall be sealed with liquid PVC or by heat sealing according to manufacturer's written instructions.

3.05 ACCESSORIES INSTALLATION

A. General
1. Install accessories according to accessory manufacturer and pool manufacturer's written instructions and installation drawings and install grounding for steel accessories according to applicable articles and governing codes.

B. Underwater Lights
1. Install light niches prior to pool backfill.
2. Light gaskets shall be in good condition and without permanent deformation. For niches with counter-flange and pool-side flange, install gaskets between niche counter-flange and panel and between flange and panel.
3. Install electrical components/grounding according to applicable articles and governing codes.

C. Floor Inlets
1. Remove screws, cover plates, flanges, and gaskets and store well-marked in secure location.
2. Setting
   a. Floor inlets cast into concrete in original foundation pour shall be protected with duct tape or by other durable means to prevent damage to inlet body. Install protection immediately upon installation of inlet and leave in place until flanges are installed.
   b. Set inlets as required to flush flange of inlet with finished top surface of PVC floor membrane. Setting may require recessing floor inlet in concrete for floors with no underlayment.
3. Securing
   a. For floor inlets positioned on concrete floors with slope in excess of 5 degrees (approx 1:12), do not cut floor membrane for inlet until water is filled within 2' (horizontal) of inlet to prevent wrinkles from forming near floor inlet.
   b. For floor inlets in line with floor membrane seams, install PVC membrane ring having a minimum radius of 62mm (2½") greater than the inlet flange radius (flange diameter +124mm [5"])centered about floor inlet in conjunction with 3.08.C.3.a. Trim PVC floor membrane approximately 12mm (½") greater that flange radius (flange diameter +25mm [1"]). Weld approximately 50mm (2") of

floor membrane to top surface of PVC membrane ring. Liquid seal cut/exposed edges of PVC membrane according to section 3.04.C 'Chemical Seals'.

c. Install all screws in inlet flange according to manufacturer's recommendations regarding screw torque. Do not over-tighten.

4. Install screws, cover plates, flanges, and gaskets immediately prior to pool commissioning.

D. Wall Inlets

1. Remove locking rings and adjustable eyelet assemblies and store well-marked in secure location.
2. If supplied, install protective cover caps until locking rings and eyelets are installed.
3. Install locking rings and adjustable eyelet assemblies immediately prior to pool commissioning.

E. Side Drains

1. Remove grille and install under-membrane drain sub-assembly (if supplied). Install temporary wood or other protective covering securely over drain.
2. Install grounding according to applicable articles and governing codes.
3. Set drain body flush with panels.
4. Temporarily remove bracing members located over drain flanges as required to facilitate drain plumbing pressure testing. Immediately re-install bracing members upon completion of testing.
5. Install drain grilles immediately prior to pool commissioning.

F. Water Toys

1. Water toys shall be equipped with steel and/or rigid PVC flange and counter-flange and two gaskets.
2. In lieu of manufacturer supplied counter flanges and gaskets, pool system manufacturer or pool installer may provide a custom structural steel counter flange and gaskets or rigid PVC counter flange drilled to facilitate mechanical or chemically anchored fasteners per toy manufacturer's recommendations along with required gaskets. Pool system manufacturer shall supply installation details of custom systems/installations.

3.06 ERECTION AND LOCATION TOLERANCES

A. Horizontal Line

1. Face of pool at pool edge shall remain within +/- ¼" of designed dimensions.

B. Structure Elevation

1. Elevation of wall system below tile or coping shall remain within +/- 1/8" of required elevation to achieve finished pool water level.

C. Finished Skim Elevation

1. Finished elevation of skimming tile or coping shall remain within +/- 3/32” of specified pool water level.

END OF SECTION

SECTION 13 11 20

POOL PIPE AND PIPE FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, connections, wall penetrations.

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES/PIPE – FITTING REQUIREMENTS

A. The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.

1. ANSI/ASTM D2564 - Solvent Cements and ASTM F656 – Primers for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
2. ASTM D2855 – Practice for Making Solvent Cemented Joints with PVC Pipe and Fittings
3. ANSI/ASTM D1785 – Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Schedules 40, 80 and 120, NSF Seal for Potable Water
4. ASTM D2466 – PVC Plastic Pipe Fittings, Schedule 40, Injection Molded, Sizes Through 12”, NSF Listed. As manufactured by Spears Manufacturing Company, “or approved equal”.
5. ASTM D2467 – Socket Type PVC Plastic Pipe Fittings, Schedule 80, Injection Molded, Sizes through 12”, NSF Listed. As manufactured by Spears Manufacturing Company, “or approved equal”.
6. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
7. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
8. ASTM D-1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (Modified Proctor Maximum Dry Density)
9. ASTM F679 – PVC Large Diameter Plastic Gravity Sewer Pipe and Fittings, Bell Gasketed Joints, Sizes 18” Through 36”. As manufactured by J-M Manufacturing Co., Inc. “Perma-Loc”, “or approved equal”.
10. ASTM B88 – Seamless Copper Water Tube
11. Eslon Engineering Manual for Plastic Piping Systems
12. ASTM D2563 – Fabricated, Fiberglass Wrapped PVC Pipe Fittings 12”, 14”, and above, Schedule 40 or 80 manufactured from PVC pipe conforming to ASTM D1785 and compliant to the most recent publication of the “Spears General Specification for Standard Fabricated Fittings

(FAB-7-702)". Butt-fusion welded fabricated fittings are not acceptable. All fittings shall be certified for potable water service by NSF. As manufactured by Spears Manufacturing Company or "approved equal"

13. CLASS 150 - All plastic pipe flanges shall be Class 150 and of the same schedule as the associated pipe with neoprene gaskets where required.

1.04 QUALITY ASSURANCE

A. Qualifications of Pool Contractor

1. Work of this Section shall be performed by a Contractor who has a proven record of competence and experience in the construction of similar facilities of this size and complexity for not less than 5 years. Contractors shall have an established record of reliability.

B. The following tests shall be performed during construction of the project. Refer to General Conditions and Division 01 for further requirements.

1. Testing and Flushing of Piping

a. Contractor shall be responsible for discovering leaks and making necessary repairs.

i. Pressure piping and suction piping: After the piece is laid, the joints completed and the trench partially backfilled, leaving joints exposed for examination, subject new lines to a hydrostatic pressure of not less than 50 pounds per square inch. Joints shall remain watertight under this pressure for a period of two (2) hours. All air must be expelled from pipes prior to testing.

ii. Gravity lines: A water test shall be applied to all gravity drain piping systems, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a 10 foot head of water (4.3 psi). The water shall be kept in the system, or in the portion under test, for at least fifteen (15) minutes before the inspection starts. System shall be water tight at all joints.

iii. Leaks shall be repaired and tested repeatedly until leakage or infiltration is approved.

b. Provide test results to the Architect/Engineer before covering with concrete.

1.05 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Product Data: For each type of manufactured material and product indicated.

C. Provide Shop Drawings showing all pipe penetration locations through concrete pump pit walls and concrete surge tank walls. Include dimensioned location of pipe penetrations in plan and elevation view, pipe sizes, sleeve sizes, link-seal sizes, and sleeve and link-seal material/product information.

D. Provide a submittal including system drain valves and location of drain valves for Owner's use during pool shut-down and/or pool winterizing.

1.06 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

PART 2 PRODUCTS

2.01 PIPE BEDDING & BACKFILL MATERIALS

A. Pipe Trench Foundation/Subbase: In-situ soils meeting the Project Geotechnical Report requirements for preparation. Trench base materials shall be free of large rocks, organic matter, and other deleterious substances.

B. Pipe Trench Embedment Zone (bedding, haunching, initial backfill):

1. Existing subsoil materials shall not be used for pipe bedding.
2. Condition 1: ASTM D 2487 Class IA Aggregate.
    a. Manufactured aggregates containing little or no fines including angular, crushed stone or rock, crushed slag, cinders, or shell.
    b. Open graded, clean: < = 10% Passing No.4 sieve, < 5% Passing No. 200 sieve
    c. Maximum pipe diameters >=6": Maximum aggregate size <= 1.5".
    d. Maximum pipe diameters <6": Maximum aggregate size 3/4".
    e. Where conditions may cause migration of fines into the trench from adjacent soil (and loss of pipe support) apply Condition 2 and use Class 1B Aggregate. Alternatively, include the addition of a filter fabric between the trench and Class 1A aggregate to prevent migration of fines into the embedment zone.
3. Condition 2: ASTM D 2487 Class IB Aggregate.
    a. Use where conditions may cause migration of fines from adjacent soil and loss of pipe support. Process materials as required to obtain gradation which will minimize migration of adjacent materials.
    b. Manufactured processed aggregates; angular, crushed stone (or other Class IA materials) and stone/sand mixtures with gradations selected to minimize migration of adjacent soils
    c. Dense graded, clean: < = 50% Passing No.4 sieve, < 5% Passing No. 200 sieve
    d. Maximum pipe diameters >=6": Maximum aggregate size <= 1.5".
    e. Maximum pipe diameters <6": Maximum aggregate size 3/4".

C. Final Pipe Trench Backfill: Use on-site existing soils meeting the Project Geotechnical Report requirements for backfill materials. Final trench backfill may not include organic material, clay, topsoil, or other deleterious substances. The source and suitability of all proposed off-site fill shall be confirmed by the Project Geotechnical Engineer prior to bringing material on site.

2.02 PIPE & FITTINGS

A. Refer to Section 1.03 for pipe and fitting requirements.
B. Refer to pipe schedule(s) on drawings for size and type.

2.03 THREAD TAPE
A. Teflon 2

2.04 SOLVENT CEMENTS AND PRIMERS
A. PVC pipe shall be installed using solvent weld materials including primers, cleaners, and cements. All solvent weld materials, methods, and applicator tools shall conform to all ASTM Standards for solvent cements used for plastic pipe installations.
B. Manufacturer: IPS Corporation, Weld-On Product Line

2.05 WALL SLEEVES
A. Pipes penetrating all water tight walls shall use "Century Line" thermoplastic wall sleeves in combination with “Link Seals” having stainless steel service designation. As manufactured by Thunderline Corporation, or the Metraflex Company, “or approved equal”.

2.06 NON-SHRINK GROUT
A. Upcon High Flow, The Upco Company, Cleveland, Ohio; Masterflow 713, The Master Builder Company, Cleveland, Ohio; Crystex L & M Construction Chemicals, Inc., Omaha, Nebraska.

2.07 PIPE SIGNAGE
A. Brady, B-946, custom legend, self-sticking markers and arrows or equal.

PART 3 EXECUTION

3.01 PIPE INSTALLATION
A. Pool Pipe Trench Excavation
1. General:
a. Excavation for all pool systems and related piping shall comply with the following:
i. Division 31 Earthwork Specifications for buried utilities.
ii. Project Geotechnical Report requirements for pipe trench preparation, backfilling, and engineered fill.
iii. Current OSHA criteria and regulations.
b. See pool pipe plans for additional piping details, notes/requirements, pipe routing, material types and sizes.
2. Pipe Trench Requirements: Excavate pool piping trenches to proper depths for pool operations, required pipe slopes, and a minimum final cover plus backfill depth of 36-inches. Trench widths shall be minimized as indicated in the Pool Drawings “Typical Pool Pipe Trench Detail” and as required for proper compaction. Maintain a clear trench width of 6 to

12-inches beyond the nearest pipe wall. Maintain a minimum of 6-inches between each adjacent pipe. Protect the soils adjacent to the trench to maintain an undisturbed condition for optimal pipe support.

3. Pipe Trench Foundation/Subbase: The trench bottom shall be smooth and free from large dirt clods, frozen material, and stones greater than 1.5-inches in diameter. A subbase is necessary only when native subgrade soils are unstable. For such conditions, over-excavate the subgrade soils and place a layer of supportive engineered fill material as the trench subbase. Compact subbase materials to provide a firm foundation for the subsequent pipe embedment materials. Match the compaction effort specified in the Final Backfill layer of the pipe trench.

B. Pool Pipe Bedding & Backfill

1. Embedment Zone: Controlled placement of pipe trench materials is required in the embedment zone for pipe performance and to minimize deflection. Schedule inspections prior to the backfilling as needed, however backfilling the embedment zone should follow pipe assembly as closely as possible to protect the pipe from falling debris, minimize the possibility of flooding an open trench and avoiding shifting pipe. See Part 2 PRODUCTS for material specifications and assure selected embedment zone materials are free from dirt clods, clay, frozen materials, and rocks greater than 1.5-inches in diameter. Place materials in six-inch lifts in the following three subzones:

   a. Bedding: Place six inches of supportive, compacted bedding materials beneath the pool piping to provide uniform longitudinal support under the pipe, prevent low spots, and to set piping to the proper grade. Do not use blocking of any type to bring the pipe to grade. If the native trench soil is comprised of fine grain soils and migration of those soils into the bedding material is anticipated, a well-graded bedding material without voids or a fabric barrier should be used to avoid compromising the trench backfill materials. Consult the Geotechnical Report for specific recommendations.

   b. Haunching: Haunching is required from the bottom of the pipe to the centerline of the pipe (“springline”). To provide resistance to pipe deflection compaction of the haunching zone is required prior to placement and compaction of the initial and final backfill. Place the haunching materials by hand to give effective support of the pipe Compact materials using shovel slicing and/or firmly tamping the materials under the pipe haunches, around the pipe, up to the spring-line of the pipe and out to the trench walls. If automatic tampers are used, avoid contacting and damaging the pipe. Control haunching to avoid vertical and horizontal displacement of the pipe from proper alignment.

c. Initial Backfill: The initial backfill extends from the pipe springline to a point above the top of the pipe. Place the initial backfill to a 12-inch minimum compacted depth of cover above the pipe.

2. Final Backfill: This zone extends from the top of the initial backfill to the top of the trench and up to final grade. Adjust final grades as required to allow for landscaping, flatwork, or roadwork materials if applicable. Place materials for this zone using materials and compaction efforts in accordance with the Geotechnical Report and/or Division 31 Specification requirements. If those requirements are not provided, place materials in accordance with the following:
   a. +- 2% of the optimum moisture content
   b. 12-inch maximum lifts, as measured in loose thickness.
   c. Uniformly compact each lift to a minimum of 95 percent of the material's ASTM D-1557 Modified Proctor Maximum Dry Density, prior to placement of subsequent lifts.
   d. Place each subsequent lift and compact in a similar manner until achieving proposed finished grades.
   e. Final cover plus backfill materials shall measure a minimum of 36-inches above the top of the pipe/s unless noted otherwise on the plans or details.

C. Piping Placement and Use
   1. Base Bid shall be on pipe materials shown. See the PL Drawings and associated schedules for required pipe material types.
   2. All material transitions shall be above-grade, flange to flange connections and include ribbed EPDM type rubber gaskets. Below-grade materials transitions will not be allowed.
   3. Piping must be laid on a grade so it will drain completely by gravity. In all instances where gravity drainage is not provided, the contractor shall install drain valves so that all lines can be drained completely. Shop drawings will be required on any such installation.
   4. No installation shall be made that will provide a cross connection or inter-connection between distribution supply for drinking purposes and the swimming pool that will permit a backflow of water into the potable water supply. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly covered and protected against dirt, water and chemical or mechanical injury. At the completion of work the fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.
   5. All gutter lines shall drain by gravity to the surge tank.
   6. All above grade outdoor piping shall be painted, in accordance with the manufacturer's recommendations, to protect against ultraviolet degradation.

D. PVC Pipe
   1. Cut all pipe with mechanical cutter without damage to pipe.

2. Placing and laying: Inspect pipe for defects before installation. Clean the interior of pipe thoroughly of foreign matter and keep clean during laying operation. Pipe shall not be laid in water or when trench conditions are unstable. Water shall be kept out of the trench until the pipe is installed. When Work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipes or fittings.
3. Threaded joints: After cutting and before threading, the pipe shall be reamed and shall have burrs removed. Screw joints shall be made with graphite or inert filler and oil or with an approved graphite compound applied to male threads only. Threads shall be full-cut and not more than 3 threads on the pipe remained exposed. Use Teflon II tape on the male threads of all threaded pipe joints. Caulking of threaded joints to stop or prevent leaks will not be permitted. Unions shall be provided where required for disconnection of exposed piping. Unions will be permitted only where access is provided.
4. All PVC pipe connections shall be flanged or solvent welded.
5. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions and the following minimum standards:
    a. All fittings shall fit easily on the pipe before applying cement. The outer surface area of pipe and inner wall of fitting shall be dry and clean. Cleaner is to be applied to the outer surface of the pipe and to the inner surface of the fitting. Cement is to be applied to the outer surface of the pipe, or on the male section of fittings only. When the outside surface area of the pipe is satisfactorily covered with cement allow ten (10) seconds open time to lapse before inserting pipe end into fittings. After full insertion of pipe into fitting, turn fitting about the pipe end approximately 1/8 to 1/4 of a turn. Wipe off excess cement at the joint in a neat cove bead. Follow manufacturer's instructions on solvents. Remove all debris, including, containers, brushes, applicators and other items from premises, dispose of properly. Burying of debris on site is not permitted.
    b. In addition to the requirements outlined above, the solvent weld process for pipe sizes of 6” diameter and larger includes additional requirements outlined below. As pipe diameter increases, so does the difficulty in installing it. Follow all of the solvent weld manufacturer’s recommendations for larger diameter pipe.
        i. The installer shall use proper size applicators to ensure enough cement is applied to fill the larger gap that exists between the pipe and fittings.
        ii. Use the applicable cement for the size of pipe and fittings being installed.
        iii. End of pipe must be cut square and chamfered (beveled).

iv. Provide adequate crew size to properly handle and fit pipe installations.

v. It is important in large diameter joining that the primer and cement be applied simultaneously to the pipe and fittings. Apply a second, full layer of cement to the pipe. Pipe must be bottomed into the fitting.

vi. Large diameter pipe and fittings require longer set and cure times. Prefabricate as many joints as possible. If pipe is to be buried, fabricate as many joints as possible above ground, after joints have cured, carefully lower into trench.

c. All joints shall remain completely undisturbed for a minimum of 10 minutes from time of jointing the pipe and fitting. If necessary to apply pressure to a newly made joint, limit to 10% of rated pipe pressure, during the first 24 hours after the joint has been made.

d. Make provisions for expansion and contraction by way of swing joints or snaking.

e. Protect plastic pipe from exposure to aromatic hydrocarbons, halogenated hydrocarbons, and most of esters and ketones that attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.

f. PVC welding is not allowed without prior approval of the Architect/Engineer.

E. Field Coordination

1. It is the Contractor's responsibility to provide piping by means that account for all necessary coordination, including, but not limited to: water stops, oversize sleeves, pipe supports, valves and other attachments, over-excavations required for fusion machinery or other equipment, etc.
2. Provide pipe extensions and temporary caps necessary for pressure testing requirements.
3. Contractor is required to provide coordination and adequate protection as needed to all external services (i.e. ducts, pipes, cables) that run throughout the project site. Plumbing shall be located and placed to prevent damage during and after construction from traffic loads above.

F. Overhead piping in mechanical room/pool room shall be run such that a minimum head clearance of 7’-0” is observed to all piping, pipe fittings and pipe hangers/supports. Piping runs shall not create path obstruction or a tripping hazard.

G. Pipe Identification

1. Provide identification on all piping located in mechanical equipment, chlorine, acid rooms, heater courts, etc.
2. All piping in Mechanical Room to be labeled with description of line and arrows indicating direction of flow.
3. Mark at least once on each line and at 5 ft. intervals minimum. Consult Health Department Code for minimum marking requirements.

4. Color code per Health Department requirements. If code does not identify color coding requirements consult Architect/Engineer.

3.02 SLEEVES AND WALL PENETRATIONS

A. Patch exterior side of wall penetrations with non-shrink grout. Other methods of water tightness shall be pre-approved by the Architect/Engineer.

END OF SECTION

SECTION 13 11 23

POOL PIPE SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES
- A. Pipe Hangers & Supports.

1.02 RELATED DOCUMENTS
- A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 SUBMITTALS
- A. Refer to General Requirements and Division 01.
- B. Product data including manufacturer's specifications, installation instructions.
- C. Shop Drawings showing type and locations.

1.04 SUBSTITUTIONS
- A. Refer to General Requirements and Division 01.

1.05 DELIVERY, STORAGE AND HANDLING
- A. Refer to General Requirements and Division 01.

PART 2 PRODUCTS

2.01 MATERIALS
- A. Hangers and Supports
  1. General
     - a. All hangers, pipe supports, threaded rod, hardware, etc. shall be hot-dipped galvanized steel , ASTM A123, or type 304 stainless steel or better grade.
     - b. All piping connections and support hardware inside surge tanks and gutters shall be stainless steel.
  2. Strut
     - a. Minimum height 1 5/8", minimum width 1 5/8", minimum thickness 12-gauge material.
     - b. Finish shall be hot-dipped galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
  3. Strut Clamps
     - a. Pipe sizes ½" thru 12", two-piece clamps with clamping bolt and nut. Pipe sizes 14" and larger, provide "U" bolts, nuts and washers.

b. Finish shall be hot-dipped galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.

4. Strut Accessories
   a. Flat plate fittings, corner braces, post bases, etc. Finish shall be hot-dipped galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
5. Wedge Anchors
   a. One-piece assembly, 3/8” minimum body diameter.
   b. Grade 2, hot-dipped galvanized steel anchors and clips, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
6. Beam Clamps
   a. Steel “C” clamp type with locknut.
   b. Finish shall be hot-dipped galvanized, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
7. Support Components
   a. All threaded rod, threaded rod couplings, nuts, washers, etc. Finish shall be hot-dipped galvanized, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.

PART 3 EXECUTION

3.01 GENERAL

A. All mechanical room piping must be properly supported using the schedule indicated on the drawings as a guideline for maximum allowable spacing between supports.

B. It shall be the contractor’s responsibility to properly support piping at all valves, pumps, equipment, overhead areas and changes in direction.

C. All piping must be supported laterally as well as vertically hung.

D. Ring, clevis, roller and J hook type hangers are not acceptable.

E. Comply with manufacturer’s written instructions.

END OF SECTION

SECTION 13 11 24

POOL VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Butterfly Valves
B. Ball Valves
C. Check Valves
D. Expansion Joint/Flexible Connector
E. Modulating Float Valves
F. Modulating Electrical Main Drain Valves
G. Submerged Service Operators
H. Valve Operator Extension
I. Drainage Valves
J. Reducers

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

A. The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.
   1. ANSI – American National Standards Institute
   2. ASTM – American Society of Testing Materials

1.04 SUBMITTALS

A. Refer to General Requirements and Division 01.
B. Submit Shop Drawings, clearly indicating make, model, location, type, size, pressure rating, and type of service.
C. Valve charts
   1. Submit two copies of valve charts for each piping system, consisting of isometric Drawings, or piping layouts showing and identifying each valve and describing its function to the Architect/Engineer for approval.
   2. Upon completion of the Work, one copy of each valve chart sealed to rigid backboard with clear lacquer, placed under glass and framed, shall be hung in a conspicuous location in the equipment room.

1.05 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.06 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

1.07 WARRANTIES

A. Standard Manufacturer's Warranty

PART 2 PRODUCTS

2.01 GENERAL

A. Cast Iron valves 3" and larger shall have an epoxy coated body on all interior and exterior surfaces, ductile iron-nylon II coated disc, one piece 416 stainless steel shaft with Buna-N or EPDM seat minimum, 150 PSI rating, or cast aluminum ASTM S12A housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and T304 stainless steel shaft. 150 psi rating.

B. Cast Aluminum valves 3" and larger shall have an ASTM S12A body and coated with Rilsan on all interior and exterior surfaces. Internal components include Buna-N or EPDM resilient lining and seat, Rilsan coated ductile iron disc and T304 stainless steel shaft. 150 psi rating.

C. Thermoplastic valves 3" and larger shall be constructed from PVC Type 1 Cell Classification 12454 or CPVC type 4 cell classification 23447. Thermoplastic valves shall include PVC disc with solid type 316L stainless steel shaft with Buna-N or EPDM seat pressure rated to 150 psi @ 73 degrees Fahrenheit.

2.02 BUTTERFLY VALVES

A. Butterfly valves 3" - 12" shall be wafer or lug bodies and shall be suitable for use between ANSI 125 and 150 lb. Flanges.

B. Bodies of the flangeless design shall be provided with at least two bolt guides to center the valve in the pipeline.

C. All valves shall be as manufactured by Bray Valve (713) 894-5454, Dominion or equal.

D. All bolts and, nuts and washers shall be corrosion resistant hot-dipped galvanized, ASTM A123 or type 304 stainless steel with plated washers to be used when secured to PVC flanges.

2.03 UV LAMP STRAINER VALVE

A. EZ Strainer 4" to 12" butterfly type valve with stainless steel strainer disc and shaft, case aluminum rislan (nylon) coated valve housing, with manual locking valve handle as manufactured by Neptune Benson. Install on downstream side of UV lamp per UV installation details.

2.04 BALL VALVES

A. PVC True Union Ball Valves, Ipex, Asahi, Spears or equal.

2.05 CHECK VALVES

A. ½" thru 2 ½" shall be PVC body, true union, ball type, seal material EPDM as manufactured by Ipex, Asahi Spears or equal as indicated on Contract Drawings.

B. 3" thru 20" diameter check valves:

1. Type: Split disc wafer style
2. Valve Body: Ductile or cast iron with an epoxy painted exterior
3. Lining: Fully lined with a Buna N elastomer
4. Shaft: 316 stainless steel shaft and shaft plug
5. Plates: 316 stainless steel (3" – 12") or Aluminum Bronze (14"+)
6. Spring & Plate Travel Stop: 316 stainless steel
7. Manufacturer: Center Line Series 800 as manufactured by CRANE ChemPharma & Energy, or Model CVXXK Series by Metraflex, or approved equal.

2.06 EXPANSION JOINT/FLEXIBLE CONNECTOR (where required)

A. Shall be the Metrasphere, Style R with EPDM body and threaded bolt holes, Model #MSREE Series manufactured by Metraflex, as indicated on drawings. Install with a control unit assembly (tie rods) from flange to flange per manufacturer's instructions to minimize expansion joint damage caused by excessive motion.

2.07 MODULATING FLOAT VALVES

A. Float operated modulating valve shall be designed for submerged service.

B. The housing body shall be fabricated using Sch. 80 PVC pipe with Sch. 80 PVC van stone flanges. The internal wafer shall be 12 gauge T304L material and positioned with 1/8" (+1/16") clearance around the perimeter. The body shall also incorporate and interior stop plate constructed of PVC to define that allowable range of arm motion. Close fitting Delrin bushings shall be included on the shaft penetration of the body to provide a seal against water loss and air entrance.

C. The valve shaft shall be T304L material 1" in diameter. Float arms shall securely fasten to shaft using T316SS nuts with washers to provide adjustability. Arms shall be ½" diameter all thread rod T316SS with length as required. Valve sizes 14" – 20" shall have ¾" square tubing for arms.

D. Ball floats shall be constructed of T304L stainless steel and be 7" in diameter with internal weighting. Floats shall also be adjustable using T316SS nuts with washers as previously described. Provide one (1)/two (2) float arms as shown on the drawings. Valve sizes 14" – 20" shall have 12" diameter cylindrical floats.

E. The float arms shall be hinged to allow for vertical operation. A 12 gauge T304L bracket shall be provided as a guide to maintain the vertical float positions.

2.08 MODULATING ELECTRONIC MAIN DRAIN VALVES

A. The modulating electronic main drain valves shall be assembled and installed as specified in the Contract Drawings. The purpose of the valve is to use the surge tank and/or balance tank water level as a means of electronically adjusting and controlling the flow from the pool main drain plumbing.

B. Provide and install equipment as detailed in the Contract Drawings and as follows:

1. The surge tank sensor and transmitter (Basis of Design): Shall be a BECSys, Model SLS continuous level sensor, or equal with the following characteristics:
   a. Piezoresistive pressure measurement of the water column.
   b. Automatically adjusts for changes in atmospheric pressure.
   c. Factory calibrated.
   d. Field configurable sensor length.
   e. Solid-state; no moving parts that can wear out over time.
   f. Installation options for wall mount and stand pipe glass configurations.
2. Digital Processor (Basis of Design): Is internal with the BECSys 7 Chemical Controller or approved equal (see pool mechanical and main drain detail on PL drawings). Program settings as shown on detail per the manufacturer's instructions. The controller shall continuously monitor, display and data log surge tank level with 10 mm (0.4") resolution or better. The controller shall also use the surge tank level to control a water makeup valve to maintain water level (Autofill) and/or control a main drain modulating valve.
3. Valve: One (1) butterfly valve. Valve shall be one pipe size smaller than the main drain pipe.
   a. See "Butterfly Valves" within this specification section for additional valve material and manufacturer requirements.
4. Valve Positioner:
   a. DHC-100 digital positioner, electronic actuator with manual over-ride wheel operator, and battery back-up.
   b. Positioner: Pushbutton calibration to plus/minus 0.1 degree within a 90-degree quadrant. See detail for range of positions. Fail position (loss of command/signal) shall be 100% closed.
   c. Electronic Actuator: Provide Series 92 Quarter master Protek Failsafe electric actuator with rechargeable battery pack and low battery indicator. Voltage: Available in 115/230VAC and 12/24VDC, 0.2 to 4.0 amp draw.
   d. Manufacturer: Asahi America, Inc., www.asahi-america.com; or equal.

2.09 SUBMERGED SERVICE OPERATORS

A. Use only approved service operators for the valve requiring underwater operation in the surge tank or in manhole used for pool draining.

2.10 VALVE OPERATOR EXTENSION

A. Extensions shall be stainless steel and by same manufacturer as the valve manufacturer.

2.11 DRAINAGE VALVES

A. Provide min. 3/4" True Union Ball valve on all piping at such a location to allow complete drainage of system.

2.12 REDUCERS

A. Use Eccentric reducers on pump suction lines only and concentric reducers on pump discharge lines only.
B. Stainless steel body and flanges, T304 materials, ANSI 125# rated flanges.
C. Use Neptune Benson, 15-CNS/15ECS series “or equal”.
D. Provide valves of same manufacturer throughout where possible and practical.
E. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

2.13 VALVE LABELS

A. Provide and install 2” round, 1/16” thick, multi-layered valve tags with contrasting lettering with non-corrosive beaded tie on all valves. All labels shall be me labeled in accordance with the valve chart per Section 13 11 14.

PART 3 EXECUTION

3.01 VALVE CONNECTIONS

A. Provide valves suitable for connection to adjoining piping.
B. Valve size shall be the same as the pipe size.

3.02 VALVE USE

A. Pipe sizes 3" - 14" – Butterfly
B. Miscellaneous valves 1/2" – 2-1/2" - PVC True Union Ball Valves
C. All chemical lines and equipment - PVC True Union Ball Valves

3.03 VALVE OPERATORS

A. All butterfly valves shall have gear operators and chain operators as required unless drawings indicate otherwise. Chain operators shall be required on all gear operators located 7’-0” or higher above finished floor.
B. Provide extension lengths as necessary to operate submerged or below surface valves and the appropriate valve box access cover.

END OF SECTION

SECTION 13 11 25

POOL CENTRIFUGAL PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pumps
   1. Self-Priming Thermoplastic

B. Pump Accessories
   1. Pump Strainers
   2. Gauges
   3. Flow meters

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

A. The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.
   1. Hydraulic Institute Standards
   2. Institute of Electrical and Electronics Engineers Standards (IEEE)
   3. National Electrical Manufacturers Association Standards (NEMA)
   4. Occupational Safety and Health Administration Rules and Regulations (OSHA)
   5. National Sanitary Foundation (NSF)
   6. American Society for Testing and Materials Standards (ASTM)
   7. American Iron and Steel Institute (AISI)
   8. American National Standards Institute (ANSI)
   9. ASTM A48 – Standard Specification for Gray Iron Castings
   10. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
   11. AISI 1045
   12. ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings

1.04 DESCRIPTION OF WORK

A. The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings by the Architect/Engineer.

B. Pump capacity, horsepower, TDH (Total Dynamic Head), speed, suction and discharge diameters, type, and other requirements shall be as shown on the drawings and shall comply with the requirements as specified herein.

C. The General Conditions shall apply to this Section as fully as if repeated herein.

1.05 QUALITY ASSURANCE

A. To assure a properly integrated and compatible system, the Equipment Manufacturer shall assume full responsibility for the warranty and proper operation of the pumps and/or accessory equipment.

B. Acceptable Products and Manufacturer: As listed on the contract documents or included herein or, an Engineer approved equal product and manufacturer.

C. All pumps and strainers shall be NSF50 certified as provided, including required coatings and shall be labeled as such on the serial number identification tag.

1.06 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submit complete motor and pump data together with shop drawings for the driven machine. All material is to be collated in a card stock binder, with pockets for large drawings, and with index. This data shall be prepared by the motor and/or pump manufacturer and shall include:

1. Pump manufacturer and model number, name of motor manufacturer, type of pump and motor with dimensioned drawings.
2. Characteristic curves at full load motor speed showing flow, TDH, efficiency, horsepower, and NPSH required. For all VFD applications include a family of performance curves, separate of the full load motor speed curve, for speeds of 105%, 100%, 89%, 83%, 66%, and 50% of the scheduled RPM.
3. Nominal motor horsepower, speed at full load, frame size, enclosure construction, winding insulation class and treatment, temperature rise at nominal horsepower, service factor, voltage rating (indicate if dual voltage), number of phases, frequency rating, full-load amperes at nominal horsepower for application voltage, starting code letter, or locked rotor KVA or amperes.
4. Complete pump description plus material list including casings, impellers, seals, shaft, bearing frame, motor mounts, guards, base plate, exterior coating type and mill thickness.
5. Installation Instruction and Operation and Maintenance Manuals shall include recommended protection and maintenance required for storage prior to putting pumps in service and may be submitted any time before shipment of the pumps.

1.07 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.09 WARRANTIES

A. Manufacturer's standard pump warranty. Warranty on mechanical seals covering 100% of the cost on all parts and labor extending over the same time period as the standard pump warranty.

B. Self-priming, integral strainer pumps shall be provided with a minimum one-year warranty covering failure of any pump/motor/strainer component directly attributable to materials and/or workmanship.

PART 2 PRODUCTS

2.01 END SUCTION, CENTRIFUGAL PUMPS

A. General

1. Pump performance shall be optimized with provision of variable speed drives where designated in the drawings.
2. Operational Pump Characteristics
    a. Engineer has the right to reject any pump with a pump curve having a design point operating efficiency more than 5% below the operating efficiency of the scheduled pump provided on the drawings.
3. Furnish and install horizontal close-coupled end suction centrifugal pumps as specified on the Contract Drawings or as pre-approved by the Architect/Engineer.

B. Materials of Construction:

1. Pump internal materials shall be as follows:
    a. Casing – Thermoplastic Resin
    b. Impeller – Thermoplastic Resin
    c. Case Wear Ring – Bronze (ASTM B505)
    d. Shaft – Hardened Steel (AISI 1045) or Stainless Steel (ASTM A895)
    e. Shaft Seal – Ceramic and carbon seal faces, with stainless steel, brass, and Buna N materials in the bellows portion.
2. Impeller: The impeller shall be of the enclosed type, molded in one piece. The impeller will be secured to the shaft by means of a stainless-steel key and locking screw into the end of the motor shaft.
3. Case Wearing Ring: The pump casing shall be fitted with a diffuser. The diffuser has a bronze case wear ring to minimize abrasive and corrosive wear to the casing. The case wear ring shall be of the radial type, press fitted into the diffuser.
4. Shaft: The impeller shall be direct coupled to the motor shaft.
5. Shaft Seal: The pump shaft shall be fitted with a shaft seal to minimize shaft wear. The shaft seal shall be Ceramic and carbon seal faces, with stainless steel, brass, and Buna N materials in the bellows portion.
6. Motor

a. The motor shall be a premium efficiency motor meeting current NEMA Standards and shall be totally enclosed fan cooled (TEFC).
b. The motor must be rated for use with a Variable Frequency Drive and meet the NEMA MG1 Standard, Part 30.
c. The motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head capacity curve at full load speed (60 Hz) regardless of selected operating speed without overloading the nameplate horsepower rating of the motor, regardless of service factor. Vendor shall confirm that motor current does not exceed allowable full load amperage at reduced frequency. Vendor shall verify scheduled horsepower meets above requirements. In no case shall the horsepower be less than indicated on the Drawings without specific approval from the Engineer.
d. Electrical requirements including phase, frequency, and voltage are indicated on the Drawings.

7. For pumps indicated on the contract documents to be provided with an integral VFD:
a. Drive shall be UL 60730 Compliant.
b. Provide manufacturer's standard control panel and communication cable.
c. Control panel shall include an alarm LED and error message to alert the user of malfunctions.
d. VFD shall include a programmable priming mode with automatic detection of prime for easy start-up and automatic detection of loss of prime.

2.02 PUMP ACCESSORIES

A. Pump Strainers
1. All Horizontal Pumps
a. Unless the pump has an integral hair and lint strainer, supply and install strainers equal to those indicated on the Contract Documents.
b. Provide each strainer with two strainer baskets.

B. Gauges
1. Provide compound gauges where called for on Drawings and as required by Code.
2. Compound gauges shall be Liquid Filled, 30 Hg to 60 PSI with gauge cock and snubber as manufactured by Weksler, Marsh, Winters or equal.

C. Flowmeters
1. Provide flow meters where called for on the Drawings and as required by Code on main lines and on branch lines of flow ranges indicated.
2. Flowmeters shall be as specified on the contract documents or approved equal.

3. Transmitter shall have an operating voltage of 12-24VDC and meet appropriate CE, CSA & UL standards. Reading accuracy must be within +/- 0.5% of reading at 25ºC. Device shall meet NEMA 4X & IP65.

D. Pump Labels
   1. Provide corrosion-resistant, permanent pump labels with contrasting lettering.
   2. Label shall include pump ID from contract drawings and a description. (e.g. “P1A Lap Pool Filtration Pump”)

PART 3 EXECUTION

3.01 PUMP INSTALLATION

A. The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings by the Pool Engineer.

B. Ensure that the pumps and motors are properly supported and aligned with no pipe strain transmitted to the pump casing.

C. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

D. Permanently affix pump label to the pump.

3.02 ACCESSORY INSTALLATION

A. Install accessories as shown on the contract documents and in accordance with manufacturer’s instructions.

B. Strainers shall be supported on a concrete housekeeping pad and provided with sufficient space for maintenance.

C. Gauges shall be positioned to be read adjacent to the pump or from above, where pumps are in a pump pit.

D. Field mount the flowmeter and flow meter transmitter as located and shown on the pool plans. Mount transmitter at 4-5 feet above the floor utilizing the 3-8050 universal mounting kit.

E. Permanently affix pump label to the pump in an easily visible location.

3.03 FACTORY TRAINED REPRESENTATIVE

A. Provide a factory-trained representative for the purpose of supervising installation, start-up, final field acceptance testing, and providing instruction to the owner's operating personnel in the proper operation and maintenance of the equipment in this section.

B. Contractor and factory-trained representative shall verify pump flow aligns with the pump curve and calibrate flowmeter as required.

END OF SECTION

SECTION 13 11 34

POOL VERTICAL FIBERGLASS FILTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pool Vertical Fiberglass Filters

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

A. The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.

1. National Sanitary Foundation (NSF)

1.04 DESIGN REQUIREMENTS

A. As assurance that each item of apparatus is properly sized to perform in conjunction with each other, the Owner requires bidders to use the filter manufacturer as a single source of supply for the items of equipment as listed and described herewith.

1.05 SUBMITTALS

A. Provide detailed Shop Drawings of the items of equipment being provided, indicating the dimensions, material and characteristics of the filter shells, interior and exterior filter manifolds, nozzle system and filter media.

B. Provide a typed sheet of Operating Instructions, embracing the operation functions and recurring maintenance processes involved in connection with the complete filtration system.

1.06 CERTIFICATIONS

A. Shall bear the NSF Seal of Approval, Standard #50 for sand type filters.

1.07 QUALIFICATION STATEMENTS

A. The equipment described herein shall be a product of a manufacturer regularly engaged in the fabrication of fiberglass pressure vessels for at least fifteen (15) years.

1.08 WARRANTY

A. The equipment supplier shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other, that if the installation is made in accordance with his drawings and operated in accordance with his instructions, the system will perform the prescribed functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, will not produce any toxic effect or impart undesirable taste, odors or colors, and will be sanitary to the satisfaction of all authorities having jurisdiction.

B. Provide a standard one (1) year non-prorated warrantee.

1.09 SYSTEM STARTUP

A. An authorized representative of the equipment supplier shall provide the supervisory services of an Installation Engineer for at least 4 hours to fully instruct designated personnel in the operation, care and maintenance of the filter system.

PART 2 PRODUCTS

2.01 FILTERS

A. Fiberglass Filter Tank

1. The filter tank shall be no less diameter and length than shown on plan. It shall be suitable for 50 psi working pressure.
2. The vessel(s) shall be constructed of multi-layer fiberglass. Layers shall consist of a combination of chopped glass and woven roving in an isopthalic-polyester matrix. The vessel shall be assembled from one side shell and two domed ends which shall be joined with an adhesive and reinforced with FRP layup. Alternate construction methods shall not be acceptable.
3. Vessels shall be provided with ABS support bases. The tanks will be secured to these bases with adhesive.
4. The wetted surface shall be a standard gel coat (GC). The gel coat shall be a modified polyester gel coat equivalent to a Cook gel coat 943-AN-023 with a thickness of no less than 10 mils.
5. The external surface shall be smooth in appearance and be free of cracks or other defects. The exterior surface shall be supplied with an all-weather coating. The tank coating shall be water based acrylic emulsion paint with UV inhibitors.
6. Each filter tank shall be equipped with a bottom mounted drain out system that shall completely empty the vessel.
7. Each tank shall have an automatic and manual air release system and shall be of non-corrosive materials.
8. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping and valves.

9. Each tank shall have one influent header fitted with sufficient distributors to properly distribute incoming flow evenly across the sand bed surface and one hub with sufficient laterals equally distributed not less than 12 inches below the filtering sand bed with a total effective slot area such that the average velocity through the slots will not exceed 6 feet per second at the design flow rate. The hub shall be fabricated of ABS and all distributors and laterals shall be replaceable. The laterals shall have "cam and ramp" ¼ turn connections and be constructed of ABS plastic with molded 'V'-groove slots. Laterals with machined or cut slots shall not be accepted. Laterals shall be threaded at right angles into the header pipe.
10. Exterior influent and effluent pipe connections shall be 2" PVC.
11. Each tank shall have an 8.5-inch diameter access manhole with molded cover, o-ring, and pressure gauge.
12. The system shall be designed for installation against a back or side wall with all servicing accessible without moving tank(s). When the system is off, the tank(s) must remain full of water and not allow water to gravity drain back to the source to prevent disturbance of the sand bed.
13. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping and valves.

B. Multi-port and Hi Flow Valve Control Assembly (Unless Otherwise Noted in Drawings).
1. Valve assembly shall be pre-plumbed and constructed of PVC.
2. Valve shall include a six-position positive lock operation system.
3. Shall be side mounted.
4. Valve mechanism shall be designed so that the filter, drain, rinse and backwash cycles can be accomplished by repositioning one valve handle that will provide accurate positioning for tight shut off.

2.02 FILTER MEDIA

A. A sufficient quantity of #20 US sieve grade clean crystal silica sand to cover filter elements with a minimum 12-inch sand bed shall be furnished and installed into each tank and shall be free of limestone or clay and shall be free from minerals that may precipitate onto pool surfaces. The following is an acceptable gradation for this media:
1. #20 SILICA SAND
2. Effective size: 0.45 mm (0.018 in.)
3. Uniformity coefficient: 1.5
4. Mean diameter: 0.616 mm (0.0243 in.)
5. Standard deviation: 0.110 mm (0.00432 in.)
6. Grain Sphericity: GRTR 0.7

B. Each filter tank shall be provided with media as required per manufacturer's recommendations.

END OF SECTION

SECTION 13 11 40

POOL HEATING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES
- A. Gas-fired Pool Heaters

1.02 RELATED DOCUMENTS
- A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 DESCRIPTION OF WORK
- A. Heating system for swimming pool. Coordinate all venting, interlocking and control wiring for pool heaters with HVAC Contractor.

1.04 SUBMITTALS
- A. Refer to General Requirements and Division 01.
- B. Submittals required:
  1. Heaters
  2. Thermometers
  3. Printed and bound operating, installation, and service manuals

1.05 SUBSTITUTIONS
- A. Refer to General Requirements and Division 01.

1.06 DELIVERY, STORAGE AND HANDLING
- A. Refer to General Requirements and Division 01.

1.07 WARRANTIES
- A. Standard Manufacturer’s Warranty

PART 2 PRODUCTS

2.01 POOL HEATERS
- A. Provide gas fired heaters for pools, as scheduled on Contract Drawings, complete with controls.
- B. Heaters must be A.S.M.E. Coded and labeled by manufacturer if they exceed the HLW-101 service limits; a heat input of 200,000 Btu/hr (60 kW) or a nominal water-containing capacity of 120 gal (450 L).
- C. Heaters will not require A.S.M.E labeling if they do not exceed the HLW-101 service limits; a heat input of 200,000 Btu/hr (60 kW) nor a nominal water-containing capacity of 120 gal (450 L). However, the heater must meet HLW-700 and HLW-800 design requirements per current A.S.M.E. standards.
- D. Provide and install per State and Local Codes, including State Boiler Code required control and safety device packages.

2.02 THERMOMETERS

A. Thermometers shall have an adjustable angle and separable brass socket thermowell. The insertion length shall accommodate pipe size as required by the manufacturer.

B. Thermometers shall be liquid filled with a 9" scale, glass window, and dual face to display both Fahrenheit and Celcius temperatures, manufactured by Weksler, Marsh, Winters or approved equal; or thermometers shall be solar powered with digital display, glass passivated thermistor and aluminum stem as manufactured by Wika or approved equal.

PART 3 EXECUTION

3.01 POOL HEATERS

A. Install per manufacturer's installation instructions and recommendations, and in accordance with all applicable State and Local Codes.
B. Furnish and install thermometers in inlet and outlet piping to heater and downstream in the blended water stream.
C. Furnish and install a pressure relief valve for each heater and pipe to within 6" of floor.
D. Furnish and install a flow switch per heater manufacturer's requirements.
E. Factory authorized start-up required. Start-up form shall be included in the Operating and Maintenance Manuals and submitted separately to the Architect/Engineer.

3.02 POOL HEAT EXCHANGERS

A. Furnish and install thermometers in inlet and outlet piping to heater and downstream in blended water stream.
B. Furnish and install a relief valve for each heat exchanger in the secondary piping. Pipe relief valve to within 6" of floor.
C. Furnish and install a flow switch for each heat exchanger in the secondary piping.

END OF SECTION

SECTION 13 11 45

POOL RAIL GOODS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rail Goods
   1. Hand rails
   2. Grab rails
   3. Ladders
   4. Stanchions

B. Accessories
   1. Wedge Anchors
   2. Compression Anchors
   3. Escutcheons

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

1.04 DESCRIPTION OF WORK

A. Fabrication and installation of hand rails, grab rails ladders, stanchions and accessories required for installations.

1.05 QUALITY ASSURANCE

A. Refer to General Requirements and Division 01 of the Specifications for additional requirements.

1.06 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submittals required:
   1. Hand Rails
   2. Grab Rails
   3. Ladders
   4. Therapy Rails
   5. Anchors
   6. Escutcheon Plates
   7. Stanchions
   8. Stanchion Sockets

C. Provide care and maintenance instructions, embracing the operation functions and maintenance processes involved in connection with the complete system,

including routine maintenance and cleaning. Provide information regarding maintenance practices and products which may be detrimental to the products.

D. Printed and bound operating, installation, and service manuals.

1.07 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.09 WARRANTIES

A. Pool Equipment

1. Manufacturer's Standard Warranty

PART 2 PRODUCTS

2.01 GENERAL

A. Provide the equipment scheduled, and any necessary fittings, anchors, and connectors as required and not provided by the manufacturer. The equipment shall be the manufacturer and model number listed or a pre-approved equal. Although unit quantities are shown, it is the installing contractor's responsibility to verify and provide actual quantities required.

B. The following manufacturers have been pre-approved as capable of providing products meeting this specification. Note that custom material/size/finish may be required from some of the manufacturer's listed to meet these specifications.

1. Spectrum Aquatic, 800-791-8056
2. SR Smith LLC, 800-824-4387
3. Paragon Aquatics, 888-KDI-SWIM

2.02 MATERIALS OF CONSTRUCTION

A. Rails

1. All rail products specified in this section shall be 316L stainless steel.
2. All rail goods with a grip surface (handrails, grab rails, therapy bars, ladders) shall be 1.50" OD.
3. Provide rail material with 0.120 wall thickness.
4. The surface of the rails shall be polished to a minimum 500 grit mirror finish and passivated according to ASTM A967.
5. Final coating of steel shall be per manufacturer's standard treatment procedure. All welds shall be finished, polished, and passivated to blend and match the rail finish.

B. Stanchions (Backstroke and activity)

1. All rail products specified in this section shall be 316L stainless steel.
2. Shall be 1.90" OD, 0.145" wall thickness

3. The surface of the stanchions shall be polished to a minimum 500 grit mirror finish and passivated according to ASTM A967.
4. Final coating of steel shall be per manufacturer's standard treatment procedure.
5. Stanchions shall be 8' 0" tall and provided with a 2" ring on the top surface and a 2" ring on sliding collar.

C. Wedge Anchors
1. Rail Anchors shall be corrosion resistant, sized to accept the rail dimensions specified and a minimum of 4" deep. For anchors greater than 4" deep, contractor shall verify adequate concrete thickness at the anchor points.
2. Stanchion Sockets shall be corrosion resistant, minimum 6" deep and designed to accept a 1.90" OD stanchion.

D. Escutcheon Plates
1. Provide escutcheon plates for each anchor location, sized to match rail diameter.
2. Shall be rail manufacturer's round, stamped 316L Stainless Steel escutcheon.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manufacturer's Installation Instructions
1. All equipment of this section shall be installed in accordance with industry standards and comply with manufacturer's installation instructions/recommendation. The contractor shall notify the engineer in writing of any discrepancies between the contract documents and the manufacturer's instruction. This notification shall include a request for clarification prior to installation.

B. Install equipment true and level.

C. Equipment shall be installed secure, with no "play" or movement when shaken.

D. Rails shall be clean, free of dirt and contamination, and polished prior to turnover to owner.

E. Protect Equipment from damage during installation and up to substantial completion. Repair or replace damaged parts.

END OF SECTION

SECTION 13 11 46

POOL EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pool Equipment

1. Pool fittings, deck, maintenance, and safety equipment.

B. Pool Specialty Equipment

1. Spray and play equipment manufactured for use in swimming pools and/or spray pads.

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

A. Specialty Equipment

1. Equipment submitted shall be designed by manufacturer to meet all federal, state, and local requirements.
2. Equipment manufacturer shall meet applicable requirements of Consumer Product Safety Commission, ASTM, UL, and other applicable standards.
3. Comply with ASTM F2461-09, standard practice for manufacture, construction, operation, and maintenance of aquatic play equipment.

1.04 DESCRIPTION OF WORK

A. Refer to General Requirements and Division 01 of the Specifications for additional requirements.

1.05 QUALITY ASSURANCE

A. Refer to General Requirements and Division 01 of the Specifications for additional requirements.

1.06 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submittals required:

1. Pool Fittings and Equipment
2. Deck Equipment
3. Safety Equipment
4. Maintenance Equipment
5. Pool Specialty Equipment

a. Provide detailed Shop Drawings of equipment being installed, including but not limited to:
    i. Location
    ii. Flow rates
    iii. Safety equipment

C. Provide a typed sheet of Operating Instructions, embracing the operation functions and maintenance processes involved in connection with the complete system, including routine maintenance, start-up, and winterization requirements.

D. Printed and bound operating, installation, and service manuals.

1.07 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.09 WARRANTIES

A. Pool Equipment
    1. Manufacturer's Standard Warranty

B. Pool Specialty Equipment
    1. Manufacturer's Standard Warranty – 2-year minimum

PART 2 PRODUCTS

2.01 GENERAL

A. Provide the equipment scheduled on the drawings, and any necessary fittings, anchors, and connectors as required and not provided by the manufacturer. The equipment shall be the manufacturer and model number listed or a pre-approved equal. Although unit quantities are shown for value engineering purpose, it is the installing contractor's responsibility to verify actual quantities required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manufacturer's Installation Instructions
    1. All equipment of this section shall be installed in accordance with industry standards and comply with manufacturer's installation instructions/recommendation. The contractor shall notify the engineer in writing of any discrepancies between the contract documents and the manufacturer's instruction. This notification shall include a request for clarification prior to installation.

B. Install equipment true and level.

C. Protect Equipment from damage during installation and up to substantial completion. Repair or replace damaged parts.

END OF SECTION

SECTION 13 11 61

POOL CERAMIC TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ceramic Pool Tile

1.02 RELATED DOCUMENTS

A. Drawings and Contracting Requirements, including General and Supplementary Conditions and Division 01 - General Requirements, apply to this Section.

1.03 REFERENCES

A. The following latest edition reference specifications, guides and standards shall become part of this Section as if herein written. If provisions conflict, the more stringent provisions shall apply.

1. ANSI A108 – Specifications for Installation of Ceramic Tile
2. ANSI A137.1 – Tile Grade Requirements
3. ASTM C-150, Type 1 – Portland Cement
4. ASTM C-206, 7 Type S – Hydrated Lime
5. ASTM C-144 - Sand
6. ANSI A118.1 – Dry Set Mortar
7. TCA 759 – Dry Set Mortar
8. ANSI A118.3 – Epoxy Adhesive
9. TCNA – Tile Council of North America, Handbook for Ceramic, Glass, and Stone Tile Installation, latest edition
10. ISO 13007 – International Standards Organization; Classification for Grouts and Adhesives.

1.04 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submit product data and samples for each tile product indicated.

C. Submit shop drawings for approval before ordering tile. Include the following:

1. Plan, elevations, and sections of pool tank and deck.
2. Indicate tile layout, patterns, color, expansion joints, junctions with dissimilar materials and setting details.

D. Plans of all tile marking showing exact locations and positions of individual tiles.

E. Maintenance data: Include routine maintenance and stain removal methods.

F. Provide five copies of submittals.

1.05 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.06 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

B. Deliver all products to job in manufacturer's unopened containers with grade seals unbroken and labels intact.

C. Keep tile cartons dry.

1.07 QUALITY ASSURANCE

A. Single source responsibility:

1. Obtain each type and color tile material from single source.
2. Obtain setting and grouting materials from one manufacture to ensure compatibility.
3. Obtain membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.
4. Furnish fifteen (15) year guarantee from installation material manufacturer. This guarantee is inclusive of installation materials, finish product, and labor.

B. Manufacturer Qualifications:

1. Tile: Minimum five (5) years' experience in manufacture of tile products.
2. Setting Materials: Minimum ten (10) years' experience in manufacture of setting and grout materials specified.

C. Installer Qualifications: Specializing in tile work having a minimum of 5 years successful documented experience with work comparable to that required for this project.

D. Certifications:

1. Submit "Master Grade Certificate" for each shipment, type, and composition of tile, signed by tile manufacturer and installer with requirements of ANSI A137.1.
2. Submit manufacturers certifications that mortars, adhesives, and grouts are suitable for intended use.

E. Field Samples:

1. Sample Installation:
   a. For final review of each type of installation, construct sample panel of approximately 100 square feet.
   b. Install in location as directed by Architect and approved by Owner's Representative.
   c. Show workmanship of finished work and construction techniques including installation and incorporation of waterproofing membrane. Where a particularly difficult detail or technique is required, or where special sizes or shapes of product are needed, they shall be included in sample panel.
   d. Approved field samples will serve as project standard and may remain as part of the work.

F. Pre-Installation Conference:
   1. Require attendance of General Contractor, Pool Contractor, Tile Installer and Installers of related work. Review installation procedures and coordination required with related and adjacent work. Hold meeting one week prior to commencing work of this section. Publish meeting minutes within 5 days of meeting, distribute minutes to participants, copy Architect.
   2. Meeting agenda shall include, but is not limited to:
      a. Surface preparation
      b. Tile and installation material compatibility
      c. Edge protection, transition and pre-fabricated movement joint profiles
      d. Waterproofing techniques
      e. Crack Isolation techniques
      f. Environmental requirements
      g. Finish protection

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers, fully identified with brand, name, type and grade. Comply with requirements in ANSI A137.1 for labeling sealed tile packages.
B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location. Protect materials from contamination, dampness, freezing or overheating in accordance with manufacturer's instructions.
C. Broken, chipped, warped, stained or damaged tile will be rejected.
D. Store liquid latexes in unopened containers and protect from freezing.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
B. Do not begin installation until construction in spaces is complete and ambient temperature and humidity conditions are consistent with standards and manufacturers written instructions.
C. Ventilate spaces receiving tile with manufacturer's instructions.

1.10 WARRANTIES

A. Contractor shall provide written materials and installation warranty, executed by the contractor, Installer and Manufacturer, agreeing to repair or replace tile that fails in material or workmanship within the specified warranty period to Architect/Engineer prior to filling pool with water.
   1. Warranty Period: Fifteen (15) years after Substantial Completion, or manufacturer's system warranty, if longer.

PART 2 MATERIALS

2.01 GENERAL

A. ANSI Standard for Ceramic Tile: Provide tile that complies with ANSI 137.1 for types, compositions, and grades of tile indicated.

B. ANISI Standard for Tile Installation Materials: Provide materials that comply with ANSI standards referenced in “American Standard Specifications for the Installation of Ceramic Tile” with products and materials indicated for setting and grouting.

C. Furnish ceramic tile required as follows. Colors shall be as selected by Owner and Architect.

D. Furnish all tiles required for special markings and lettering in conformance with the drawings and applicable Codes, including depth markings and no diving markers.

E. Racing lane tile edges shall be installed flush with finish pool floor.

F. Target tile shall be installed flush with finish pool wall.

G. Use surface bullnose on pool edge where required for proper trim and as directed on the drawings.

2.02 POOL CERAMIC TILE

A. Indoor Pool Ceramic Tile

1. Agrob Bucthtal, Dal-Tile - Keystone or equal as scheduled.
    a. Sizes, types, and slip resistance as scheduled, see end of this section.
    b. Color as selected by Owner/Architect (see Architect’s tile selection schedule).
    c. Increase the slip resistance of all endwall target tile with the addition of 7.5% by weight abrasive grains.
    d. Provide special shapes, bullnose and other tile as required.

2.03 MORTAR, GROUT AND ADHESIVE MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements herein, provide products from one of the following manufacturers or an approved equal:

1. MAPEI Corporation, Deerfield Beach, FL.
2. Laticrete International, Inc., Bethany, CT.

2.04 MORTAR MATERIALS: THICK SET

A. Latex – Portland Cement Mortar: Thick Set (ANSI A118.4)

B. Description: Two component system; latex additive water emulsion added to Portland cement mortar in place of water or replacing part of the water. The dry-set mortar must be pre-blended and must be specified by the latex manufacturer for use with the particular latex additive. Use amount of liquid latex recommended by latex additive manufacturer.

C. Acceptable Products:

1. Laticrete 226 thick bed mortar mixed with Laticrete 3701 Mortar Admix, by Laticrete International.
2. MAPEI, 4 to 1 Mud Bed Mix mixed with MAPEI, Planicrete AC, by MAPEI Corporation.

2.05 MORTAR MATERIALS: THIN SET AND SLURRY BOND COAT

A. Improved Modified Dry-Set Cement Mortar: Thin Set (ANSI A118.15)

B. Description: Two component system; latex additive water emulsion added to Portland cement mortar in place of water or replacing part of the water. The dry-set mortar must be pre-blended and must be specified by the latex manufacturer for use with the particular latex additive. Use amount of liquid latex recommended by latex additive manufacturer.

C. Acceptable Products:
1. Laticrete 254 Platinum thin set mortar by Laticrete International.
2. Keralastic System consisting of Keralastic polymer additive and Kerabond dry-set mortar by MAPEI Corporation.

2.06 EPOXY GROUT

A. Multi-component, factory prepared, 100 percent epoxy resin and hardener with sand or mineral filler material. (ANSI A118.3)

B. Acceptable Products:
1. Laticrete SpectraLock Pro Grout by Laticrete International.
2. Kerapoxy CQ by MAPEI Corporation.

2.07 ANTI-FRACTURE/ WATERPROOFING MEMBRANE

A. Multi-component, factory prepared, anti-fracture/ waterproofing membrane system comprised of a self-curing liquid rubber polymer

B. Acceptable Products:
1. Laticrete Hydroban by Laticrete International.
2. Mapelastic AquaDefense by MAPEI Corporation.

2.08 WALL PATCH & RENDER MORTAR

A. Quick-Setting, Fiber-Reinforced, Cementitious Patch and Render Mortar.

B. Acceptable Products:
1. Laticrete 3701 Fortified Mortar Bed by Laticrete International
2. Planitop 330 Fast by MAPEI Corporation.

2.09 MISCELLANEOUS MATERIALS

A. Temporary protective coating: Provide product that is formulated to protect exposed surfaces of tile against adherence of mortar and grout, is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.

1. Grout release in form of manufacturers standard propriety liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

B. Acceptable Products:
   1. Stonetech Grout Release by Laticrete International.
   2. UltraCare Grout Release by MAPEI Corporation.

C. Epoxy Grout Haze Remover.

   1. Stontech Epoxy Grout Haze & Coating Stripper by Laticrete International
   2. UltraCare Epoxy Grout Haze Remover by MAPEI Corporation

2.10 MIXING MORTAR AND GROUT

A. Mix mortars and grouts in accordance with manufacturer's instructions.

2.11 EXTRA MATERIALS

A. Supply extra 5% of each color of flat and trim in clean marked cartons for Owner's use.

PART 3 EXECUTION

3.01 ACCEPTABILITY OF SURFACES

A. Before tiling, check area to be tiled for acceptability as follows:
   1. Surface medium-rough texture.
   2. All surfaces to be tiled shall be free of dust, rust, paint, from oil or other release coatings.
   3. Provision for ladders and other embedments at proper locations.
   4. Concrete true to line, level, plumb and curvature.
   5. Width, depth and length will permit finished accuracy of markings and dimensions.
   6. Verify surfaces for compatibility with tile setting material manufacturer's requirements prior to installation.

3.02 ENVIRONMENTAL CONDITIONS

A. Protect all newly tiled areas.

B. Maintain temperature at 50 degrees F minimum during tile work and for seven days after completion or furnish protection as approved by the Architect/Engineer.

3.03 PREPARATION

A. Clean substrates.

B. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to tile applications.

C. Install waterproofing membrane at pools A & B.

D. Install slurry bond coat.
E. Do not seal substrate unless required by manufacturer.
F. Prime substrate if required by manufacturer.

3.04 INSTALLATION

A. Tile installation, General
   1. Install tile materials in accordance with ANSI A137.1, other reference ANSI or TCNA specifications, and TCNA “Handbook For Ceramic, Glass, and Stone Tile Installation”, except for more stringent requirements of manufacturer or these specifications.
   2. Cut and fit tight to protrusions and vertical interruptions.
   3. Work tile joints uniform in width, subject to variance in tolerance in tile size. Make joints watertight, without voids, cracks, excess mortar or grout.
   4. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of North America.
   5. Floors and walls: dry set: TCNA F113, F115, and W202E.
   6. Comply with tile setting material manufacturer’s installation requirements.
B. Thin set method
   1. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Back bed tiles with mortar. Maintain 95 percent coverage on back of tile and fully bed all corners.
   2. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
   3. Set tile in place and rub or beat with small beating block.
   4. Beat or rap tile to ensure proper bond and also to level surface of tile.
   5. Align tile to show uniform joints and allow to set until firm.
   6. Clean excess mortar or adhesive from surface of tile with wet cheesecloth while mortar is fresh.
   7. Sound tile after setting. Replace hollow sounding tiles.
C. Thick Set Method
   1. Apply slurry bond coat.
   2. While the slurry bond coat is wet, spread the mortar and compact well.
   3. While slurry bond coat is wet and sticky, set tile in place and beat in well.
   4. Beat or rap tile to ensure proper bond and also to level surface of tile.
   5. Align tile to show uniform joints and allow to set until firm.
   6. Clean excess mortar or adhesive from surface of tile with wet cheesecloth while mortar is fresh.
   7. Sound tile after setting. Replace hollow sounding tiles.
D. Grouting
   1. Allow tile to set a minimum of 48 hours before grouting.

2. If bonding materials are rapid setting, follow manufacturer's recommendations.
3. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
4. Pack joints full and free before mortar takes initial set.
5. Clean excess grout from surfaces per manufacturer recommendations, as work progresses.

3.05 LAYOUT

A. Align all joints to give straight uniform grout lines.
B. Observe exact minimum length per dimensions shown on Contract Drawings.
C. Observe exact minimum width per dimensions shown in Contract Drawings.
D. Observe +/- 1/16" maximum finish elevation tolerance on all gutter edges.
E. Provide expansion joints per TCNA EJ171.

3.06 WORKMANSHIP

A. Supply first-class workmanship in all tile work.
B. Use all products in strict accordance with recommendations and directions of manufacturer.
C. Proportion all mixes in accordance with latest ANSI Standard Specifications.
D. Smooth all exposed cut edges.
E. Gutter edges shall not vary from level or true plane more than 1/8" of pool static water level.

3.07 CLEANING

A. Clean excess mortar from surface with water as work progresses.
B. Clean tile surface as thoroughly as possible on completion of grouting, preform cleaning while mortar is fresh and before it hardens on surfaces.
C. Before acid cleaning, saturate with clean water all grout joints in areas to be cleaned.
D. Use manufacturers suggested products for cleaning off grout film.
E. Remove temporary protective coating by method recommended by coating manufacturer. Trap and removing coating to prevent it from clogging drains.

3.08 PROTECTION

A. Prohibit traffic from tile finish for 72 hours after installation.
B. Protect work so that it will be without any evidence of damage or use at time of acceptance.

3.09 TILE SCHEDULE

A. See Tile schedule, on Drawing PL101, for tile information.

END OF SECTION