ADDENDUM TO THE CONTRACT

for the

AUGUSTUS BROWN POOL MECHANICAL & ELECTRICAL UPGRADES
Contract No. BE23-019

ADDENDUM NO.: **FOUR** **CURRENT DEADLINE FOR BIDS:** **July 26, 2022**

PREVIOUS ADDENDA: **THREE**

ISSUED BY: City and Borough of Juneau
ENGINEERING DEPARTMENT
155 South Seward Street
Juneau, Alaska 99801

DATE ADDENDUM ISSUED: **July 13, 2022**

The following items of the contract are modified as herein indicated. All other items remain the same. This addendum has been issued and is posted online. Please refer to the CBJ Engineering Public Purchase webpage at: https://www.publicpurchase.com/gems/juneau,ak/buyer/public/home

CLARIFICATIONS:

Question: *"I find no spec for who/how the 'Project Commissioning' will be accomplished. Will this be part of the scope of work for this project?"*

Response: See Project Manual Item No. 4 in this Addendum.

Question: *"The project Schedule is way too tight at 5 months."*

Response: See Project Manual Item Nos. 1 and 3 in this Addendum.

Question: *"The 3 Pool bidders in the spec have declined to bid on this project. Please provide approved alternate sources that will give bids on this project."*

Response: See Project Manual Item No. 6 in this Addendum, there are substantial changes, including the addition of two more pre-approved pool contractors.

Question: *"Specification section 070150 – Preparation for Reroofing doesn't appear to be applicable to this project. Per the drawings there will be some roof patching but the building is not to be reroofed. Please clarify."*

Response: See Project manual Item No. 5 in this Addendum.

Question: *"Will water tightness testing per Section 131100 part 3.5 be required for both pools?"*

Response: Water tightness testing should be performed on the leisure pool before construction begins to achieve a baseline of water tightness, and then the testing shall be performed once all finishes are applied and the pools are filled.

PROJECT MANUAL:

Item No. 1 SECTION 00030 – NOTICE INVITING BIDS, COMPLETION OF WORK.
Replace the Completion of Work table ***with*** the following:

Work Description	**Completion Date**
Earliest Field Start	April 1, 2023
Substantial Completion Date	December 15, 2023
Final Completion Date	December 30, 2023

Item No. 2 SECTION 00100 – INSTRUCTIONS TO BIDDERS, Article 17 – AWARD OF CONTRACT, Paragraph C.
Replace Paragraph C ***with*** the following:

C. Low Bidder will be determined on the basis of the lowest total of the Base Bid plus combinations of Alternates if funding allows, as selected by the Selection Committee through the process described below.

A. Prior to the Deadline for Bids, a Selection Committee will be appointed by the Owner.
B. The Selection Committee will be sequestered in a conference room apart from the bid opening room at the time of bid opening.
C. The CBJ Purchasing staff will open bids. A bid summary sheet will be compiled without bidder identification, so that the Selection Committee will have no knowledge of which bids were made by which bidders.
D. The bid summary sheet will be delivered to the Selection Committee by the Engineering Contract Administrator.
E. The Selection Committee will choose the low bid comprised of the Base Bid and those Alternates deemed to be in the best interest of the project and within the approved construction budget. For award purposes, the CBJ will add any Alternate to the Total Base Bid Amount in Section 00310 – Bid Schedule.
F. The Selection Committee will identify in order from low to high the bids received for the project and the results will be posted.

Item No. 3 SECTION 00500 – AGREEMENT, Article 2 – CONTRACT COMPLETION TIME.
Replace the Contract Completion Time table ***with*** the following:

Work Description	**Completion Date**
Earliest Field Start	April 1, 2023
Substantial Completion Date	December 15, 2023
Final Completion Date	December 30, 2023

Item No. 4 ***Add*** the attached SECTION 019113 – COMMISSIONING, labeled Addendum 4.

Item No. 5 SECTION 070150 – PREPARATION FOR REROOFING
Delete Section 070150 – Preparation for Reroofing ***in its entirety***.

Item No. 6 SECTION 131100 – SWIMMING POOLS
Replace Section 131100 ***with*** the attached Section 131100, labeled Addendum 4.

Item No. 7 SECTION 131103 – SWIMMING POOL TILE
Replace Section 131103 ***with*** the attached Section 131103, labeled Addendum 4.

Item No. 8 SECTION 131104 – SWIMMING POOL CEMENTITIOUS FINISH
Replace Section 131104 ***with*** the attached Section 131104, labeled Addendum 4.

By: _____
Caleb Comas,
Contract Administrator

Total number of pages contained within this Addendum: 40

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 COMMISSIONING PLAN

A. Systems: Commission the following equipment, systems, and work.

1. HVAC Systems
   a. Hydronic heating equipment and systems
   b. Air handling equipment and systems
   c. Domestic hot water equipment and systems
   d. Testing, Adjusting and Balancing
   e. Building automation system and controls
2. Lighting systems and controls
   a. Interior lighting
   b. Emergency lighting
   c. Occupancy sensors
   d. Exterior lighting

B. Commissioning Tasks

1. Prerequisites: Submit the following to the CxA.
   a. Schedule of commissioning activities
   b. Approved O&M Manuals
   c. Settings list
   d. Startup reports
   e. TAB report
   f. 7-day DDC trend report
   g. Screen shots of all DDC graphic displays
   h. Updated control drawings, sequences, and calibration report
2. Functional Verification Tests: Demonstrate the operation of the equipment and systems to the Commissioning Authority (CxA). Verify that the systems and DDC controls and graphics are operational, all coordination requirements have been resolved, and troubleshoot problems.
   a. Demonstrate the operation of the equipment and systems to the CxA at the time of the substantial completion inspections.
   b. The visit will coincide with completion of the DDC and TAB work.
   c. Contractor Attendees: Superintendent, mechanical, electrical, DDC and TAB

3. Functional Performance Tests: Provide a final commissioning verification process site visit to verify the functional performance of the systems.
   a. Demonstrate the performance of the equipment and systems to the Commissioning Authority (CxA). The scope of functional performance testing covers the entire installation, from central equipment through distribution of services to each space. It includes measured capacities, effectiveness of operation, and all control functions.
4. Training Verification: The CxA will track and verify that the Owner has the proper documentation and training to operate the systems.
   a. Submit an agenda for each training session to the CxA 7 days prior to the functional performance tests.
   b. Submit a training attendance form for each training session within 7 days of completing the respective training session.

C. Commissioning Activities Schedule

1. Prerequisites: Complete all items and submit to the CxA within 7 days of the functional verification testing. Include the following in the construction schedule:

Prerequisites	**Schedule**
DDC installation, testing and verification	Prior to TAB work
TAB work	Prior to DDC trend reports
Startup reports	Submit to CxA 7-days before SI inspections
Approved O&M manuals	Submit to CxA 7-days before SI inspections
DDC graphic screenshots	Submit to CxA 7-days before SI inspections
7-day DDC trend report	Submit to CxA 7-days before SI inspections
TAB report	Submit to CxA 7-days before SI inspections

2. Functional Verification Tests: Schedule the tests to occur simultaneously with the substantial completion inspections by the mechanical and electrical engineers.

Functional Verification Tests	**Schedule**
Functional verification tests	Concurrent with mechanical and electrical substantial completion inspections

3. Functional Performance Tests: Schedule the tests to occur when all work is complete.

Functional Performance Tests	Schedule
Punch list / functional verification deficiencies	Corrected
Systems	100% complete and operational
Final TAB Report	Approved by Mechanical Engineer Submit to CxA 7-days prior to FPTs
DDC Control System	100% Complete
DDC Documentation	Final documents approved by Mechanical Engineer Submit to CxA 7-days prior to FPTs
DDC Graphical Screenshots	Submit to CxA 7-days prior to FPTs
7-day DDC Trend Data	Submit to CxA 7-days prior to FPTs

4. Training: Schedule training after all systems are fully operational and all deficiencies have been corrected. Schedule the training at a time suitable to the Owner a minimum of 14 days in advance.

D. Retesting: If the systems do not satisfactorily pass the functional performance tests the first time for any reason, including but not limited to, equipment failure, incorrect programming or setup, lack of qualified technicians, failure of all parties to attend the testing, omission, error, incomplete startup or verification of systems, and/or failure of the functional performance tests:

1. The contractor will pay all of the Owner's costs for retesting the systems—including the CxA's expenses for tracking, coordinating, preparing, attending and directing additional tests—as many times as necessary until all items pass the functional performance tests.

2. The Owner may deduct the retesting costs from the payments due the contractor.

1.3 COMMISSIONING INTENT

A. Commissioning is a verification process. This specification provides the commissioning plan and functional testing procedures for verifying the work.

B. Completeness of the work prior to commissioning activities is vital to a successful commissioning process; the contractor is required to fully complete all work prior to the scheduled commissioning activities.

C. This work includes, but is not limited to:

1. Coordinating the commissioning effort with the Owner's Commissioning Authority (CxA).

2. Scheduling the commissioning activities with specific dates coordinated with the overall construction schedule.

3. Completing critical items in the commissioning process so that the next operation can proceed.

4. Coordinating with the designers and Owner on the operation of the systems. All settings shall be coordinated and set according to the Owner's preference.

5. Establishing a process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
6. Following step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.
7. Operation and maintenance manuals.
8. Training, including required training materials.

1.4 DEFINITIONS

A. CxA: Commissioning Authority.

B. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.5 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Owner:

1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
2. Representatives of the facility user and operation and maintenance personnel.
3. Architect and engineering design professionals.

1.6 OWNER'S RESPONSIBILITIES

A. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

1.7 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall support the CxA in coordinating and implementing the commissioning plan.

B. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

C. Collaborate with the CxA to coordinate commissioning activities.

D. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

E. Provide trending data for CxA review and comment prior to functional testing.

F. Provide commissioning process test procedures.

G. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

H. Attend commissioning team meetings.

I. Integrate and coordinate commissioning process activities with construction schedule.

J. Review and accept commissioning functional test procedures provided by the CxA.

K. Apply the Owner's settings preferences to the equipment and systems.

L. Provide modifications to the control sequences and settings to improve the operation or efficiency of the systems.

M. Review and accept commissioning process test procedures provided by the Commissioning Authority.

N. Complete commissioning process test procedures.

O. Provide the materials, equipment, and labor to fine-tune the operation of the systems as directed by the CxA.

1.8 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Convene commissioning team meetings.

C. Provide a list of Owner's settings and preferences for use in setting up equipment and systems.

D. Provide functional testing procedures.

E. Witness systems, assemblies, equipment, and component startup.

F. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

G. Direct modifications to the control sequences and settings to improve the operation or efficiency of the systems.

H. Prepare and maintain the Issues Log.

I. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREREQUISITES

A. General: Perform and document the following prerequisites prior to performing verification tests. For each task, submit a statement certifying that the work has been completed and equipment and systems are operational in accordance with contract documents. A certification document is provided at the end of this section.

B. O&M Manuals: Submit the approved O&M manual to the CxA.

1. Include the manufacturer's installation, startup and checkout data in the O&M Manuals.
2. Provide the approved submittal documentation to the CxA for all operating equipment.

C. Settings List: Set all equipment and system settings in accordance with the Owners preferences. These include, but are not limited to:

1. Room temperature setpoints (occupied and unoccupied)
2. Pool temperature setpoints
3. Occupied and unoccupied schedules
4. HVAC control setpoints including, but not limited to:
   a. Boiler operating temperatures
   b. Electric boiler stage on and off time delays
   c. Minimum outside air settings
   d. Supply air temperature settings
   e. CO2 sensor settings
5. Domestic hot water system setpoints
6. Occupancy and vacancy sensor time off delay and operating mode
7. Lighting control schedules
8. Exterior lighting schedules

D. System Startup

1. Startup the systems in accordance with the manufacturer's requirements, acceptable practice, industry standards, and other sources. Inform the CxA of any deviations or additions from the manufacturer's requirements prior to starting the systems.
2. Develop and submit a startup report for each piece of equipment showing step-by-step conformance with the startup requirements and manufacturer's startup instructions.
3. Copies of the manufacturer's printed startup requirements may be used for documenting the startup procedures. Note the project name, equipment tag, startup technician and date at the top of the page. Specifically note the completion of each step and any other relevant information.

4. Perform the manufacturer's installation, pre-starting checks, and start-up procedures for all of the following equipment:
   a. Pumps
   b. Variable frequency drives
   c. Oil-fired boilers: Include combustion test report in the startup report
   d. Domestic hot water heaters
   e. Tempering valves or Thermostatic mixing valves
   f. Glycol mixing tanks
   g. Air handling units
   h. Supply fans
   i. Exhaust fans
5. Testing, Adjusting, and Balancing (TAB): Confirm that testing, adjusting, and balancing procedures have been completed. Submit TAB report.
6. Building Automation and Automatic Control Systems
   a. Perform static and dynamic point-to-point tests of the system.
   b. Check operation of all valve and damper actuators.
   c. Confirm that the automatic control systems have been completed and calibrated and are operating in accordance with contract documents.
   d. Submit updated control drawings and sequences, calibration reports, point-to-point test reports, screen shots of each graphic display, 7-day trend report and certification to the CxA.

3.2 DDC TRENDING DATA

A. Trend all building automation system points at five-minute intervals.

B. Submit a continuous seven-day data set to the CxA for review.

C. Continue to trend the data prior to the functional tests, during the functional tests, and for a week after the functional tests.

D. Submit electronic copies of the monitored data in usable format as selected by the CxA.

E. Graphical output is required for all output, if the system can produce it. If the system is incapable of graphical output, provide data in a columnar format with time down the left column and at least 5 columns of point values on the same page.

3.3 FUNCTIONAL VERIFICATION TESTING

A. Functional Verification tests will occur at the time of substantial completion inspections in accordance with the Functional Performance Testing and Testing Procedures requirements below. The following exceptions apply:

1. The TAB contractor is not required during the Functional Verification Testing.

3.4 FUNCTIONAL PERFORMANCE TESTING AND TESTING PROCEDURES

A. General

1. Perform functional performance tests on all of the equipment associated with the HVAC, lighting, and special systems. The systems and equipment that will be functional tested includes, but is not limited to, the systems listed in this section.
2. The CxA will oversee, witnesses, and document the functional testing of all equipment and systems according to the Specifications. The contractor executes the tests to verify proper operation of the systems. The functional test requirements provide a guideline for performance of the tests.
3. Verify the operation of the systems under all potential operating modes. This will include varying setpoints and conditions to demonstrate operation of the systems under normally expected conditions throughout the system life.
4. Submit data on the procedure to be used for any tests that require temporary modifications to control functions to simulate desired load conditions up to design load conditions. Include measuring instruments and logging devices to record the test data for the required test period. The instrumentation shall meter and record all operating conditions to allow for complete evaluation of the test results.
5. Functional performance testing will progress from the central equipment and systems to the individual components of the systems that distribute throughout the building.
6. During functional performance testing of a system, a failure in performance of a part of the system or of a component may be revealed. Any performance deficiencies must be evaluated to determine the cause and whether they are part of the contractual obligations. After necessary corrective measures are completed, repeat the necessary functional performance tests.

B. Functional Testing Procedures

1. Purpose
   a. This section describes the intended testing procedures that will be used to verify system operation during the functional performance tests. The typical methodology will be to verify operation by changing inputs and setpoints to simulate and assess normal system response to load variations and weather.
   b. The test procedures are not limited to only these procedures; other procedures will be applied as required to fully verify the system operation.
   c. Functional testing procedures will include all tests necessary to verify the full and complete operation of the systems under expected operation conditions.
2. General Verification Procedures
   a. Starter testing will involve manually positioning the starter to all positions and verifying proper response.
   b. The equipment will be tested for proper operation.
   c. Control sequence testing will occur at the DDC graphic screens and the DDC front end, where applicable.
   d. Safety testing will occur by triggering the safety device and/or overriding values within the DDC system.
   e. Alarms will be verified by changing settings or operations outside of acceptable ranges to trigger the alarm.

f. Local controls will be tested from the controllers by changing setpoints and triggering a response.
g. The manufacturer's recommended startup and checkout test procedures will be used where applicable.

C. Starter Operation: Tests of equipment starters include, but are not limited to:

1. Variable Frequency Drives
   a. Hand: Manual control of motor speed
   b. Bypass: Manual operation of motor at 100% speed
   c. Auto: Automatic control and modulation of speed

2. Magnetic Starters
   a. Hand: Manual control
   b. Auto: Automatic control

D. Hydronic Heating System – Verify the following:

1. Miscellaneous
   a. Water Feeder: Remove fluid from system and observe fill to proper pressure.
   b. Chemical Feeder: Required flow.
   c. Glycol Tanks and Pumps: Drain fluid from system back into tank and observe proper operation of pump and safeties.

2. Fuel Oil Boiler
   a. Safeties: Calibration and operation of the operating thermostat, high limit thermostat, extra high limit thermostat, and low-water cutoff.
   b. Manual Mode: Boiler aquastat enables and modulates burner on each boiler to maintain setpoint. Boiler pump operates when burner operates.
   c. Automatic Mode
      1) Remote enabling of boiler by the DDC system or boiler control panel.
      2) Plant will maintain the heating supply setpoint while the load is increased from minimum to peak design load.
         a) Proper lead/lag/lag/standby operation of all heating equipment (boilers, heat pumps, etc.) and primary pumps. Test each possible lead/lag/standby combination.
         b) Proper burner low/high/low modulation, including synchronous modulation when two or more boilers are enabled.

3. Pumps: Pump operates properly and modulates in response to load by changing inputs and setpoints.

4. Pool Heat Exchanger: Change inputs or setpoints and observe proper system response.

5. Terminal Units: Reheat Coils, Booster Coils, Radiant Panels, Finned Tube, Cabinet Unit Heaters, Cabinet Fan Heaters, Unit Heaters, Convectors: Change inputs or setpoints and observe proper response.

6. Radiant Slab Heating System: Reheat Coils, Booster Coils, Radiant Panels, Finned Tube, Cabinet Unit Heaters, Cabinet Fan Heaters, Unit Heaters, Convectors: Change inputs or setpoints and observe proper system response.

7. Calibration Tests
   a. Sensor and actuator calibration by comparing BAS readout against hand-held calibrated instruments. Readout must be within 0.5°F for temps. or within a tolerance equal to 10% of the pressure setpoint, with a test gage.
   b. Flow meter calibration using pump curves or other method.
8. Acceptance Criteria
   a. For the conditions, sequences and modes tested, the boilers, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
   b. Boiler shall maintain the supply water setpoint to within +/- 1.0F of setpoint deadband without excessive hunting.
   c. Pumping system and controls shall maintain the current desired pressure setpoint to within an amount equal to 10% of the setpoint value either side of the deadband without excessive hunting.

E. Domestic Hot Water System – Verify the following:

1. Domestic Hot Water Heater: Change inputs or setpoints and observe proper system response.
2. Hot Water Recirculating Pump: Changing inputs and setpoints and observe proper system response.
3. Tempering Valve: Vary flowrate while maintaining a temperature output within 2°F of setpoint.
4. Acceptance Criteria: For the conditions, sequences and modes tested, the components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

F. Ventilating Systems – Verify the following:

1. Air Handling Units and Heat Recovery Units
   a. Change inputs or setpoints and observe proper system response.
   b. Minimum Outside Air Flow: TAB contractor will measure the minimum outside airflow to validate proper settings.
2. Terminal Units (VAV, Dual Duct, Reheat Coils): Change inputs or setpoints and observe proper system response.
3. Supply Fans: Change inputs or setpoints and observe proper system response.
4. Heat Exchangers: Change inputs or setpoints and observe proper system response.
5. Exhaust Fans: Change inputs or setpoints and observe proper system response.
6. Acceptance Criteria: The systems, integral components and related equipment respond as specified and according to acceptable operating practice.

G. Test, Adjustment, and Balancing (TAB) – Verify the following:

1. Purpose. The purpose of this test is to spot check the TAB work to verify that it was done in accordance with the contract documents and acceptable practice and that the TAB report is accurate.

2. The following tests and checks will be conducted. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in the contract documents.
   a. A random sample of up to 50% of the TAB report data shall be selected for verification (air velocity, air or water flow rate, pressure differential, electrical or sound measurement, etc.). The original TAB contractor will execute the checks, witnessed by the CxA. The TAB contractor will use the same test instruments as used in the original TAB work.
      1) A failure of more than 10% of the selected items of a given system shall result in the failure of acceptance of the system TAB report. The TAB contractor shall be responsible to rebalance the system, provide a new system TAB report, and repeat random verifications of the new TAB report.
   b. Verify that final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked by the TAB Contractor.
   c. Verification that the air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all TUs taking off downstream of the static pressure sensor, the TU on the critical leg has its damper 90% or more open.
   d. Verification that the water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full heating or cooling the respective heating or cooling coil valve of that leg is 90% or more open.
   e. Definitions
      1) Examples of a “system” are: the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system. Systems can be defined smaller if inaccuracies in TAB work within the smaller defined system will have little or no impact on connected systems.
      2) Cooling season, Heating season or Both. “Design” means within 5° of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

3. Acceptance Criteria: Failure of an item is defined as follows:
   a. For airflow of supply and return: a deviation of more than 10% of instrument reading.
   b. Minimum Outside Air and Air Flow Monitoring Stations: 10% of instrument reading.
   c. For temperatures: a deviation of more than 1°F
   d. For air and water pressures: a deviation of more than 10% of full scale of test instrument reading.
   e. For sound pressures: a deviation of more than 3 decibels. (Variations in background noise must be considered).

H. Control Systems – Verify the following:

1. A significant part of the control system functional testing requirements is the successful completion of the functional tests of equipment and systems. Uncompleted equipment functional tests or outstanding deficiencies in those tests lend the required controls functional testing incomplete.

2. DDC Controls
   a. Graphics: Screens are neatly arranged, equipment image and system layout is accurate, all points are displayed, information is accurate, text sizes and colors are accurate, and the layout is organized and understandable to a new person on the Owner's operations staff.
   b. Monitoring
      1) All points are accurate, properly displayed and identified.
      2) User capability to change all setpoints is provided.
   c. Alarms
      1) Trigger by changing setpoints at the device to trigger an alarm. If this is not feasible, trigger an alarm by changing the alarm setpoint.
      2) Annunciate alarms and provide a central alarm log.
   d. Verify accuracy of control documentation

3. Integral or stand-alone controls are functionally tested with the equipment they are attached to, including any interlocks with other equipment or systems.

I. Lighting Systems and Controls – Verify the following:

1. Emergency Lighting: Interrupt the power to the fixtures and observe that all fixtures function.

2. Exterior Lighting
   a. Observe photocell control at dusk and dawn.
   b. Change time clock settings and observe proper response.

3. Occupancy or Vacancy Sensors
   a. Walk-though test to verify operation without nuisance operation due to actions in adjacent spaces or inability to sense occupancy.
   b. Operates according to Owner's preferences for operating mode and off time delay.

4. Acceptance Criteria: The systems, integral components and related equipment respond as specified and according to acceptable operating practice.

3.5 TRAINING

A. Scope: Provide training of the following equipment and systems:

1. Heating System
   a. Fuel-oil boilers
   b. Glycol pump systems
2. Plumbing Systems
   a. Tempering valve
3. Ventilation and Exhaust Systems
   a. Air handling units
   b. Supply fans
   c. Heat recovery units
   d. Fire dampers
   e. Exhaust fans
4. VFD drives
5. Control Systems
   a. Direct digital control system
   b. Local and automatic controls
6. Lighting controls

B. Agenda: For each training session, submit a form describing the subjects to be covered during training, along with the name and qualifications of the trainer(s).

C. Training Record: Document each training session (duration and general subjects covered). The trainer signs for the session and obtains the signature of each trainee.

3.6 CERTIFICATE OF READINESS

Provide the following certifications at each commissioning milestone and submit to the CxA.

Systems Startup: I certify that the systems are installed in accordance with the contract documents. I certify that the HVAC systems and associated subsystems are completed, calibrated, and started up in accordance with the startup requirements and are believed to be operating in accordance with contract documents.

General Contractor	Mechanical Contractor	DDC / Controls Contractor

Testing, Adjusting, and Balancing (TAB): I certify that the testing, adjusting, and balancing procedures are completed in accordance with the contract documents.

General Contractor	Mechanical Contractor	TAB Contractor

Lighting Systems and Controls: I certify that the lighting systems and controls are completed in accordance with the contract documents.

General Contractor	Electrical Contractor	Controls Contractor

Automatic Control Systems: I certify that the automatic control systems are completed, calibrated, and operating in accordance with contract documents.

General Contractor	Mechanical Contractor	DDC / Controls Contractor

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

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

A. Introduction

1. Provide labor, materials, equipment, and services necessary to re-finish the recreation pool. This work must include installation of pool finishes as well as products listed in Part 2 of Section 131100.

B. Work included in this section:

1. It is the intent of this section to place the entire responsibility for the re-finishing of the pool under one vested CONTRACTOR. Under this section the Swimming Pool Contractor will provide but is not necessarily limited to the following:

a. Completely remove the existing Recreation Pool plaster layer down to bare via hydroblasting or sandblasting and provide a proprietary aggregate plaster finish (Diamond Brite) to the Recreation Pool structure. Provide installation of bond coat prior to application of pool finish in strict accordance with manufacturer's instructions. Properly remove and dispose of the existing recessed steps, vertical waterline tile, and stair entry tile. Provide new recessed steps and waterline ceramic tile trim on the pool vertical tile band, stairs, nosings, depth markings, warning signs, and other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications. Reference Section 131103 – Swimming Pool Tile and Section 131104 – Swimming Pool Cementitious Finish.

C. Related work specified in other sections:

1. Section 131104 – Swimming Pool Cementitious Finish

2. Section 131103 – Swimming Pool Tile

1.3 QUALITY ASSURANCE

A. The specifications and drawings illustrate and detail one (1) swimming pool system that is utilized for recreational use. Certain technical aspects of the design are common only to pool systems planned for public use. Understanding these aspects, their functions and interaction through experience is vital to re-finishing a pool. It is a mandatory requirement that bidders will have achieved such experience as a prerequisite for bidding this project.

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

2. The SWIMMING POOL CONTRACTOR must include a bid bond from an approved surety company registered in the State of ALASKA certifying that the SWIMMING POOL CONTRACTOR has adequate bonding capacity to provide a bid for this project. The

SWIMMING POOL CONTRACTOR must submit a copy of the bid bond for review prior to SWIMMING POOL Contractor's selection.

3. If the Contractor has not received prior written approval for this project or has not been included in the pre-approved list of Contractors, they must submit a list of projects meeting the aforementioned qualifications, including contact information of the General Contractor must be submitted for review and approval at least 5 days prior to the Deadline for Bids. The Contractor must have re-plastered and re-tiled at least five (5) public-use pools with individual water surface areas in excess of 3000 square feet and a depth of 5'-0" or more within the past 10 years.

4. The Contractor must submit prior to the start of construction the name of the on-site Project Superintendent including their relevant experience. The Contractor's on-site Project Superintendent must have re-plastered and re-tiled at least five (5) public-use pools with individual water surface areas in excess of 3000 square feet and a depth of 5'-0" or more within the past 10 years. A list of projects meeting the aforementioned qualifications, including contact information of the General Contractor as well as Owner must be included with the experience submittal. Project Superintendent must not change on the project unless written authorization has been provided by the Architect and Owner.

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

6. The following bidders have been pre-approved. Bidders must meet the requirements listed above.

Acapulco Pools
Bernie Gall
1550 Victoria St. N.
Kitchener, Ontario N2B3EZ
Phone: 519-743-6357

Associated Pools
David Volk
2121 Lovett Ave.
Bismarck, ND 58502
Phone: 701-258-6012

The Pool Company, Inc
Dwight Love
3077 20th St E Suite D
Tacoma, WA
Phone: 253-926-6875

Anderson Poolworks
Dana Anderson
9500 Boeckman Rd
Wilsonville, OR 97070
Phone: 503-625-5628

Mid-America Pool Renovation
Austin Kateusz
5929 E 154 Terrace
Grandview, MO 64030
Phone: 816-994-3300

7. The following Contractors are included as potential bidders. Their inclusion does not imply an 'Approved Bidder' on the part of the Pool Specialty Consultant- Councilman-Hunsaker. Submittal of a Pool contactor approval request, as stated in SECTION 131100 PART 1-GENERAL, Article 1.3 Quality Assurance, Paragraph A, subparagraph 3 will be required to be submitted for review by the Pool Consultant within 5 days prior to deadline for Bids.

a. WMS Aquatics, Ellensburg, WA, Phone 800-426-9460, www.wmsaquatics.com

b. Polar Pools, Anchorage, AK, Phone 907-360-9643, www.polarpoolsak.com, Bob Walker, Owner

1.4 COORDINATION AND CLARIFICATION

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

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

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

1.5 ALTERNATES

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

B. Pool Alternate:

1. Base Bid: No work shall occur within the Pool Structures.

2. Alternate #1: Completely remove and replace the existing plaster, tile finishes, and recessed steps within the Recreation Pool Structure. This includes all plaster, vertical waterline tile, stair entry tile/nosings, and recessed steps. Refer to the SP drawings and specification sections 131100, 131103, and 131104.

1.6 CONTRACTOR'S ALTERNATE PROPOSAL

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

B. It is the intent of the contract documents to encourage competition. The base proposal must include the construction methods and equipment as specified and detailed. Proposed system substitutions must have prior written approval by the Architect.

C. If there is a deviation from the basis of design equipment, confirm that engineering criteria are appropriate for the substituted equipment.

D. Substitutions of specified construction methods and equipment must include a complete submittal as required by these specifications and drawings of appropriate scale incorporating required changes. Provide a list of at least five (5) satisfactory installations comparable to this project that have been manufactured and installed under the manufacturer's current legal name. Submit a list of such projects with the name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect on the bid date.

E. Changes or modifications to the Contract Documents that are not authorized by the architect are the sole responsibility of the Contractor.

1.7 SUBMITTALS

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

B. One (1) set of manufacturer data must be tabbed, indexed, and referenced to the specifications, compiled into an electronic submittal. Each section of items must be prefaced by a cover sheet listing the items submitted within the section. Electronic submittals must be organized, numbered, and submitted in the same format and order as the project specifications. Only complete sets will be reviewed.

1. All finishes and corresponding setting materials must be submitted for review. This data must include drawings, manuals, maintenance data, and descriptive information in sufficient detail for proper installation of the materials.

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

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

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

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

6. Deviations from the contract documents must be identified on each submittal and must be tabulated in the CONTRACTOR'S letter of transmittal. Such submittals must, as pertinent to the deviation, indicate essential details of changes by the CONTRACTOR.

7. The CONTRACTOR must accept full responsibility for the completeness of each submission, and, in the case of a resubmission, must verify that exceptions previously noted have been considered.

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

9. Review of drawings and data submitted by CONTRACTOR will cover only general conformity to the drawings and specifications. Review does not indicate a thorough review of dimensions, quantities, and details of the material, equipment, device, or item shown. Review of submittals does not relieve CONTRACTOR from responsibility for errors, omissions, or deviations, or responsibility for compliance with the contract documents.

10. When the drawings and data are returned marked REJECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, the corrections must be made as noted thereon and as

instructed and six corrected copies (or one copy and one corrected reproducible copy) resubmitted.

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

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

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

C. Test Reports

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

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

1. Paragraph 2.01 – Recessed Steps

E. Reference Section 131104 – Swimming Pool Cementitious Finish

F. Reference Section 131103 – Swimming Pool Tile

1.8 OPERATION AND MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

A. Detailed maintenance information must be supplied for finishes requiring maintenance or other attention. The supplier and/or CONTRACTOR must prepare a maintenance manual for equipment. Maintenance instructions must be provided.

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

1. Include manufacturer recommended maintenance schedule and maintenance instructions.

2. One set of applicable submittals must be included in each manual.

C. The maintenance manuals must be in addition to instructions packed with or attached to the materials when delivered, or which may be required by the CONTRACTOR.

D. Manuals and other data must be printed on heavy, first quality paper, 8-1/2 x 11-inch size with standard 3-hole punching and inserted in plastic covers. Drawings and diagrams must be reduced to 8-1/2 x 11 inches.

E. Six (6) bound volumes of each manual must be submitted. Material must be assembled and bound in the same order as specified, and each volume must have a table of contents and suitable index tabs.

F. Material must be marked with project identification. Non-applicable information must be marked out or deleted.

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

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

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

C. Handle materials in a manner to prevent damage.

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

E. Remove damaged materials from site.

1.10 WARRANTIES

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

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

C. Warranties must be for a period of one year from the date of substantial completion or the owner begins using the pool unless otherwise specified. Submit warranties covering, but not limited to the following:

1. Defects in material, workmanship, and installation of recessed steps for a minimum period of three (3) years.

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

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

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

1.11 SYSTEM TRAINING

A. A qualified representative of the CONTRACTOR performing work under this section must put the pool into operation for a total of three (3) days after the work has been completed.

B. The CONTRACTOR’S training representative must have completed the pool finish manufacturer’s training requirements and be certified, by the manufacturer, to provide start-up.

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

D. Start-up periods scheduled as follows:

1. 24 hours (3 days) of initial start-up and chemical balance on the complete swimming pool system.

1.12 POOL FILL WATER QUALITY

A. The Owner is to bear the cost of the water required for one (1) complete filling of the pool. Removal of iron or copper (if in excess of .3 ppm) will be required for the final fill to avoid staining of the pool finish. Subsequent fillings or partial fillings (more than 25%) of the pool is by the CONTRACTOR, at its own expense.

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

C. Provide the necessary chemicals and to adjust and balance the water chemistry in the pools to the following levels:

pH	7.4 - 7.6
Calcium Hardness	200 - 400 PPM
Total Alkalinity (Sodium Hypochlorite)	80 – 120 PPM
Total Alkalinity (Calcium Hypochlorite)	60 - 80 PPM
Langelier saturation index	-0.3 - +0.3
Total Dissolved Solids (TDS)	not to exceed 1,500 PPM

PART 2 – PRODUCTS

2.1 RECESSED STEPS

A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.

1. Recessed steps (6 required) must be a single molding of white ABS with an integral slip resistant tread surface. The step must be 16.5 inches wide by 6 inches deep. Portions of the backside must be completely filled with non-shrink grout and set into the wall block-out and mortared in with non-shrink grout. Steps by Paragon, S.R. Smith, Spectrum Products or approved equal.

PART 3 – EXECUTION

3.1 EXISTING CONDITIONS, INSPECTION AND PREPARATION

A. Carefully examine of the contract documents for requirements that affect the work of this section. Prior to starting work, notify the General Contractor of defects requiring correction. Do not start work until conditions are satisfactory.

B. Protect materials and work completed by others from damage while completing the work in this section.

3.2 FIELD MEASUREMENTS

A. Verify benchmark and pool location prior to layout.

B. If field measurements differ from the construction drawing dimensions, notification must be given to the Architect prior to proceeding with work.

3.3 WATER TIGHTNESS TEST

A. This test applies to the pool. The test must be performed prior to draining the pools for construction to get a baseline reading of the pool, and after all described work has been completed at the pool. Record results of each test and forward them along to the engineer for review.

B. Water Tightness Test Procedure

1. Preparation

a. Securely seal all outlets to isolate the vessel.

2. Fill: Fill and then isolate the vessel. The water tightness test must begin after the vessel has been filled for a minimum of three (3) days. During the filling, outlets must be monitored for water tightness. If visible leakage from the vessel is observed, the condition must be corrected prior to the start of the test.

a. After the initial fill, ground water must be removed from the pool sight sump or the pool location de-watering system if applicable. This must be completed prior to the start of the water tightness test. De-watering of the pool sight sump (if applicable) must be maintained during the entire duration of the test.

3. 24-hour Allowable Loss

a. Calculate the allowable water loss from the unlined vessel(s). This is .1% of the total vessel volume. For the example, the vessel has a volume of 200,000 gallons, the 24-hour allowable loss will be 200 gallons.

Vessel	Total Volume (Gallons)	24-hour Allowable loss (.1% or .001 of Total Volume)
EXAMPLE	200,000 gal	200 gal
Pool		

4. Measurement

a. Measurements must be taken at the pool. Multiple test points with averaging are recommended for vessels which will be exposed to wind. Document the separate findings on the chart below. Repeat the measurements and document every 12 hours for a total of three (3) days. The Contractor must check the pool for water loss with the Architect or Owner's representative every 12 hours. Submit photo documentation of each measurement with the completed water tightness report. Example measurements are shown in the table below.

5. Evaporation Measurement Procedure

a. Fill a floating, restrained, partially filled, calibrated, open pan with water and allow the container to float within the pool during the testing period. This will be used to measure evaporation

Vessel	12 hrs. passed	24 hrs. passed	Day 1 TOTAL	36 hrs. passed	48 hrs. passed	Day 2 TOTAL	60 hrs. passed	72 hrs. passed	Day 3 TOTAL
Example Pool	.021 ft	.010 ft	.031 ft	.016 ft	.019 ft	.035 ft	.012 ft	.017 ft	.039 ft
Example Pan	.008 ft	.006 ft	.014 ft	.008 ft	.007 ft	.015 ft	.009 ft	.007 ft	.016 ft
Pool 1									

6. Calculate Daily Loss

a. Calculate the total daily water loss for the vessel and record in the table below. If a vessel has a daily water loss that is greater than the calculated 24-hour allowable loss, the vessel cannot be considered watertight.

1) Daily Loss = 7.481 x Structure Surface Area (SF) x [Total Water Loss per Day (FT) – Evaporation per Day (FT)]

b. For the example, we have a body of water that is 200,000-gallon volume and 3,500 square feet of surface area. Measurements for this example body of water are recorded in the table above.

1) Day 1 Loss = (7.481 gallons per cubic foot) x (3,500 SF) X [(.031 ft water loss) – (.014 ft evaporation)] = 445 gallons Day 1 loss

2) Day 2 Loss = (7.481 gallons per cubic foot) x (3,500 SF) X [(.035 ft water loss) – (.015 ft evaporation)] = 524 gallons Day 2 loss

3) Day 3 Loss = (7.481 gallons per cubic foot) x (3,500 SF) X [(.039 ft water loss) – (.016 ft evaporation)] = 602 gallons Day 3 loss

Vessel	Daily Water Loss Day 1 (Gal)	Daily Water Loss Day 2 (Gal)	Daily Water Loss Day 3 (Gal)	Allowable Loss (calculated above, Gal)	Are daily values higher than the Allowable Loss? (Y/N)
EXAMPLE	445 gal	524 gal	602 gal	200 gal	Y, not watertight
Pool 1					

7. Absorption

a. Waiting 3 days after the initial water fill will allow the structure and plaster to absorb water and must be sufficient to minimize the effect of absorption on the test results.

8. Evaporation

a. Evaporation must not have a significant effect on natatoria that are completely enclosed with no air circulation during the water tightness test. However,

evaporation will have a significant effect on the water level in natatoria that has air movement across the water surface or are still partially uncovered.

9. If leaks are detected, repair the vessel, and make watertight in accordance with these requirements.

10. With regard to this test, the curing requirements, the final fill, and the cost of the water for two (2) complete fillings must be borne by the Owner. Expenses for subsequent fillings or partial fillings (more than 25%) of the pool must be provided and will not be borne by the Owner.

3.4 EQUIPMENT AND SYSTEMS INSTALLATION

A. Items necessary to complete this section are shown on the plans or described in the specifications. Items are detailed and specified as a guide for dimensional purposes. Make provisions accordingly and submit shop drawings and submittals based on that data.

3.5 START-UP AND INSTRUCTION

A. Supply the start-up services of an experienced swimming pool operator/instructor for a period of not less than three days (total 24 hours) after the pool have been filled and initially placed in operation. Deliver six (6) complete sets of operating and maintenance instructions for the swimming pool finishes.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and General Provisions of the contract, including General and Supplementary Conditions apply to work of this section.

1.2 SUMMARY

A. Properly remove and dispose of the existing recessed steps, vertical waterline tile, and stair entry tile. Provide new recessed steps and waterline ceramic tile trim on the pool vertical tile band, stairs, nosings, depth markings, warning signs, and other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.

B. The CONTRACTOR must furnish and install the work of this section.

1.3 RELATED SECTIONS

A. Division 1 – Mock Ups

B. Division 7 - Joint Sealers

C. Division 9 - Ceramic Tile

D. Section 131104 - Swimming Pool Cementitious Finish

1.4 QUALITY ASSURANCE

A. Reference Standards: Conform to the following standards unless otherwise required herein.

1. American National Standards Institute (ANSI)

a. A108.01 – General Requirements: Subsurfaces and Preparations by Other Trades.

b. A108.02 – General Requirements: Materials, Environmental, and Workmanship.

c. A108.1, Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.

d. A108.1C – Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry Set or Latex-Portland Cement Mortar.

e. A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.

f. A108.10 – Installation of Grout in Tile Work.

g. A137.1 Standard Specifications for Ceramic Tile.

2. American Society for Testing and Materials (ASTM)

a. C144-99, Aggregate for Masonry Mortar

b. C150-00, Portland Cement

c. C171-97a, Sheet Materials for Curing Concrete

d. C206-97, Finishing Hydrated Lime

e. C207-91 (R1997), Hydrated Lime for Masonry Purposes

f. F-1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

g. F-2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes

3. Tile Council of North America (TCNA); 2021 Edition, Handbook for Ceramic Tile Installation.

4. American Concrete Institute

a. ACI 302 – Guide for Concrete and Floor Slab Construction

5. International Concrete Repair Institute (ICRI)

a. Concrete Surface Profile (CSP)

B. Tile installers must have two years' experience in similar pool projects which the Owner may require written proof thereof and proper tools to install tile.

1.5 MANUFACTURERS

A. Subject to compliance with requirements provide ceramic tile, mortar and grout of the following manufacturers: American Olean Tile Co. (tile), Dal-Tile Co. (tile), Buchtal (tile), KlinkerSire (tile), Daldorado (tile), MAPEI, Inc. (thin-set, waterproofing, grout and admixtures), and LATICRETE International Inc. (thin-set, waterproofing, grout and admixtures) or approved equal.

1.6 SUBMITTALS

A. Submit shop drawings indicating tile layout, patterns, joint layout, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details.

B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.

C. Samples:

1. Mount tile and apply grout on 24"x24" backerboard to indicate pattern, color variation and grout joint size variations of each pattern. Furnish mounted tile samples as requested by the architect/owner.

D. Submit manufacturer's installation instruction.

E. Submit maintenance data.

1. Include recommended cleaning and stain removal methods, cleaning materials.

1.7 PRODUCT DELIVERY AND STORAGE

A. Deliver tile materials to site in unopened factory containers sealed with grade seals bearing printed name or manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

1.8 JOB CONDITIONS

A. Inspect and verify job conditions. Report defects in base surfaces for correction before proceeding.

B. Maintain environmental conditions, including temperature humidity and ventilation, within limits recommended by the manufacturer. Do not install products under environmental conditions outside manufacturer's absolute limits.

C. Do not install mortar, set, or grout tile exterior when inclement weather conditions are expected within 48 hours after work is scheduled to be completed unless proper protection is provided.

D. Maintain a temperature range of 50 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average a temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.

E. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

1.9 COLORS

A. Colors must be selected by the Architect, Owner, or Interior Designer. Note that swimming pool regulations may dictate color selections within the pool tank. See tile materials for price group breakdowns.

1.10 WARRANTIES

A. The CONTRACTOR warrants to the Owner that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements including substitutions not properly approved and authorized, may be considered defective. The CONTRACTOR'S warranty excludes remedy for damage or defect caused by abuse, improper or insufficient maintenance, improper operation, modifications not executed by the CONTRACTOR or improper wear and tear under normal usage. If required by the Owner, provide satisfactory evidence as to the kind and quality of materials and equipment. Warranties must be for a period of five years, unless otherwise specified.

B. Setting materials must be provided by the same manufacturer. Mixing materials and application procedures must be done in accordance with manufacturer's recommendations and requirements. Documentation must be provided to this affect by the contractor with verification from the manufacturer. This documentation must be included in the operations and maintenance manual under warranties as documentation qualifying the project for a 15 Year Systems Warranty by LATICRETE International, Inc., MAPEI, Inc. or approved equal.

C. Contractor must contact the tile setting material manufacturer's technical representative to review installation details, job site conditions, selected materials and their conformance to the manufacturer's warranty requirements prior to the commencement of work. Failure to follow these requirements will not relieve the Contractor of the requirement to provide specified warranties.

D. Contractor must agree to repair or replace work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

PART 2 – PRODUCTS

2.1 TILE MATERIALS

A. Standard grade conforming to ANSI A137.1. Provide trimmer units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors must be as indicated and specified, colors of approved shades. Mesh mounted or perforated paper backed tile is not allowed where the mesh of paper remains as a permanent part of the installation. If dot mounting is used, a minimum of 67% of the depth of the tile must be free from dots to ensure proper grout curing.

B. Tile must be "frost-proof".

C. Unglazed Ceramic Mosaic Tile

1. Slip-resistant porcelain unglazed ceramic mosaic tile, cushion or all-purpose edges, 1" square from price group 2 for the Recreation Pool stair entry. Minimum dynamic coefficient of friction must be 0.42 for wet surfaces. Where special shapes are required, they must be selected from price group 3. Equivalents provided by Knoxtile, Dal-Tile or American Olean. For wet surfaces: Buchtal Chroma Mosaics with front mount film (seven color options) 1"x1" or American Olean Unglazed color-body porcelain mosaics 1"x1", price group 1-3 or Dal-Tile or American Olean Unglazed color-body mosaics 1"x1" with 7.5% abrasive grain (7 color options). A bright color (such as white) shall be used to contrast with dark stair nosings. Color selection by Owner/Architect.

2. Recreation Pool Ceramic tile band below the pool gutter lip (with color selected by Owner/Architect) from Dal-Tile, Keystone Unglazed Mosaic, 2"x2" price group 4, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 1-3, or powder glazed 2"x2" Buchtal Chroma Mosaics provided by Knoxtile.

3. Recreation Pool Contrasting ceramic tile nosings at pool stairs must be Universal Trim 1"x1" with color selected by the Architect from Dal-Tile, Keystone Unglazed Mosaic, price group 3 and 4, American Olean Unglazed color-body porcelain mosaics 1"x1", price group 1-3. Color shall be a dark blue to contrast with other stair entry tile and plaster finish.

D. Provide tile trim units where indicated or necessary for a complete and finished installation at the Recreation Pool. Provide rounded units for external and internal corners and angles. Provide trim units of material and finish identical to the adjoining tile.

E. Message Tile and Depth Markings

1. New Recreation Pool vertical depth markings and warning signs must be 6"x6" with 4" high numbers and letters. Single tile abbreviations must be used for 'FT' and 'IN'.

2.2 SWIMMING POOL TILE SETTING MATERIALS AND INSTALLATION

A. Surface Preparation

1. Surface preparation must be in accordance with ACI 302. The surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion. Sound and remove loose concrete to firm substrate. Surfaces must be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards for acceptable profile height). Thoroughly

wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations.

B. Slurry Bond Coat

1. Horizontal surfaces to receive a thick bed mortar application must be installed over a slurry bond coat of either LATICRETE 254 Platinum one-step, polymer-fortified, thin-set mortar or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only in compliance with ANSI A108.1A (2.2 & 5.2). As manufactured by LATICRETE International, MAPEI, Inc., or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.

C. Mortar & Leveling Beds

1. Bonded Thick Bed Method (Floor / Horizontal Surfaces): Provide a dry pack, thick mortar bed on horizontal surfaces consisting of LATICRETE 3701 Fortified Mortar Bed or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only. Apply over a properly prepared slurry bond coat. Maximum lift thickness not to exceed 2".

2. Render- Scratch and Float Coats (Wall / Vertical Surfaces): Provide wall render (scratch and float coats) on vertical competition turning surfaces to a depth of 4'-0" below the water surface, consisting of either LATICRETE 3701 Fortified Mortar Bed or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only for lift thicknesses up to ½". Wall render is made to a plastic consistency when used vertically. Fill holes and bring surface up to line and plane as required. As manufactured by LATICRETE International, MAPEI, Inc. or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.

D. Tile Thin-Set

1. Use either LATICRETE 254 Platinum one-step, polymer fortified, thin-set mortar or MAPEI Keraflex Super one-step, polymer modified, thin-set mortar, used in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal.

E. Tile Grout

1. Use either LATICRETE PERMACOLOR Grout or MAPEI Ultracolor Plus FA Grout in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal.

F. Elastomeric Sealant

1. Use LATICRETE LATASIL over LATASIL 9118 primer or MAPEI Mapesil "T" 100% silicone sealant for inside/outside corners, expansion/movement joints, and to seal lighting/plumbing fixture penetrations. Primer and sealant installation must be in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, Inc., MAPEI, Inc. or approved equal.

G. Mixing and application procedures must be in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative must visit the site to verify field conditions, confirm materials and application requirements and ascertain that materials and systems are so installed. Documentation must be provided to this effect.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean substrates of dust, dirt, oil, grease and deleterious substances and mechanically roughen concrete and shotcrete for bond. Conform to applicable reference standards and to recommendations of manufacturers of materials used and meeting ICRI, CSP of 3-5.

B. Substrates to Receive Mortar Setting Beds

1. Dampen concrete substrate to receive tile work according to above referenced standards or tile manufacturer's instructions, as required.

C. Substrates to receive thin set tile applications must meet normal construction tolerances of 1/4" in 10' where competition tolerances do not apply and must meet competition tolerances where required elsewhere in these specifications, and must be free of bumps, dips and surface irregularities that may effect the satisfactory installation of the tile.

D. Tile Wetting

1. Dampen tile according to above reference standards or tile manufacturer's instructions, as required.

E. Screeds

1. Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.2 TILE INSTALLATION

A. Arrange tile according to patterns detailed. Set tile with flush well-fitted joints, finished in true planes, plumb, square, joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts.

B. Follow Tile Council of North America installation methods P601 and B417 to achieve total tile system thickness for thin or thick-set.

1. Thick Set

a. Apply specified setting bed mortar, up to 2" in thickness, on cured and dried concrete pool shell. Tamp and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 3/32" to 1/8" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.

2. Thin Set

a. Apply specified bond coat on cured and dried concrete pool shell. Trowel 3/32” to 1/8” thick bond coat over concrete pool shell just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.

C. Finished tile surface must be level and in plane, with no sharp or protruding edges. Tiles out or plane more then 1/16" must be removed and replaced. Sharp edges must be stoned smooth.

D. Grout Joint Sizes

1. Unless otherwise approved, install tile with uniform 3/32” joint width. A maximum 1/8" joint width may be utilized to meet specific installation requirements, if required.

E. Ceramic Tile Joint Grouting

1. Mix grout to a thick creamy consistency and force into joints for entire thick depth, flush with surface. Clean off excess and fill skips and gaps before grout sets. Color selection by Architect or Interior Designer. Provide dampness for minimum 3-day curing and polish with clean dry cloths (not required when epoxy grouts are used).

F. Expansion Joints

1. Place expansion joint per applicable TCNA Method P601MB, P601TB, or P602 and conforming to Method EJ171. Provide shop drawings showing backer rod and joint dimensions. Expansion, control, construction, cold, and seismic joints in the pool structure should continue through the tile work, including such joints at vertical surfaces. Movement joints must be placed at changes in direction and elevation. Refer to the structural engineer for additional required movement joints. Joint size must be a minimum of 1/8”. Joints through tile work directly over structural joints must not be narrower than the structural joint. The Contractor must use cement compatible coatings when using chalk lines for joint layout purposes.

G. Fill and Empty Rates

1. Use a fill and drain rate of 2’-0” per 24 hours to minimize thermal shock and structural movement. Maintain a temperature differential of 10 degrees Fahrenheit or less between the pool water and the substrate during fill and drain cycles.

3.3 TESTING AND INSPECTION

A. Before filling of the pool, and its subsequent provisional acceptance at substantial completion, the tile installation must be visually inspected and sounded in the presence of the Architects and/or the Owner’s representative to verify mortar coverage below the tile to its substrate as well as its overall compliance with the requirements of this Section.

B. Tile work found loose, lacking proper mortar coverage, out of plane, misaligned or otherwise non-conforming must be removed and replaced at no additional cost to the Owner.

3.4 CLEANING

A. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile must be cleaned with pH neutral solutions, free

of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.

B. Leave finished installation clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.

C. Protect installed tile work with non-staining Kraft paper, polyethylene sheeting, or other approved heavy covering during the construction period to prevent damage.

3.5 REPLACEMENT TILE

A. Provide Owner with approximately 10% or 25 square feet (whichever is least) of each color and type tile used on the project for Owner’s repair and replacement requirements.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. Completely remove the existing Recreation Pool plaster layer down to bare via hydroblasting or sandblasting, and provide a proprietary aggregate plaster finish (Diamond Brite) to the Recreation Pool structure. Provide installation of bond coat prior to application of pool finish in strict accordance with manufacturer's instructions. Provide new recessed steps and ceramic tile trim on the pool vertical tile band, stairs, nosings, depth markings, warning signs, and other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.

B. Refer to the Swimming Pool Tile & Recessed Steps, 131103 specification.

C. Provide water analysis and pre-fill requirements.

1.2 SUBMITTALS

A. Samples

1. Prepare 12-inch square panel at the site showing color and texture for pool plaster. Finished cementitious finish work must match the approved sample panel.

B. Certificates

1. Submit certificates attesting that the materials provided meet the requirements specified herein.

C. Test Report

1. Submit results of domestic water analysis and calculation of amounts of chemicals required to balance pool water on initial fill of pool.

1.3 PRODUCT DELIVERY AND STORAGE

A. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep cementitious materials dry until ready to be used and stored off the ground, under cover and away from damp surfaces.

1.4 JOB CONDITIONS

A. Apply plaster in swimming pool only when ambient temperature is above 40 degrees F and below 90 degrees F and protect applied plaster from rapid drying by sun or wind until curing is completed or pool is filled with water. Confirm and comply with applicable manufacturer's installation requirements.

1.5 QUALITY ASSURANCE

A. Plaster installers must have two years' experience in similar pool projects which the Owner may require written proof thereof and proper tools to install plaster.

PART 2 – PRODUCTS

2.1 DIAMOND BRITE

A. The CONTRACTOR must provide a slip-resistant proprietary plaster finish in the areas indicated on the drawings. Description: Diamond Brite finish must be a blend of selected quartz aggregates and fortified white Portland cement. Color and texture selected by the Architect. Confirm installation requirements with the manufacturer.

B. Surface Preparation

1. Surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove loose concrete to firm substrate. Surfaces must be roughened by sand blasting or water blasting. Shot blasting can also be an accepted method of surface preparation. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations. Lightly moisten walls and floors prior to application of Diamond Brite.

C. Bond Coat

1. Bond Kote by SGM, Inc., or approved equal, in strict accordance with manufacturer's instructions. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of foreign matter prior to plastering.

D. Mixing

1. Thoroughly mix Diamond Brite to a homogeneous lump-free consistency using 1-1/2 to 2 gallons of potable water per 80 lb. bag.

E. Application

1. Diamond Brite must be applied to a uniform thickness of 3/8" to 1/2" over the entire surface. The walls must be scratch-coated followed by a finish coat. Material applied to the floor after the walls have been applied must be accelerated to assure uniform setting time throughout the pool surface.

F. Coverage

1. Each 80 lb. bag to cover approximately 25 square feet to a thickness of 3/8".

G. Proprietary plaster finish must be applied by a licensed applicator as approved by the manufacturer.

PART 3 – EXECUTION

3.1 PREPARATION OF SURFACES AND BOND COAT

A. Surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove loose concrete to firm substrate. Surfaces must be roughened by sand blasting or water blasting. Shot blasting can also be an accepted method of surface preparation. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations.

1. National Plasterers Council Surface Preparation Definitions

a. Pressure Washing: The washing or cleaning of a surface by a stream of water ejected from a nozzle at high velocity, typically in the range of 1,000 psi – 4,000 psi.

b. Water Blasting: The cutting, abrading, or removal of a surface or substrate by a stream of water ejected from a nozzle at ultra-high velocity, typically in the range of 10,000 psi – 40,000 psi.

2. Apply and cure bond coat in strict accordance with manufacturer's instructions. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of foreign matter prior to plastering.

B. Do not apply finish materials to base surfaces containing frost. Provide temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.

C. Protect or mask adjacent surfaces that are not scheduled to receive cementitious finish. If expansion or construction joints exist in the areas where cementitious finish will be applied cover plastic joints for protection (if plastic joints are used). Additionally, mark joints for saw-cutting if area will be saw-cut.

D. Verify that concrete surfaces that are to receive a cementitious finish have cured for a minimum of 5 days. Consideration should be given for the application of a primer for concrete structures that is over 28 days old to improve bonding.

3.2 APPLICATION OF CEMENTITIOUS FINISH

A. General

1. Confirm application requirements with the manufacturer. Apply finish plaster to the properly prepared substrate at the minimum thickness required by the manufacturer, but no less than 3/8-inch thickness. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:

a. Place cone on level, dry non-absorptive base plate.

b. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release air bubbles.

c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.

d. Place cone in a vertical position adjacent to freed plaster sample suing care not to jiggle base plate.

e. Lay straightedge across top of cone being careful not to vibrate cone; measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.

2. Mixing of materials and application procedures must be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative must visit the site to verify field conditions, confirm materials and application requirements and ascertain that materials and systems are so installed. Documentation must be provided to this effect.

B. Workmanship

1. Unless otherwise required by the manufacturer, apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another. Finish proprietary plaster as required by the manufacturer.

2. Cementitious finishes must be applied by a licensed applicator as approved by the manufacturer.

C. Curing

1. Curing cementitious finishes with fine fog water spray applied to finish coat as frequently as required to prevent dry-out of surface, or as directed by the manufacturer of the cementitious finish. Keep plaster damp until pool is filled. Prevent damage or staining of plaster by troweling or curing.

D. Patching, Pointing, and Cleaning Up

1. Upon completion, cut out and patch loose, cracked, damaged, or defective plaster; patches matching existing plaster in texture, color, and finish, flush with adjoining plaster. Perform pointing and patching of surfaces and plasterwork abutting or adjoining other finish work in a neat and workmanlike manner. If 10 percent or more of the pools plaster finish is found to be defective, the plaster must be removed and replaced complete from surfaces. Remove plaster droppings or spattering from surfaces. Leave plaster surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

3.3 PRE-FILL SPECIFICATION

A. Contractor must employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date and must employ a swimming pool experienced water chemistry consultant to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of water filling.

1. Have on hand quantities of the chemicals as determined above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and

muriatic acid are in addition to standard bromine/chlorine products and alkalizer/pH control products required elsewhere.

B. The pool must not be plastered until directed by the Owner's representative. The Contractor must supply chemicals required for treatment of the pool water.

C. The Contractor must submit domestic water analysis to the Owner and/or Architect at least 2 weeks prior to filling the pool.

END OF SECTION