MSA DESIGN

ADDENDUM

Addendum Number	02	**Date**	**April 23, 2026**
Project Name	City of Troy Aquatic Park Maintenance Improvements	**Project Number**	25306.00

The following Addendum contains clarifications and revisions to the construction documents issued for bid 4/15/2026 for the above mentioned project. This addendum forms a part of the Contract Documents and modifies all previously issued specifications and drawings. Bidders shall update their Bidding Documents with the information contained in this Addendum. Where new Drawings are enclosed with this Addendum, discard the old Drawing and insert the new. Where Supplemental drawings (Sketches) are enclosed with this Addendum, attach the Supplemental drawing to the documents as noted. Where only written modifications are given, copy the information onto the appropriate Documents and note the Addendum number. All items contained herein shall be included with the Bid. Acknowledge receipt of this addendum by inserting the number and date on the bid form.

Note: This addendum ☐ does ☒ does not modify the bid due date.

General

1.A The Aquatics Consultant and Architect has updated the plans and specifications to provide clarity for some coordination items during the bidding process.

Specification

1.A Section 01 12 50 – Scopes of Work, General
   a. Revised section 1.4 to have prevailing wage rates provided by City of Troy.

1.B Section 01 12 51 – Contract Summary
   a. Revised section 3.2.1 Work Restrictions to indicate correct On-Site Work Hours.

1.C Section 01 23 00 – Alternates
   a. Revised Alternate 2 to only include flume slides and added Alternate 6 for drop slide refinishing.

1.D Section 13 11 13 – 13 14 13
   a. Reissued pool specifications missing in initial bid document package.

Drawings

1.A Sheet: G0.00 COVER SHEET
   a. Alternates: Revised notation on Alternate 02 to indicate just double flume slide refinishing. Added alternate 06 to separate drop slide refinishing.

1.B Sheet: D100 DEMOLITION PLAN
   a. Demolition Keynotes: Revised keynote 15 to indicate ground sleeve replacement for umbrella.

1.C Sheet: PL101 GENERAL DETAILS AND SCHEDULES
   a. Detail 10: Revised detail to indicate ground sleeve replacement of existing umbrella.

1.D Sheet: PL110 POOL DIMENSION PLANS
   a. Revised alternate #2 to indicate just the double flume slide refinishing. Added alternate #6 to separate drop slide refinishing.

Summary of Attachments

Specifications

Division 01_ADD	04/22/26
Division 13_ADD	04/22/26

Drawings

G0.00	Cover Sheet	04/22/26
D100	Demolition Plan	04/22/26
PL101	General Details and Schedules	04/22/26
PL110	Pool Dimension Plans	04/22/26

END OF ADDENDUM

For the City of Troy:

4/23/26

Director of Public Service & Safety **Date**

SECTION 011000 – SUMMARY

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 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work phases.
4. Work under other contracts.
5. Products ordered in advance.
6. Owner-furnished products.
7. Use of premises.
8. Owner's occupancy requirements.
9. Work restrictions.
10. Specification formats and conventions.

B. Related Sections include the following:

1. Division 1 Section "Summary of Contracts" for division of responsibilities for the Work.
2. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Troy Aquatic Park Improvements

B. Project Location: 460 West Staunton Dr., Troy, Ohio 45373

C. Owner: City of Troy

1. Owner's Representative: Patrick E. J. Titterington, Director of Public Service and Safety.

D. Architect: MSA Design, 15 West Cherry Street, Suite 300 Columbus, Ohio 43215

E. The Work consists of the following:

1. Miscellaneous Improvements to existing pool facility.

1.4 TYPE OF CONTRACT

A. Project will be constructed under a single contract. See Division 1 Section "Summary of Contracts" for a description of work included.

1.5 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period.

B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine constructions operations to the immediate property only.
2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.6 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of the Project site, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.

1.7 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00a.m. to 6:00 p.m., Monday through Friday, except otherwise indicated.

1. Weekend Hours: Working hours will be the same as weekday hours.
2. Early Morning Hours: Work may not begin prior to 7:00am, unless authorized by the Owner.
3. Other: As coordinated and approved by owner.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s permission.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.9 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 011250 – SCOPES OF WORK, GENERAL

PART 1 - GENERAL

1.1 GENERAL

A. The following Scopes of Work are intended to be an additional source of information, and at times, a clarification to the Construction Drawings and Specifications. The intention is to have the successful Contractor perform all related work shown on the Contract Documents (Construction Drawings, Specifications, Scopes of Work) other than those items specifically indicated below to be excluded.

B. The words "Prime Contractor" and "Contractor" may be used interchangeably throughout the Contract Documents. *A Prime Contractor or Contractor has a contract with the Owner.* The words "Summary of Work" may be used interchangeably with the words "Scope of Work" or "Scope".

1.2 OVERVIEW OF WORK

A. **Provide all necessary labor, material, equipment, mockups, supervision, safety, protection, tools, hoisting, scaffolding, unloading, rigging, placing, storage, permits, engineering, shop drawings, samples, coordination, layout, inspection, cleaning, etc., to complete all work for the above-referenced Project, as shown or implied by the Contract Documents and Conditions, stated herein or inferable therefrom.**

1.3 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.

1.4 SUMMARY

A. This is a **Prevailing Wage Project**. City of Troy will provide applicable rates upon request.

B. This Project is **Tax-Exempt** on materials that are a permanent part of the building.

C. Material testing services will be provided by the Owner unless otherwise specifically noted in the specifications.

D. The General Building Permit will be secured by the Owner. All other permits, inspection fees, etc. that may be required by various governing entities for specific work activities outlined in the bid package shall be secured and paid for by the Contractor performing the work requiring a permit/inspection fee, etc.

E. All tap fees will be paid for by the Owner.

F. Construction schedule and management of any required phasing of the work with be the responsibility of the Lead Contractor. All work associated with this Project is to be completed per the Project schedule as developed by the Lead Contractor and included in the Project Manual. All Contractors are to include in their proposal all costs associated with the necessary resources to complete their scope of work based upon the durations provided in this schedule including, but not limited to the following; all additional overtime costs, multiple crews and expediting costs required to procure any/all materials in order to maintain this Project schedule.

G. The Contractor must provide sufficient manpower and equipment to maintain and meet the Project schedule

H. The General Trades Contractor will provide initial Project control using information provided by the Owner, Architect & Engineers and stake and grade for pavements, curbs, storm structures, etc. All layout and field engineering required for the performance of the work beyond the initial layout, including protection of reference points and replacement of such points that are lost or damaged during the execution of this work, shall be the responsibility of the prime Contractor needing such layout.

I. Provide all protection of your work.

J. The Contractor is responsible for replacing/repairing any damage to existing structures in or outside the building limits caused by this Contractors' workforce.

K. The Contractor shall provide its employees with all protective equipment and tools and enforce their use, as required by the Project Safety Program, federal, state and local codes and regulations.

L. Each job trailer shall be equipped with at least one (1) 20# ABC type fire extinguisher in good working order with prominent signage leading to the location, an OSHA approved First Aid Kit and current OSHA Manual. Trailers with phones shall have posted emergency numbers of the following; list of hospitals, ambulance service, fire and police departments. If gang boxes are used in lieu of a trailer, the gang box shall contain an OSHA approved First Aid Kit, OSHA Manual and one (1) 20# ABC type fire extinguisher, at a minimum.

M. The Contractor should have at least one qualified / certified first aid and CPR trained person and one qualified OSHA 30-hour trained person present on the Project.

N. The Contractor is required to conduct a weekly toolbox safety meeting with its employees and Subcontractors.

O. All Subcontractors shall comply with all OSHA regulations and shall submit to the Lead Contractor the required Material Safety Data Sheets for any hazardous material they may use or bring on the site in the performance of their work. Contractors are to submit site-specific MSDS organized in a binder.

P. Each Subcontractor shall submit to the Lead Contractor a Daily Construction Report. This report must contain at a minimum the following:

a. Contractors Name
b. Date
c. Manpower – by trade (i.e. supervision, carpenter, laborer, electrician, etc.) listed by Foreman, Journeyman and Apprentices.
d. Minority / Female Participation
e. Brief description of Day's Work
f. Deliveries and any other pertinent information.

The Daily Construction Reports (DCR's) shall include the same information for the Contractor's SubContractors and Sub-Subcontractors . These reports are to be received by the Construction Manager no later than 9:00 am on Monday of the following week. Failure to submit these reports in a timely fashion may result in the prorating of monthly application payments to the offending Contractors.

Q. All Contractors shall enforce the wearing of OSHA approved hard hats ("cowboy" hats not permitted) during the total construction of this Project.

R. The Contractor is responsible for all its Subcontractors and suppliers compliance with the Project Safety Requirements.

S. All Contractors' key people to be assigned to the Project should be named with the provision that they will not be removed without prior approval by the Owner.

T. Project Management / Field Supervision: (The following is not intended to be an all-inclusive list of duties)

1. The Contractor shall provide the following Project staff as outlined below:

Project Manager
- Offsite personnel

Duties consist of:
- Preparing and updating schedule
- Shop drawing review and procurement
- Preparing and updating material procurement log
-Distribute all submittals required to all parties
-Review, distribute, prepare estimate and submit pricing on all changes
-Prepare monthly requisitions and all appropriate documents
-Attend weekly jobsite meetings (mandatory)
-Handle Subcontractor issues and confrontations

Project Superintendent
- Fulltime onsite personnel
- Overseeing new construction

The Project Manager and Project Superintendent for the Contactor shall be a person who has held that position for the Contractor on a Project of similar size, complexity and cost. The Project Manager and Project Superintendent shall be responsible for the following:

- Complete knowledge of drawings and specifications and should develop the onsite plans and procedures for the implementation, including quality control procedures and requirements
- To plan and review the construction program, including site logistics, plant layout, equipment and manpower.
- To assist the Lead Contractor in preparing progress schedules and keep them properly updated and to see that the job does everything feasible to meet the required dates. These schedules must be coordinated with all Contractors and submitted to the Architect monthly with pay application.
- To expedite the delivery method of material and equipment furnished by Subcontractors and to assume the primary responsibility for their timely site delivery and development of material procurement log. This log will be updated and submitted monthly with pay application.
- To coordinate, direct and monitor the activities of the Subcontractors and suppliers, including weekly coordination meetings, weekly toolbox safety meetings and monthly safety meetings.
- To establish and maintain good safety and security practices for the entire Project in accordance with the Jobsite Safety Program.
- To prepare regular and special reports for Job Meetings and attend the meetings.
- To maintain good relations and communications with all involved in the Project.

U. All private and public paved roadways, parking areas, service roads, etc., are to be kept free of excavated materials, mud, debris, etc., resulting from equipment or vehicles performing the work of this Contract, in compliance with local city Ordinances. Failure to do so may result in serious fines imposed on each violating SubContractor. All paved areas are to be kept “broom clean” at all times. Roads should be checked on a two times a day basis if not more often.

V. On-site storage areas are limited. All requests for on-site material storage are to be coordinated in advance with the Construction Manager.

W. The Contractor is responsible to provide its own drinking water.

X. The Contractor will be responsible to de-water its own work areas, which includes, but is not limited to utility trenches.

Y. The Contractor is responsible for the clean up required or associated with its specific work activities and the work of lower tier Subcontractors and suppliers. Each Contractor shall provide trash receptacles, gondolas, etc. as required to transport debris to containers/dumpsters (provided by General Trades Contractor). All debris generated that must be disposed of with special care or handling is the responsibility of the Contractor associated with such debris.

Z. Debris shall be immediately placed into containers. There shall be no stockpiling of materials on the site.

AA. Each Subcontractor shall coordinate all work of other trades through the Lead Contractor for proper functions and sequence to avoid construction delays and to deter conflicts. Each Subcontractor shall provide to all other trades information (drawings, diagrams, templates, embedments) and other related materials necessary for the coordination of the work.

BB. Smoking or use of Tobacco products is not permitted anywhere on the project site including all interior and exterior.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011250

SECTION 011250 – SCOPES OF WORK, GENERAL

PART 1 - GENERAL

1.1 GENERAL

A. The following Scopes of Work are intended to be an additional source of information, and at times, a clarification to the Construction Drawings and Specifications. The intention is to have the successful Contractor perform all related work shown on the Contract Documents (Construction Drawings, Specifications, Scopes of Work) other than those items specifically indicated below to be excluded.

B. The words “Prime Contractor” and “Contractor” may be used interchangeably throughout the Contract Documents. *A Prime Contractor or Contractor has a contract with the Owner.* The words “Summary of Work” may be used interchangeably with the words “Scope of Work” or “Scope”.

1.2 OVERVIEW OF WORK

A. **Provide all necessary labor, material, equipment, mockups, supervision, safety, protection, tools, hoisting, scaffolding, unloading, rigging, placing, storage, permits, engineering, shop drawings, samples, coordination, layout, inspection, cleaning, etc., to complete all work for the above-referenced Project, as shown or implied by the Contract Documents and Conditions, stated herein or inferable therefrom.**

1.3 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.

1.4 SUMMARY

A. This is a **Prevailing Wage Project**. City of Troy will provide applicable rates upon request.

B. This Project is **Tax-Exempt** on materials that are a permanent part of the building.

C. Material testing services will be provided by the Owner unless otherwise specifically noted in the specifications.

D. The General Building Permit will be secured by the Owner. All other permits, inspection fees, etc. that may be required by various governing entities for specific work activities outlined in the bid package shall be secured and paid for by the Contractor performing the work requiring a permit/inspection fee, etc.

E. All tap fees will be paid for by the Owner.

F. Construction schedule and management of any required phasing of the work with be the responsibility of the Lead Contractor. All work associated with this Project is to be completed per the Project schedule as developed by the Lead Contractor and included in the Project Manual. All Contractors are to include in their proposal all costs associated with the necessary resources to complete their scope of work based upon the durations provided in this schedule including, but not limited to the following; all additional overtime costs, multiple crews and expediting costs required to procure any/all materials in order to maintain this Project schedule.

G. The Contractor must provide sufficient manpower and equipment to maintain and meet the Project schedule

H. The General Trades Contractor will provide initial Project control using information provided by the Owner, Architect & Engineers and stake and grade for pavements, curbs, storm structures, etc. All layout and field engineering required for the performance of the work beyond the initial layout, including protection of reference points and replacement of such points that are lost or damaged during the execution of this work, shall be the responsibility of the prime Contractor needing such layout.

I. Provide all protection of your work.

J. The Contractor is responsible for replacing/repairing any damage to existing structures in or outside the building limits caused by this Contractors' workforce.

K. The Contractor shall provide its employees with all protective equipment and tools and enforce their use, as required by the Project Safety Program, federal, state and local codes and regulations.

L. Each job trailer shall be equipped with at least one (1) 20# ABC type fire extinguisher in good working order with prominent signage leading to the location, an OSHA approved First Aid Kit and current OSHA Manual. Trailers with phones shall have posted emergency numbers of the following; list of hospitals, ambulance service, fire and police departments. If gang boxes are used in lieu of a trailer, the gang box shall contain an OSHA approved First Aid Kit, OSHA Manual and one (1) 20# ABC type fire extinguisher, at a minimum.

M. The Contractor should have at least one qualified / certified first aid and CPR trained person and one qualified OSHA 30-hour trained person present on the Project.

N. The Contractor is required to conduct a weekly toolbox safety meeting with its employees and Subcontractors.

O. All Subcontractors shall comply with all OSHA regulations and shall submit to the Lead Contractor the required Material Safety Data Sheets for any hazardous material they may use or bring on the site in the performance of their work. Contractors are to submit site-specific MSDS organized in a binder.

P. Each Subcontractor shall submit to the Lead Contractor a Daily Construction Report. This report must contain at a minimum the following:

a. Contractors Name
b. Date
c. Manpower – by trade (i.e. supervision, carpenter, laborer, electrician, etc.) listed by Foreman, Journeyman and Apprentices.
d. Minority / Female Participation
e. Brief description of Day's Work
f. Deliveries and any other pertinent information.

The Daily Construction Reports (DCR's) shall include the same information for the Contractor's SubContractors and Sub-Subcontractors . These reports are to be received by the Construction Manager no later than 9:00 am on Monday of the following week. Failure to submit these reports in a timely fashion may result in the prorating of monthly application payments to the offending Contractors.

Q. All Contractors shall enforce the wearing of OSHA approved hard hats ("cowboy" hats not permitted) during the total construction of this Project.

R. The Contractor is responsible for all its Subcontractors and suppliers compliance with the Project Safety Requirements.

S. All Contractors' key people to be assigned to the Project should be named with the provision that they will not be removed without prior approval by the Owner.

T. Project Management / Field Supervision: (The following is not intended to be an all-inclusive list of duties)

1. The Contractor shall provide the following Project staff as outlined below:

Project Manager
- Offsite personnel

Duties consist of:
- Preparing and updating schedule
- Shop drawing review and procurement
- Preparing and updating material procurement log
-Distribute all submittals required to all parties
-Review, distribute, prepare estimate and submit pricing on all changes
-Prepare monthly requisitions and all appropriate documents
-Attend weekly jobsite meetings (mandatory)
-Handle Subcontractor issues and confrontations

Project Superintendent
- Fulltime onsite personnel
- Overseeing new construction

The Project Manager and Project Superintendent for the Contactor shall be a person who has held that position for the Contractor on a Project of similar size, complexity and cost. The Project Manager and Project Superintendent shall be responsible for the following:

- Complete knowledge of drawings and specifications and should develop the onsite plans and procedures for the implementation, including quality control procedures and requirements
- To plan and review the construction program, including site logistics, plant layout, equipment and manpower.
- To assist the Lead Contractor in preparing progress schedules and keep them properly updated and to see that the job does everything feasible to meet the required dates. These schedules must be coordinated with all Contractors and submitted to the Architect monthly with pay application.
- To expedite the delivery method of material and equipment furnished by Subcontractors and to assume the primary responsibility for their timely site delivery and development of material procurement log. This log will be updated and submitted monthly with pay application.
- To coordinate, direct and monitor the activities of the Subcontractors and suppliers, including weekly coordination meetings, weekly toolbox safety meetings and monthly safety meetings.
- To establish and maintain good safety and security practices for the entire Project in accordance with the Jobsite Safety Program.
- To prepare regular and special reports for Job Meetings and attend the meetings.
- To maintain good relations and communications with all involved in the Project.

U. All private and public paved roadways, parking areas, service roads, etc., are to be kept free of excavated materials, mud, debris, etc., resulting from equipment or vehicles performing the work of this Contract, in compliance with local city Ordinances. Failure to do so may result in serious fines imposed on each violating SubContractor. All paved areas are to be kept “broom clean” at all times. Roads should be checked on a two times a day basis if not more often.

V. On-site storage areas are limited. All requests for on-site material storage are to be coordinated in advance with the Construction Manager.

W. The Contractor is responsible to provide its own drinking water.

X. The Contractor will be responsible to de-water its own work areas, which includes, but is not limited to utility trenches.

Y. The Contractor is responsible for the clean up required or associated with its specific work activities and the work of lower tier Subcontractors and suppliers. Each Contractor shall provide trash receptacles, gondolas, etc. as required to transport debris to containers/dumpsters (provided by General Trades Contractor). All debris generated that must be disposed of with special care or handling is the responsibility of the Contractor associated with such debris.

Z. Debris shall be immediately placed into containers. There shall be no stockpiling of materials on the site.

AA. Each Subcontractor shall coordinate all work of other trades through the Lead Contractor for proper functions and sequence to avoid construction delays and to deter conflicts. Each Subcontractor shall provide to all other trades information (drawings, diagrams, templates, embedments) and other related materials necessary for the coordination of the work.

BB. Smoking or use of Tobacco products is not permitted anywhere on the project site including all interior and exterior.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011250

SECTION 011251 - CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.

B. Specific requirements of each contract are also indicated in individual Specification Sections and on Drawings.

C. Work is in one (GC) General Trades Contract.

1.3 DEFINITIONS

A. General Contractor (GC): Includes work normally associated with the scope of work as outlined within the contract documents.

B. Owner: The Owner is the City of Troy as outlined in the Notice to Bidders.

C. Architect or Associate: MSA Design and associated consultants.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. As outlined in the Summary of Work.

1.5 COORDINATION

A. Lead Contractor shall be responsible for coordination of the General Construction Contract.

1. General Contractor shall act as Lead Contractor. In the specifications, any reference to “Project Coordinator” is referring to the Lead Contractor.

B. Work under separate contracts by the Owner which may be performed during the work of this contract are also anticipated, some of which are outlined elsewhere as “Term Contractors.” Contractors are to coordinate their work with the Owner’s occupied spaces and work of the Owners projects to maintain access and workflow for all projects.

1.6 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of the project, before Completion, provided such occupancy does not interfere with the completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.

1.7 LEAD CONTRACTOR

A. Lead Contractor: Full-time Lead Contractor shall be experienced in administration and supervision of building construction, including fire protection, mechanical, plumbing and electrical work.

1. Coordination activities of Lead Contractor include, but are not limited to, the following:

a. Responsibilities as outlined in the General Conditions for the coordinating contractor.
b. Provide overall coordination of the Work.
c. Coordinate shared access to work spaces.
d. Assemble, track and coordinate all submittals and RFI's and distribute information to all parties to create a single point of contact for such information. Maintain Submittal and RFI logs. Coordinate information among and between all subcontractors.
e. Coordinate product selections for compatibility.
f. Provide overall coordination of temporary facilities and controls.
g. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
h. Coordinate construction and operations of the Work with work performed by Owner's construction forces on other work in the building and site.
i. Coordinate sequencing and scheduling of the Work. Include the following:
   1) Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with separate contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
   2) Prepare a Contractor's Construction Schedule for entire Project. .
   3) Distribute copies of schedules to Associate, Owner, and separate contractors.
   4) Conduct weekly coordination meetings, the results of which are to be reported in the weekly progress meeting with the Owner and Associate.

j. Provide construction photography.
k. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
l. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
m. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
n. Provide field documentation of in-progress construction.
o. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
p. Coordinate cutting and patching including coordinating of various trades to include combining work in the same trenches and routes wherever possible to minimize cutting and patching.
q. Coordinate protection of the Work.

2. The Lead Contractor is responsible for all meetings, and coordination of a single master schedule for the project.

    a. The Lead Contractor shall be responsible for progress meetings with the Owner, Architect, and Subcontractors.
    b. The Lead Contractor shall be responsible for weekly coordination meetings, schedule updates, and safety meetings with the Subcontractors.
    c. The Lead Contractor shall take and provide copies of meeting minutes to all Subcontractors, the Owner, and the Architect.
    d. Meeting agendas are to include review of schedules and progress in relation to schedules, delays, reasons for delays, anticipated work, changes, off-site work and fabrication, submittals, scheduled deliveries, sequence of construction and component installations required, and job site administration needs of each entity.
    e. The Lead Contractor shall be responsible for providing an updated schedule and report of the project progress on a monthly basis, beginning on the date of the preconstruction meeting.
    f. The Owner may consider failure to conduct or attend meetings, update schedules and provide meeting notes as cause for potential loss or damage to the work and backcharges may be assessed.

3. Responsibilities of Lead Contractor for temporary facilities and controls include, but are not limited to, those as outlined in “Temporary Facilities and Controls.”

1.8 GENERAL REQUIREMENTS OF THE CONTRACTS

A. Extent of Contract: All work described in the Contract Documents shall be conducted by the Contractor unless specifically noted otherwise.

1. Unless otherwise indicated, the Work described in this Section shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. The Contractor is to review all documents to understand all parts of the work in a given area. Coordinate work with Owner’s contractors (if applicable) to resolve clearances between systems, equipment, and devices.
3. Minimize numbers of trenches required and combine work into trenches.
4. Selective Demolition work shall follow, but is not limited to, specification section 024119 - Selective Demolition.

B. Substitutions: The contractor shall coordinate approved substitutions with remainder of the Work.

C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section the contractor is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
3. Its own field office complete with necessary furniture, utilities, and telephone service.
4. Its own storage and fabrication sheds.
5. Temporary enclosures for its own construction activities.
6. Special or unusual hoisting requirements for its own construction activities, hoisting material or equipment into spaces below grade, and hoisting requirements outside building enclosure.
7. Progress cleaning of its own areas on a daily basis.

8. Secure lockup of its own tools, materials, and equipment.
9. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
10. Waste disposal facilities for collection and legal disposal of its own hazardous, dangerous, unsanitary or other harmful waste materials. Other waste materials are to be removed to a location as specified by the Lead Contractor for common waste facilities.
11. Restoration of Owner facilities used as temporary facilities or access to the site or temporary facilities; or any existing facilities damaged by Contractor.

1.9 GENERAL CONSTRUCTION CONTRACT

A. Work in the General Contract includes, but is not limited to, the following:

1. Demolition.
2. New Work as outlined on Contract Documents.
3. Final Cleaning

B. Temporary facilities and controls in the General Contract include, but are not limited to, the following:

1. Unpiped temporary toilet facilities and fixtures, wash facilities, and drinking water facilities, including disposable supplies.
2. Excavation support and protection.
3. Project identification and temporary signs.
4. General/common waste disposal facilities and dumpsters.
5. Pest control.
6. Temporary fire-protection equipment.
7. Dewatering of the site and excavations.
8. Barricades, warning signs, and lights.
9. Security enclosure and lockup.
10. Environmental protection.
11. Piped sewers and drainage.
12. Piped water service including backflow preventers.
13. Plumbing connections to existing systems and temporary facilities and controls, including but not limited to temporary water, drains and gas.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 USE OF PREMESIS

A. General: The Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to areas within the Contract limits. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways and Entrances: Keep driveways and loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

3.2.1 WORK RESTRICTIONS

C. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00a.m. to 6:00 p.m., Monday through Friday, except otherwise indicated.

   1. Weekend Hours: Working hours will be the same as weekday hours.
   2. Early Morning Hours: Work may not begin prior to 7:00am, unless authorized by the Owner.
   3. Other: As coordinated and approved by owner.

D. Hours for Utility Shutdowns:
   1. Coordinate any Utility Shutdowns with Owner 7 days prior to anticipated shutdown date.

END OF SECTION 011200

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SECTION 012300 - ALTERNATES

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 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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PART 2 - EXECUTION

2.1 SCHEDULE OF ALTERNATES

A. **Alternate No. 01**: Provide added cost (add alternate) to provide painting on existing play structure.

B. **Alternate No. 02:** Provide added cost (add alternate) to provide interior gel coat re-finish and exterior UV resistance paint on Double Flume Slides.

C. **Alternate No. 03:** Provide added cost (add alternate) to provide and install ADA chairlift.

D. **Alternate No. 04:** Provide added cost (add alternate) to remove existing pool deck lockers and replace with new as specified.

E. **Alternate No. 05:** Provide added cost (add alternate) to remove and replace existing doors at pool mechanical building with new FRP frames and doors. Add alternate should also include the new door hardware as specified.

F. **Alternate No. 06:** Provide added cost (add alternate) to provide interior gel coat re-finish and exterior UV resistance paint on Drop Slide at Lap Lanes.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

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 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use of form provided in Project Manual.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify the **Contractor** of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within **60** days after **the Notice to Proceed**. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within 14 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

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 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.
c. Contractor's Construction Schedule.
d. Contractor’s Payment Application and Checklist.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
4. Submit Contractor’s Payment Application and Checklist, Section 000530.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section, and divide the work into appropriate areas of work to allow for evaluation of each area. Break each line item into two lines, one for labor and one for materials to allow for assignment of retainage

1. Identification: Include the following Project identification on the Schedule of Values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.

3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value.

        1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

10. Provide completed Contractor's Payment Application Checklist, Section 000530.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

1. Submit a separate Application for each change order issued under a separate purchase order. Applications can be in the sequence of the normal applications, but are to be limited to only the scope of the change in order to allow the district to separate the billings under each change order (for example, a line can be added in the schedule of values for a specific change order, and that line billed as a pay application) Multiple applications are acceptable .

C. Payment Application Forms: Use AIA Document G702, AIA Document G703 Continuation Sheets, and contractor payment checklist and certification as form for Applications for Payment.

D. Completed Contractor's Application for Payment Checklist, Section 000530.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders issued before last day of construction period covered by application, but bill the Change orders separately as noted above.
3. Retention will be withheld as follows:
   a. Partial payments to the Contractor for labor performed shall be made at the rate of 92 percent of the amount invoiced through the Contractor Payment Request which shows the total Contract Completion at 50 percent or less.
   b. After the Contract is 50 percent complete, as evidenced by payments in the amount of at least 50 percent of the Contract Sum to the Contractor, no additional funds shall be retained from payments for labor.

F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittals Schedule (preliminary if not final).
5. List of Contractor's staff assignments.
6. List of Contractor's principal consultants.
7. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
8. Initial progress report.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.
11. Data needed to acquire Owner's insurance.
12. Initial settlement survey and damage report if required.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
3. Deduct amounts for incorrect or incomplete work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Final Waivers of Liens, Evidence that claims have been settled.
5. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

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 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination Drawings.
2. Project meetings.
3. Requests for Interpretation (RFIs).

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

C. Related Sections include the following:

1. Division 1 Scopes of Work for a description of the division of Work among separate contracts and responsibility for coordination activities not in this Section.
2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 1 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: The Lead Contractor shall be responsible for the overall coordination of the project. Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities. The Lead Contractor shall be responsible for organizing the coordination drawing process.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

   a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   b. Indicate required installation sequences.
   c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
3. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
4. Number of Copies: Submit a minimum of three (3) opaque copies of each submittal. Architect will retain two copies and return all additional copies.

1.6 PROJECT MEETINGS

A. General: The Lead Contractor shall schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner and Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Critical work sequencing and long-lead items.
c. Designation of key personnel and their duties.
d. Procedures for processing field decisions and Change Orders.
e. Procedures for requests for interpretations (RFIs).
f. Procedures for testing and inspecting.
g. Procedures for processing Applications for Payment.
h. Distribution of the Contract Documents.
i. Submittal procedures.
j. Preparation of Record Documents.
k. Use of the premises.
l. Work restrictions.
m. Owner's occupancy requirements.
n. Responsibility for temporary facilities and controls.
o. Construction waste management and recycling.
p. Parking availability.
q. Office, work, and storage areas.
r. Equipment deliveries and priorities.
s. First aid.
t. Security.
u. Progress cleaning.
v. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner, Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Status of submittals.
        2) Access.
        3) Site utilization.
        4) Temporary facilities and controls.
        5) RFIs.
        6) Status of proposal requests.
        7) Status of Change Orders.
        8) Documentation of information for payment requests.

3. Minutes: Project Coordinator will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

    a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

D. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    c. Review present and future needs of each contractor present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.

6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with each Contractor and shall be submitted to the Lead Contractor. RFIs submitted directly to the Architect or the Architect's consultants by entities other than Lead Contractor will be returned with no response.

2. The Lead Contractor shall have the responsibility of organizing and processing RFI's. The Lead Contractor shall submit RFI's to the Architect and shall be responsible for coordinating, assembling and distributing information regarding RFI's to all applicable contractors.
3. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Architect's Action: Architect will review each RFI, determine action required, and return it. Although the Architect will endeavor to promptly return all RFI's within three days, Contractors shall allow five working days for Architect's response for each RFI. RFIs received after 3:00 p.m. will be considered as received the following working day. RFI's that are extensive in nature or require significant investigation or coordination between trades or disciplines may take longer to review.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.

e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

D. On receipt of Architect's action, Lead Contractor shall update the RFI log and immediately distribute the response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

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 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.

B. Related Sections include the following:

1. Division 1 Section "Summary of Multiple Contracts" for preparing a combined Contractor's Construction Schedule.
2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's and Construction Manager's final release or approval.

B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

C. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

D. Daily Construction Reports: Submit two copies at monthly intervals.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than 14 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work under More Than One Contract: Include a separate activity for each contract.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Deliveries.
c. Installation.
d. Adjusting.
e. Startup and placement into final use and operation.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

1. Refer to Division 1 Section "Payment Procedures" for cost reporting and payment procedures.

2. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
3. Each activity cost shall reflect an accurate value subject to approval by Architect.
4. Total cost assigned to activities shall equal the total Contract Sum.

G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 14 days after date established for the Notice to Proceed.

   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

   a. Mobilization and demobilization.
   b. Work by Owner that may affect or be affected by Contractor's activities.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

D. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.

16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial Completions and occupancies.
19. Substantial Completions authorized.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule and construction photographs.
2. Division 1 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals and for erecting mockups.
3. Division 1 Section "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Upon request, electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect and Engineers for Contractor's use in preparing submittals. Contractors will be required to sign and submit a drawing file agreement.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals.
2. If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Allow 15 days for processing each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name and address of Contractor.
e. Name and address of subcontractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Unique identifier, including revision number.
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Architect will retain up to two copies of all submittals; therefore, submit two copies of each submittal in addition to the quantity of copies the contractor wishes returned, unless otherwise indicated. Mark up and retain one returned copy as a Project Record Document.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Shop Drawings based on reproduction of the Contract Documents may be rejected at the discretion of the Architect.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches .
4. Number of Copies: Submit six blue- or black-line prints of each submittal, unless prints are required for operation and maintenance manuals. Submit seven prints where prints are required for operation and maintenance manuals. Architect and Construction Manager will retain two prints; remainder will be returned. Mark up and retain one returned print as a Project Record Drawing.

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

    a. Generic description of Sample.
    b. Product name or name of manufacturer.
    c. Sample source.

5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

    a. Size limitations.
    b. Compliance with recognized standards.
    c. Availability.
    d. Delivery time.

6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

    a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
    b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

7. Number of Samples for Initial Selection: Submit one full set[**s**] of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

8. Number of Samples for Verification: Submit three sets of Samples. Architect will retain two sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

    a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

9. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."

H. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.

I. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

J. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."

K. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."

L. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures".

O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

S. Construction Photographs: Comply with requirements in Division 1 Section "Construction Progress Documentation".

T. Material Safety Data Sheets: Submit information directly to Owner. If submitted to Architect, Architect will not review this information but will return it with no action taken.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Highlight any deviations from contract documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General:
1. Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action. Submittals that bear Contractor's approval stamp but appear not to have been reviewed may also be returned without action at the Architect’s discretion.
2. Architect shall not be responsible for ascertaining the completeness of the submittals and will review submittals as they are received.

B. Reviews: Architect will review submittals and up to two (2) re-submittals. Architect reserves the right to back-charge for labor and reimbursable expenses for additional resubmittals.

C. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Reviewed.
2. Reviewed as noted.
3. Resubmit.
4. Other.

D. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

E. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, Construction Manager**,** or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Allowances" for testing and inspecting allowances.
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

H. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include the following:

a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Architect, Construction Manager**,** and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and reinspect corrected work.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager**,** and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

1.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014005 – SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Special Conditions and Division 01 Specification Sections apply to work of this Section.

1.2 GENERAL

Special inspection is the monitoring of the materials and workmanship that are critical to the integrity of the building structure. The owner shall employ a special inspector to oversee and to provide inspections during the constructions process. Chapter 17, section 1704 of the OBC identifies the type of work and inspection required based on the building use and seismic design category. These inspections are in addition to those specified in section 109 of the OBC.

The General Contractor shall make available an updated construction schedule and list of activities that are to be performed during a given week. The General Contractor will need to work cordially with the special inspector(s) and notify the inspection agency regarding changes in the construction and inspection schedule. The General Contractor shall provide access to the site and provide the special inspector(s) with access to the current set of construction documents. The General Contractor is responsible for control of construction means, methods, sequences and procedures, for providing a safe place to work. The contractor is responsible for construction the project in accordance with the construction documents and for controlling the quality of construction. The inspection process does not relieve the Contractor of their responsibility to provide internal quality control.

END OF SECTION 014005

SECTION 014200 - REFERENCES

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	 (800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	 (888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	 (601) 634-2355
DOD	Department of Defense Specifications and Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	 (215) 697-6257

FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

C. OBC – Ohio Building Code, latest Version.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

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 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Temporary elevator usage.
9. Temporary stairs.
10. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.
3. Site enclosure fence.
4. Barricades, warning signs, and lights.
5. Temporary enclosures.
6. Temporary partitions.
7. Fire protection.

E. Related Sections include the following:

1. Division 1 Section "Summary of Multiple Contracts" for division of responsibilities for temporary facilities and controls.
2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section "Execution Requirements" for progress cleaning requirements.
4. Division 2 Section "Dewatering" for disposal of ground water at Project site.

5. Division 2 Section "Hot-Mix Asphalt Paving" for construction and maintenance of asphalt paving for temporary roads and paved areas.
6. Division 2 Section "Cement Concrete Pavement" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.
7. Divisions 2 through 16 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner's construction forces.
2. Occupants of Project.
3. Architect.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.

C. Water Service: The Plumbing Contractor shall pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.

D. Electric Power Service: The Electrical Contractor shall pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.

1.5 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Pavement: Comply with Division 2 pavement sections.

C. Chain-Link Fencing: Minimum 2-inch , 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

D. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry".

E. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

G. Paint: Comply with requirements in Division 9 Section "Painting."

H. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

I. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Connect temporary sewers to municipal system as directed by sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

C. Water Service: Provide temporary connections and metering, if required.

1. Provide rubber hoses as necessary to serve Project site.
2. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.
3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
4. Provide pumps to supply a minimum of 30-psi static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.

    a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

4. Drinking-Water Facilities: Provide bottled-water, drinking-water units.

    a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

5. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet (60 m) horizontally to facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted once such service has been established, as long as equipment is maintained in a condition acceptable to Owner. Until such time, temporary power shall be provided by the contractor.

H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
2. Provide warning signs at power outlets other than 110 to 120 V.
3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
4. Provide metal conduit enclosures or boxes for wiring devices.
5. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.

J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.

1. Provide additional telephone lines for the following:

a. In field office with more than two occupants, install a telephone for each additional occupant or pair of occupants.
b. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.
c. Provide a separate telephone line for Owner's use.
d. Install a telephone on every second or third story of construction.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

3. Provide an answering machine or voice-mail service on superintendent's telephone.
4. Provide a portable cellular telephone for superintendent's use in making and receiving telephone calls when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 2 Section "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 2 Section "Hot-Mix Asphalt Paving."

C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
3. Remove snow and ice as required to minimize accumulations.

D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
2. Prepare temporary signs to provide directional information to construction personnel and visitors.
3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

F. Common-Use Field Office: Provide an insulated, weathertight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of 10 persons at Project site. Keep office clean and orderly.

1. Furnish and equip offices as follows:

    a. Water cooler and private toilet complete with water closet, lavatory, and medicine cabinet with mirror.
    b. Coffee machine and supplies, including regular and decaffeinated coffee, filters, cups, stirring sticks, creamer, sugar, and sugar substitute.
    c. Provide a room of not less than 240 sq. ft. for Project meetings. Furnish room with conference table, 12 folding chairs, and 4-foot- square tack board.

1. Provide resilient floor covering and painted gypsum wallboard walls and acoustical ceiling. Provide operable windows with adjustable blinds and insect screens.
2. Provide an electric heater with thermostat capable of maintaining a uniform indoor temperature of 68 deg F . Provide an air-conditioning unit capable of maintaining an indoor temperature of 72 deg F .
3. Provide fluorescent light fixtures capable of maintaining average illumination of 20 fc at desk height. Provide 110- to 120-V duplex outlets spaced at not more than 12-foot intervals, 1 per wall in each room.

G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.

2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.

H. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Usage: Refer to Division 14 Sections for temporary use of new elevators.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Site Enclosure Fence: When excavation begins, install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.

1. Set fence posts in compacted mixture of gravel and earth.
2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- thick exterior plywood.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.

F. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 4-inch studs, 5/8-inch gypsum wallboard with joints taped on occupied side, and 1/2-inch fire-retardant plywood on construction side.
2. Insulate partitions to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.

4. Protect air-handling equipment.
5. Weatherstrip openings.

G. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.

   a. Field Offices: Class A stored-pressure water-type extinguishers.
   b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
   c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

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 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Division 1 Section "Allowances" for products selected under an allowance.
2. Division 1 Section "Alternates" for products selected under an alternate.
3. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
4. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words “standard of quality” and/or "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided by Owner.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified material or product cannot be provided.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Cost information, including a proposal of change, if any, in the Contract Sum.
i. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
j. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
2. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.

3. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

4. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
5. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

6. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION REQUIREMENTS

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 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting surveys.
2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than seven days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F .
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

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 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 1 Section "Selective Demolition".
2. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

    a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Verify location of structural steel tube columns on the second floor which are hidden in stud framed walls prior to beginning wall demolition.

B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-protection systems.
4. Control systems.
5. Communication systems.
6. Conveying systems.
7. Electrical wiring systems.
8. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous demolition and construction waste.
2. Disposing of nonhazardous demolition and construction waste.

B. Related Sections include the following:

1. Division 01 Section "Multiple Contract Summary" for coordination of responsibilities for waste management.
2. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction, and location of waste containers at Project site.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.4 PERFORMANCE GOALS

A. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:

1. Demolition Waste:

a. Structural and miscellaneous steel.
b. Windows.

c. Glazing.
d. Metal studs.
e. Carpet.
f. Demountable partitions.
g. Copper wiring.
h. Ceiling Tile.

2. Construction Waste:

a. Metals.
b. Carpet and pad.
c. Piping.
d. Electrical conduit.

1.5 SUBMITTALS

A. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 WASTE MANAGEMENT PLAN

A. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

B. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - EXECUTION

2.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within threedays of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

2.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

2.3 RECYCLING DEMOLITION WASTE

A. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.

B. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

C. Acoustical Panels/Tiles: Stack pulp type tiles & panels on pallets as recommended by the recycling /manufacturer

1. Review with Owner and Architect for consolidation of loads from other projects to equal full loads for pick-up by the recycler.
2. Strap or wrap tiles in 4x4x4h pallets or 4x4x6h.

2.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Related Sections include the following:

1. Division 01 Section "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
2. Division 01 Section "Execution Requirements" for progress cleaning of Project site.
3. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, which must be completed or corrected before certificate will be issued. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. Should the work not be 100% complete, the Architect reserves the right to back-charge time and materials required for subsequent reinspection and documentation.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three hard copies of list as well as in electronic spreadsheet format. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit two sets of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity that obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
   a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
   b. Accurately record information in an understandable drawing technique.
   c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
   d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit two copies of Project's Specifications, including addenda and contract modifications. Mark copies to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. Record Product Data: Submit two copies of each Product Data submittal. Mark two sets to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.

E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Assemble three complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

   a. Emergency instructions and procedures.
   b. System, subsystem, and equipment descriptions, including operating standards.
   c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
   d. Description of controls and sequence of operations.
   e. Piping diagrams.

2. Maintenance Data:

   a. Manufacturer's information, including list of spare parts.
   b. Name, address, and telephone number of Installer or supplier.
   c. Maintenance procedures.
   d. Maintenance and service schedules for preventive and routine maintenance.
   e. Maintenance record forms.
   f. Sources of spare parts and maintenance materials.
   g. Copies of maintenance service agreements.
   h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

   1. Provide instructors experienced in operation and maintenance procedures.

2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner**,** through the Lead Contractor**,** with at least seven days' advance notice.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:

1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
6. Maintenance.
7. Repair.

3.2 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

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 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, and finishes; and systems and equipment.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

F. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:

1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.

2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set of plots from corrected Record CAD Drawings and one set of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.

b. Final Submittal: Submit one set of marked-up Record Prints, one set of Record CAD Drawing files, one set of Record CAD Drawing plots, and three copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.

1) Electronic Media: CD-R.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.

    a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
    b. CAD Software Program: The Contract Drawings are available in AutoCAD 2005.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
3. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

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 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator and/or instructor.

C. Attendance Record: For each training module, submit a list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.

e. Name of Contractor.
f. Date of video recording.

2. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Systems and equipment operation manuals.
    c. Systems and equipment maintenance manuals.
    d. Product maintenance manuals.
    e. Project Record Documents.
    f. Identification systems.
    g. Warranties and bonds.
    h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Alignments.
    b. Checking adjustments.
    c. Noise and vibration adjustments.
    d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning.
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.

1. Submit video recordings on thumb drive
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.

c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 017910 - WARRANTIES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer’s standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies procedures for submitting warranties.
2. Division 1 Section "Closeout Procedures" specifies contract closeout procedures.
3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.
4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3. WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents at no cost to the Owner. All warranties shall include material and labor. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.4. SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.

E. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.5 The foregoing provisions shall not in any way limit or vary any warranties Owner may have (including from other parties), either actual or implied, including those relating to any construction, materials or equipment which may, by industry standard, law or express warranty, extend beyond one year.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01790

SECTION 131113 - POOL GENERAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 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

1.3 REFERENCES

A. Refer to individual Division 13 11 sections.

1.4 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 – Wading Pool
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. DELEGATED DESIGN: The term "delegated design" as used in Division 13 11 refers to Elements of the pool or pool systems which require the contractor to provide design services or certifications of a design professional licensed in the project location. The Owner and the Architect will specify performance and design criteria that such services must satisfy. The contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the contract documents. As may be required by the local jurisdiction, the contractor shall cause such services and or certifications to be provided by a properly licensed design professional, whose signatures and seal shall appear on all drawings, specifications, certifications, shop drawings, and other submittals prepared by such professional.
6. 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.
7. 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 wastewater 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 equipment shall be purchased and installed by the Pool Contractor.
   b. All surge tank ventilation and plumbing shall be purchased and installed by the Mechanical Contractor.
   c. All plumbing shall be Schedule 40 PVC.
   d. Exhaust fan shall be of non-corrosive materials, Plastec 20 model PLA 20, or approved equal.
   e. Pool Contractor to coordinate surge tank penetrations with Mechanical Contractor.
   f. The Electrical Contractor shall provide all wiring, bonding, and grounding per NEC Article 680.

1.5 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.

1.6 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 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. Pool Play Equipment & 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
      h. Water Flume Rides/Towers
   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

1.7 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.

1.8 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 keytones) that might attack the material. Protect all pipes from mechanical damage and long exposure to sunlight during storage.

1.9 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 (Not Used)

PART 3 - EXECUTION

3.1 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.

3.2 CLEAN UP AND PROTECTION

A. After work of Division 13 11 has been completed, cleanup 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 131113

SECTION 131114 - POOL START-UP, MAINTENANCE & OPERATIONS TRAINING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pool start-up and chemical balancing of water.

B. Training of the Owner's personnel in pool operations procedures.

1.2 RELATED DOCUMENTS

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

1.3 DESCRIPTION OF WORK

A. Water treatment and balancing.

B. Operations and maintenance instruction and manuals.

1.4 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 per Part 3.03.
   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 equipment commissioning certifications.
      f. Pool and equipment operation and maintenance training certifications.
      g. Pool cleaning instructions.
      h. Pool maintenance requirements, divided into the following:
         1) Daily
         2) Weekly
         3) Monthly
         4) Seasonally
         5) Annually
      i. Narrative on the pool operation through all sequences.
      j. A DVD of complete start-up and shut-down procedures and training session.
      k. Trouble shooting information and procedures.
      l. A schematic of piping as installed.
      m. Valve charts for each piping system, consisting of isometric drawings or piping layouts showing and identifying each valve and describing its function.
      n. Copy of Measurement Certification of Permanent Racing Course
      o. Record Drawings

p. Warranties

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION

3.1 EQUIPMENT START-UP & COMMISSIONING

A. Provide pool equipment start-up and commissioning services. See individual pool equipment specification sections and provide services in accordance with all specification requirements. Provide Equipment Commissioning Certifications. Certifications to include date/s of commissioning activities, a summary of the commissioning work performed, signature of commissioning agent/s, and a Certification statement that equipment has been properly installed and commissioned per the manufacturer's requirements. Include copies of all equipment Commissioning Certifications in the Owner's Operation and Maintenance Manual, and as a Submittal to the Engineer/Architect.

3.2 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 pool and pool equipment operation and maintenance (O&M).
2. At a minimum, the swimming pool training and O&M Manuals must include the following:
   a. General pool operations,
   b. Pool materials and deck equipment maintenance,
   c. Pool fill and operating water level
   d. Pool/Equipment start-up, shut-down, emptying, and winterizing procedures.
   e. Circulation pumping, pipe, fittings, valves, and ancillary equipment,
   f. Filtration equipment,
   g. Heating/cooling equipment,
   h. Chemical treatment & monitoring systems,
   i. Slide and water features
3. Equipment training must be provided by the certified swimming pool operator-instructor and qualified equipment manufacturer representatives. See individual Specification sections for pool materials/equipment training and O&M requirements.

B. Contractor shall obtain written certification from the Owner's designated representative acknowledging that all O&M instructions/training and materials have been provided. Certification shall include the detailed listing of equipment above with training completion and delivery dates, instructor contact information, and Owner representative's signatures.

C. 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.

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

E. 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.

3.3 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)
   9. Cyanuric Acid (CYA) [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 1500 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 +0.5. 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:
LSI = (pH) + (Temperature factor) + (Calcium factor) + (Alkalinity factor) – (TDS factor)
LSI = pH+Tf+Cf+Af-TDSf

Af: The Alkalinity Factor is determined by correcting the Total Alkalinity for Cyanuric Acid (CYA) to find the Carbonate Total Alkalinity. To make this correction, subtract 1/3 of the measured CYA from the total alkalinity. Then use the corrected Carbonate Total Alkalinity to determine the Alkalinity factor (Af). [Carbonate TA =TA-(CYA/3)]

Langelier Saturation Index (LSI) - Factor Table								
Temperature			Calcium Hardness expressed as CaC02		Total Carbonate Alkalinity		Total Dissolved Solids (TDS)	
F	C	factor	ppm (mg/L)	factor	ppm (mg/L)	factor	ppm (mg/L)	factor
32	0	0	25	1	25	1.4	≤ 800	12.1
37	2.8	0.1	50	1.3	50	1.7	801-1,500	12.2
46	7.8	0.2	75	1.5	75	1.9	1,501-2,900	12.3
53	11.7	0.3	100	1.6	100	2	2,901-5,500	12.4
60	15.6	0.4	125	1.7	125	2.1	> 5,500 5	12.5
66	18.9	0.5	150	1.8	150	2.2		
76	24.4	0.6	200	1.9	200	2.3		
84	28.9	0.7	250	2	250	2.4		
94	34.4	0.8	300	2.1	300	2.5		
105	40.6	0.9	400	2.2	400	2.6		
			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. LSI 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.

F. 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.

G. 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.

H. OUTDOOR POOLS ONLY: Stabilize pool water to within a range of 5 to 15 ppm maximum of cyanuric acid (CYA).

I. 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 131114

SECTION 131118 - POOL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cast-in-Place Concrete to be used for pool floor and wall construction and related structures including surge/collector/balance tanks.
2. Shotcrete alternate to pool wall construction only if Contractor's qualifications have been pre-approved by Architect/Engineer.
3. Concrete used for Aquatic Play Surfaces without safety surfacing
4. Admixtures.
5. Curing and Treatment Requirements.
6. Formwork, shoring, bracing, and anchorage.
7. Concrete reinforcement and accessories.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section

1.2 REFERENCES

A. Incorporated Guides and References:
1. American Concrete Institute (ACI):
   a. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
   b. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
   c. ACI 304.2R - Placing Concrete by Pumping Methods.
   d. ACI 305R - Hot Weather Concreting.
   e. ACI 309R – Guide for the Consolidation of Concrete.
   f. ACI 347 – Guide to Formwork for Concrete.
   g. ACI SP-66 – ACI Detailing Manual.
2. Concrete Reinforcing Steel Institute (CRSI):
   a. CRSI Manual of Standard Practice
   b. CRSI 63 – Recommended Practice for Placing Reinforcing Bars.
3. National Electric Code (NEC):
   a. Article 680 – Swimming Pools, Fountains, and Similar Installations.

B. Specifications & Standards:
1. American Concrete Institute (ACI):
   a. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
   b. ACI 301 - Specifications for Structural Concrete.
   c. ACI 305.1 – Specification for Hot Weather Concreting.
   d. ACI 306.1 – Standard Specification for Cold Weather Concreting.
   e. ACI 308.1 – Specification for Curing Concrete.
   f. ACI 315 - Details and Detailing of Concrete Reinforcement.
   g. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
   h. ACI 350.1 – Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures
   i. ACI 506.2 – Specification for Shotcrete
2. ASTM International (ASTM):
   a. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
   b. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

c. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
d. ASTM C33 – Standard Specification for Concrete Aggregates.
e. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
f. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
g. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete
h. ASTM C150 – Standard Specification for Portland Cement.
i. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
j. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
k. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
l. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
m. ASTM C321 – Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
n. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
o. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete.
p. ASTM C672 – Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
q. ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
r. ASTM D1037 – Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
s. ASTM D4541 – Standard Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
t. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
u. ASTM F2461 - Standard Practice for Manufacture, Construction, Operation, and Maintenance of Aquatic Play Equipment

3. Standards Australia (AS)
   a. AS - 4586 Slip Resistance Classification of New Pedestrian Surface Materials
4. Corps of Engineers:
   a. CRD C-527 - Corps of Engineers Specification for Polyvinylchloride Water Stop.
5. NSF International (NSF)
   a. NSF/ANSI Standard 61 – Drinking Water System Components

1.3 SUBMITTALS

A. Submit proposed mix design of each class of concrete to Engineer/Architect not later than 10 days after Notice to Proceed or twenty-one (21) days prior to the first concrete placement, whichever comes first.

B. Submit shop drawings of reinforcing steel under provisions of Division 01 – General Requirements.
   1. Initial submittal of reinforcement shop drawings shall be complete. No partial submittals will be accepted.
   2. Indicate reinforcement sizes, spacing, locations and quantities of reinforcing steel, bending and cutting schedules, splicing, supporting and spacing devices. Include additional reinforcement for opening through concrete structures.
   3. Reinforcement placement shop drawings shall conform to ACI SP-66 providing full wall elevations.

C. Material Certificates: For each of the following, signed by the manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Waterstops.
   4. Non-shrink grouts.
   5. Expansion Joint Materials.
   6. Sealants.
   7. Waterproof Bondcoat
   8. Concrete Densifier

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates.
   2. Concrete Testing
   3. Compaction

E. Shotcrete Nozzleman Qualifications.

F. Pool Finish Experience/Qualification Requirements.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301, 305.1, and 306.1.

B. Maintain copy of ACI 301 on site.

C. 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 five (5) years. Contractors shall have an established record of reliability.

D. Qualifications of Nozzleman and Gunman
   1. Except when shotcrete is applied under a fully automated process, the quality of shotcrete depends largely on the skill of nozzleman and gunman, and the Contractor shall satisfy the Architect/Engineer that the nozzleman has had a minimum of two years' continuous experience on shotcreting of this type of work, and that the gunman has handled the gun for a period of at least six months. The nozzleman shall show proof of good quality successful shotcreting work similar to that required for this project. Experience gained on shotcrete and ditch construction will not be considered as experience for qualifying the nozzleman.

E. Concrete Testing: The following tests shall be performed during construction of the project. Refer to General Conditions and Division 01 for further requirements.
   1. Tests to measure slump, entrained air content and compressive strength shall be conducted by independent testing laboratory employed by the Contractor unless noted otherwise in front-end specifications.
      a. Provide minimum of two 6 by 12 in. cylinders or three 4 by 8 in. cylinders per 150 cubic yard or fraction thereof for each class of concrete poured each day. Comply with ACI 318 (samples secured - ASTM C172, cylinders prepared and cured - ASTM C31, and tested - ASTM C39). Identify samples moist cure at 70 degrees F for five (5) days and ship samples to laboratory.
   2. Slump and Air Content Tests
      a. Perform on concrete from same batch as sampled for strength tests and whenever there is consistency of concrete. Slump tests shall be made in accordance with ASTM C143. Air content tests shall be made in accordance with ASTM C231. If measured slump or air content falls outside specified limits, check shall be made immediately on another portion of same sample. In event of second failure, concrete shall not be used in Work.
   3. Compliance
      a. Average of any three (3) consecutive strength tests for each class of concrete shall be equal to or greater than specified strength, and no individual test shall fall more than 500 psi below specified strength.
      b. When tests results are below specified requirements or when tests of field cured cylinders indicate deficiencies in protection and curing, Architect/Engineer may require additional tests in accordance with ACI 318.

F. Wet Mix Process Cylinder Sample
   1. Where automated wet mix equipment is used, shotcrete cylinders shall be taken from the mixer or ready-mix truck and tested in accordance with the requirements specified in this Section. Wet mix processes shall only be used with approved automated equipment.

G. Pools, surge tanks, and gutters shall have a water tightness performed per ACI 350.1. Documentation of testing and results shall be submitted for review. Refer to Water Tightness Test section of this specification.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of local, state and federal rules and regulations applicable to Work and Project location.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Concreting
1. Placement and curing of concrete where (1) average daily temperature for three consecutive days is less than 40 degrees F, and (2) air temperature is not greater than 50 degrees F for more than one-half of a 24-hour period from midnight to midnight shall be in accordance with ACI 306.1.

B. Hot Weather Concreting
1. Placement and curing of concrete subject to a combination of (1) rising air temperature (generally greater than 75 degrees F) and (2) wind and low relative humidity shall be in accordance with ACI 305.1.
2. Contractor shall provide plan for minimizing exposure of concrete to adverse conditions due to combinations of high air temperature, direct sunlight, drying winds, and high concrete temperature.
3. Protect concrete from rapid temperature drop.
4. Pre-wet subgrade and forms.

1.7 WARRANTIES

A. Special 2-Year on Concrete Structure: The Pool Contractor shall guarantee for two (2) years repair of the concrete pool structure.

PART 2 - PRODUCTS

2.1 SUBGRADE, SUBBASE AND BACKFILL MATERIALS

A. Pool Subgrade:
1. In-situ soils meeting the Project Geotechnical Report requirements for materials and preparation.
2. Subgrade soils must meet the soil parameters for pool structural design as stated in the Pool Structural Drawings for:
a. Net allowable soil bearing capacity in pounds per square foot (PSF),
b. Stated equivalent fluid pressure in pounds per square foot per foot (PSF/FT),
c. Ground water elevation
3. Pool subgrade materials shall be free of large rocks, organic matter, and other deleterious substances.

B. Filter Fabric:
1. MIRAFI 140N: Nonwoven polypropylene geotextile barrier, 4.8 oz/yd2, by Tencate Geosynthetics.

C. Concrete Pool/Tank Subbase & Backfill Materials:
1. Existing subsoil materials shall not be used for pool subbase.
2. Prefabricated Pool Panels: See Pool (PL) drawing details for prefabricated pool wall panel backfill materials and installation requirements. The requirements of this section are for concrete structures only.
3. ASTM D 2487 Class IA Manufactured Aggregate:

a. Aggregate containing little or no fines (clear), including angular, crushed stone or rock, crushed slag, cinders, or shell.
b. Gradation: Open graded, clean: < = 10% Passing No.4 sieve, < 5% Passing No. 200 sieve.
c. Concrete Pool/Tank Subbase: ¾" to 1" nominal sized aggregate.
d. Concrete Pool/Tank backfill: ¾" nominal sized aggregate.

2.2 FORM MATERIALS

A. Plywood Forms: Douglas Fir or Spruce-Pine-Fir species: Sound, undamaged sheets with clean true edges, exterior glue, facing material to provide finish specified.

B. Lumber: Douglas Fir or Spruce species; construction grade or better; with grade stamp clearly visible.

C. Preformed Steel Wall Forms: Minimum 16 gage thick, Vertically and horizontally matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and surface appearance.

D. Tubular Column Type: Round, spirally wound laminated fiber material; inside surface treated with release agent.

E. Form Ties for Exposed Surfaces: Plastic cone snap ties with 1-inch outside diameter by 1-inch (nominal) long cones, with no metal within 1-inch of concrete face after removal;
1. Manufacturers:
a. Advance Concrete Formwork, Inc.
b. Dayton Superior.
c. Symons - A Dayton Superior Company.
d. Williams Form Engineering Corporation.
e. Substitutions: As approved by Engineer/Architect.

2.3 SHOTCRETE

A. Mix Design
1. Wet-mix design only. Dry mix, mixed at the nozzle, shall not be allowed.
2. A proven mix design shall be used for all Shotcrete applications.
3. In addition to cylinders, testing of shotcrete shall be done per ACI 506.2.

B. Rebound
1. Rebound materials shall not be reused in any form for shotcrete work and shall never be worked into the construction by the nozzleman.

2.4 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade carbon steel deformed bars; uncoated, finish.

B. Reinforcement Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete. Supports shall have a minimum 2" concrete cover on waterside of pool concrete.

2.5 CONCRETE MATERIALS

A. Cementitious Materials
1. Portland Cement: ASTM C150, gray color, Type I except as specified below.
2. Fly Ash: ASTM C618, Class C.

3. Limit cement replacement to 20%.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: ASTM C1602, clean and not detrimental to concrete.

D. Admixtures
1. Admixtures to be used in the concrete mixture shall be submitted to the Engineer for approval as part of the mixture proportions.
2. Admixtures containing intentionally-added chlorides, sulfides, or nitrides are not permitted.
3. Admixtures shall be certified to NSF/ANSI 61.
4. Air-Entraining Admixture: ASTM C260.
5. Water Reducing Admixture: ASTM C494, Type A.
6. Retarding Admixture: ASTM C494, Type B or Type D.
7. Accelerating Admixture: ASTM C494, Type C or Type E.
8. High-Range Water-Reducing Admixture: ASTM C494, Type F.
9. Workability-Retaining Admixture: ASTM C494, Type S.
10. Shrinkage-Reducing Admixture: ASTM C494, Type S.
11. Crystalline Waterproofing Admixture: ASTM C494, Type S.
    a. Uses insoluble crystalline compounds to block capillary pores.
    b. Crack sealing ability up to 0.016 in (0.40 mm).
    c. Water Penetration: Manufacturer must provide independent testing report that shows concrete treated with crystalline waterproofing admixture has the capability to reduce water penetration into concrete by 70 percent as compared to control mix, when measured by EN 12390-8/DIN 1048.
12. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
13. Admixtures permitted shall be supplied by a single manufacturer for project.
14. Approved Manufacturers:
    a. Axim Italcementi Group.
    b. Master Builders Solutions
    c. Grace Construction Products.
    d. The Euclid Chemical Company.
    e. Xypex
15. Substitutions: As approved by Engineer/Architect.

2.6 ACCESSORIES

A. Pool Concrete PVC Waterstop
1. Center bulb type and size shall be as shown on Drawings, extruded from an elastomeric plastic compound, the basic resin of which shall be polyvinyl chloride (PVC). No reclaimed PVC shall be used in the compound. Meet the performance requirements of CRD C-572 and the Table below.
2. PVC Waterstop Physical Property Table:

Property	Test	Value
Water absorption	ASTM D570	0.15% max.
Tear resistance	ASTM D624	300 lb/in min
Ultimate elongation	ASTM D638	350% min.
Tensile strength	ASTM D638	2000 psi min.
Low temperature brittleness	ASTM D746	Passes @ -35°F / -37°C

Stiffness in flexure	ASTM D747	700 psi min.
Specific gravity	ASTM D792	1.38 max.
Hardness Shore A15	ASTM D2240	79 ± 3
Tensile strength after accelerated extraction	CRD- C 572	1600 psi min.
Elongation after accelerated extraction	CRD- C 572	300% min.
Effect of Alkali: - Weight Change - Hardness Change	 CRD- C 572 CRD- C 572	 +0.25%-0.10% +/-5 points

3. All waterstops shall be rated for a minimum of 50 psi head pressure, have a 1" outside diameter center bulb, a number of parallel ribs or protrusions on each side of the center of the strip, and a constant thickness from the edge of the bulb to the outside edge. Corrugated type or tapered waterstops are not acceptable.
4. Manufacturers and suppliers who have provided samples meeting the specified geometry and who have the specified waterstop readily available are listed below. Other products shall not be used without prior review and acceptance by the Architect/Engineer.
   a. Sika Greenstreak Waterstops, P.O. Box 7139, St. Louis, Missouri 63177, phone: (314) 225-9400 or fax: (314) 225-9854. Style 717 for the 6-inch by 3/8-inch.
   b. BoMetals, Inc., 141 Hammond Street, Carrollton, GA. Phone 770-832-2000 or fax (770-832-2095.Style RCB638NT for the 6-inch by 3/8".
   c. Paul Murphy Plastics Company, Wirestop Waterstop, 15301 Eleven Mile Road, Roseville, Michigan, 48066, phone 800-544-2200 fax 586-774-9146. Style CR-6380 for the 6-inch x 3/8".

B. Pool Concrete Compressible Waterstop
1. Use as illustrated in drawing details for the following:
   a. Sealing non-moving cold joints and construction joints between structural elements against penetration of water from wet-face of structure with less than 30-foot hydrostatic head.
   b. Sealing pool piping penetrations against water penetration from wet-face of structure with less than 30-foot hydrostatic head.
2. Product Description: The product shall be a 0.59" x 0.39" compressible hydrophilic sponge rubber strip composed of vulcanized rubber and urethane polymer as the hydrophilic agent.
3. Product & Manufacturer:
   a. Adeka KBA-1510FP waterstop, manufactured by Adeka Corporation and distributed by OCM, Inc., Chicago, IL. USA.
   b. Website: www.adeka.com
   c. Physical & Swelling Property Requirements: The product shall at a minimum meet the physical properties as shown in the official Adeka literature as follows.
   d. Expansion Pressure: The product shall not produce more than 0.03MPa (4.35 psi) expansion pressure when fully hydrated.
   e. Tensile Strength: At least 0.78 MPa (113 psi),
   f. % Elongation: No greater than 350% when fully hydrated.
   g. Volume (thickness) % Change: No greater than 30% volume change or increase in thickness when fully hydrated.
   h. Alternative Products:
      1) General: Drawing documents have been completed using the specified Adeka waterstop product as a basis of design. Alternative compressible waterstops shall not be used without approval from Engineer/Architect. Considerations such as concrete coverage requirements and wall thicknesses must be considered when substituting alternative products. Contractor will be responsible for any structural changes required due to alternate product concrete coverage requirements.

2) Product Requirements: Compressible waterstop alternatives may not contain bentonite materials and may not have swelling properties that exceed the specified product.
3) Acceptable Alternative: An acceptable alternative may be Synko-Flex SF302 Preformed Plastic Adhesive Waterstop with Synko-Flex SF311 primer or equal, but it must be approved prior to use. Manufacturer: Henry Company, Houston, TX. Website: http://henry.com

C. Non-Shrink Grout: Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi.
1. Upcon High Flow, the Upco Company, Cleveland, Ohio; MasterFlow 713, Master Builders Solutions, Cleveland, Ohio; Duragrout, L & M Construction Chemicals, Inc., Omaha, Nebraska.

D. Joint Materials:
1. Waterstop: See Pool Concrete PVC Waterstop.
2. Expansion Joint Dowel Sleeves: PVC or molded plastic sleeve with end cap/plug. Size sleeve to allow movement of dowel.
3. Pre-molded Expansion Joint Filler: Multicellular, closed cell, flexible polyethylene plastic foam as manufactured by Dow Chemical Co., Midland, MI. Ethafoam expanded polyethylene closed-cell foam, W.R. Meadows, Elgin, IL, Ceramar or a pre-approved equal.
4. Backer Rod Joint Backing Material: Closed cell, polyethylene, flexible, rope-like foam joint backing material. Material shall be fully compatible with polysulfide sealant and for use in swimming pools. Product shall be Kool-Rod as Manufactured by W.R. Meadows, Elgin, IL, or pre-approved equal.
5. Gun Grade Sealant: Two-part polysulfide sealant and primer certified by Manufacturer as suitable for use in pools including submerged locations. “Deck-O-Seal Gun Grade” and “P/G” solvent based primer as manufactured by W.R. Meadows or equal. Color shall be white.

E. Adhesive Waterproof Bondcoat
1. Provide adhesive waterproof bondcoat where indicated on drawings.
a. Impact strength: 19 lbs / 8.6 kg
b. Compressive strength: 7050 psi / 48.61 MPa
c. Tensile strength: 732 psi / 5.05 MPa
d. Flexural strength: 2380 psi / 16.41 MPa
e. Adhesive strength (concrete): 1372 psi / 9.46 MPa
f. Shear bond adhesion: 720 psi / 4.96 MPa
g. ASTM C321
h. ASTM C672
i. ASTM D4541
j. ASTM E96
2. Materials
a. Basecrete or equal.
3. Accessories
a. Fiberglass mesh reinforcing, 4.5 oz/sq.yd., impact resistance 75-100 in lbs. per ASTM D1037 modified.

F. Concrete Densifier
1. Provide concrete densifier under tile pool installations and where indicated on drawings.
a. Basecrete + or equal.

2.7 CURING AND TREATMENT MATERIALS

A. Water: Potable and clean.

B. Burlap shall be clean, evenly woven, free of encrusted concrete or other contaminating materials, and shall be reasonably free of cuts, tears, broken or missing areas.

C. Polyethylene Film: ASTM C171, 6 mil thick, clear.

D. Curing Paper: ASTM C171;
   1. Manufacturers:
      a. Fortifiber – Orange Label Sisalkraft 280.
      b. Substitutions: As approved by Engineer.

2.8 CONCRETE MIXTURE

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture of field test data, or both, according to ACI 301.

B. Mix concrete in accordance with ASTM C94.

C. Concrete mix designs shall be designed and submitted in accordance with Division 01 and included as part of cost of this Work.

D. Mix designs shall be prepared by a qualified agency acceptable to Engineer/Architect. Electronic copies of mix designs shall be submitted for Engineer/Architect's review prior to placing any concrete.

E. Mix design shall indicate brands, types, and quantities of admixtures included, compressive strength, slump, sieve analysis for fine and coarse aggregate, quantities of all ingredients, type and brand of cement, source of aggregate, whether fine aggregate is natural or manufactured.

F. Design of mix shall assure placing and finishing characteristics that meet Project requirements.

G. Mix designs contained in the Schedule of Mixes may be modified and submitted to Engineer for approval, by use of mid or high range water reducing admixtures to control slumps required for pumping of concrete. Strength, placing and finishing requirements shall be maintained.

H. Concrete mixtures shall be designed to have low shrinkage characteristics and designed to minimize slab curling.

I. Initial and final set times of concrete mix designs shall be coordinated between the contractor and concrete supplier.

2.9 SCHEDULE OF MIXES

A. Pool Structures: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 4500 psi.
   2. Maximum Aggregate Size: 1 inch.
   3. Maximum Slump (Inch): 3
   4. Air Entrainment: 6 percent air content is required with an acceptable air content of plus or minus 1.5 percent. Required for pool structures subject to freeze/thaw cycles.
   5. Maximum Water-Cementitious Materials Ratio: 0.45.
   6. Additional admixtures may be required as indicated on Structural Drawings.

B. Shotcrete: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 5000 psi.
   2. Wet-mix design only. Dry mix, mixed at the nozzle, shall not be allowed.
   3. Maximum Aggregate Size: 3/8 - inch.
   4. Air Entrainment: 7-1/2 percent air content is required with an acceptable air content of plus or minus 1.5 percent. Required for pool structures subject to freeze/thaw cycles.
   5. Additional admixtures may be required as indicated on Structural Drawings.

PART 3 - EXECUTION

3.1 SUBGRADE, SUBBASE AND BACKFILL PLACEMENT

A. Prepare pool subbase using in-situ soils in compliance with the Project Geotechnical Report placement methods and testing requirements. Materials shall be graded to proper elevations, free of large rocks, organic matter, and other deleterious substances.

B. Place geotextile barrier below entire pool and up the sides of the pool walls separating the subbase aggregates and pool backfill aggregates from the subgrade and remaining backfill or in-situ soils to prevent mitigation of fines.

C. Place pool subbase & backfill aggregate materials in 6” compacted lifts to minimize void spaces and eliminate potential future settlement. Compact materials using walk-behind plate compactors properly sized and operated to prevent damage to pool pipes.

3.2 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance per ACI 117.

C. Verify lines, levels, and measurement before proceeding with formwork.

D. Earth forms are not permitted.

E. Align form joints.

F. Do not apply form release agent where concrete surfaces receive special finishes or applied coatings which may be affected by agent.

G. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.3 REINFORCEMENT

A. Place, support, and secure reinforcement against displacement.

B. Locate reinforcing splices as shown on Drawings.

C. Place reinforcing steel in conformance with the information on the drawings and CRSI 63 and CRSI, except as modified herein. Minimum length of splices shall be as shown in table on drawings. Tie splices with 18-gauge annealed wire as specified in the referenced CRSI standard. All tie wires shall be “made tight” for electrical bonding purposes, as required by NEC, Article 680.

3.4 WATERSTOP

A. PVC Waterstop

1. Split formwork is generally required for slab-to-slab, slab-to-wall and wall-to-wall joints where ribbed style waterstops are used. The centerline of the waterstop should be aligned with the center of the joint. The split form shall firmly hold the waterstop in position to prevent misalignment of waterstop during concrete placement. Secure waterstop with hog rings or integral wire loops prior to concrete placement. Loop tie wires through the hog ring/wire loops and tie off to adjacent reinforcing steel to prevent displacement of the waterstop during concrete placement. Fasteners through the body of the waterstop are not permitted.
2. Lapping of the waterstop is not permitted. PVC waterstop may be butt spliced in the field with Teflon coated, thermostatically controlled splicing iron. Direct exposure to a flame is not permitted. Factory fabricated fittings are recommended for ells, tees and crosses.
    a. The following defects at splices will not be acceptable:
        1) Use of adhesives, solvents, or free lap joints
        2) Misalignment of center bulb greater than 1/16”
        3) Misalignment that reduces waterstop cross section area more than 15%.
        4) Bond failure at joint, deeper than 1/16” or 15% of material thickness.
        5) Combination misalignment and bond failure with net reduction of waterstop cross-section area greater than 15%.
        6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of ½” in 10 feet.
        7) Visible porosity in the weld joint, including pinholes
        8) Charred or burnt material
        9) Bubbles or inadequate bonding detectable with a penknife
        10) Visible signs of splice separation when cooled splices are bent at a sharp angle.
        11) Edge welding
3. Thoroughly consolidate the concrete around the waterstop to prevent voids or honeycombing next to the waterstop. Maintain adequate clearance between reinforcing steel and the waterstop. Typical clearance should be twice the maximum aggregate size. Maintain continuity of the entire waterstop system. Properly store PVC waterstops prior to installation to prevent UV degradation.

B. Compressible Waterstop – Adeka KBA-1510FP
1. Non-moving Joint Installation:
    a. Consult manufacturer and follow all recommended installation instructions.
    b. Allow concrete to cure a minimum of 24 hours.
    c. Concrete must be dry and free from form oils, release agents, curing compounds, laitance and other dirt or debris prior installation. Use a wire brush to remove contaminants prior to installation of waterstop.
    d. Use butyl tape to attach KBA-1510FP to a dry and clean substrate. The butyl tape comes in a 3/4" X 1/8" X 82-foot roll (1 roll per roll of KBA-1510FP). Press the butyl strip onto the substrate and remove the release paper. Press the KBA-15010FP firmly onto the butyl tape.
    e. Check for any gaps between the product and the substrate. If gaps are present, fill in using Adeka P-201 applied to the side of the strip. Use P-201 on corner joints and on side-by-side splice joints.
    f. Once installed, keep the product covered, clean, and dry prior to concrete placement. For best results, place the waterstop product immediately before pouring concrete. Check to make sure the waterstop is firmly adhered before placing concrete.
    g. During concrete placement, assure that the concrete is well consolidated around the waterstop at all locations with no voids or gaps.
2. Penetration Installation:
    a. Consult manufacturer and follow all recommended installation instructions.
    b. Pipe must be dry and free from form oils, release agents, curing compounds, laitance, and other dirt or debris prior to installation.
    c. Press the butyl strip onto the clean pipe completely around the pipe diameter and remove the release paper. Press the KBA-15010FP firmly onto the butyl tape. Tightly butt strip ends together with 1” overlap or side lap.
    d. Once installed, keep the product covered, clean, and dry prior to concrete placement. For best results, place the waterstop product immediately before pouring concrete. Check to make sure the waterstop is firmly adhered before placing concrete.
    e. During concrete placement assure that the concrete is well consolidated around the waterstop at all locations with no voids or gaps.
3. Alternative Products Installation:

a. Drawing documents have been completed using the specified Adeka waterstop product as a basis of design. Alternative flexible adhesive waterstops shall not be used without approval from Engineer/Architect. See Section 2 for additional information.
b. If Synko-Flex has been approved during the submittal process, the following installation requirements shall be met, as well as all manufacturer's installation instructions.
    1) Allow concrete to cure a minimum of 24 hours before priming with Synko-Flex primer.
    2) Concrete must be dry and free from form oils, release agents, curing compounds, laitance and other dirt or debris prior to priming. Use a wire brush to remove contaminants prior to installation of primer.
    3) Apply Synko-Flex SF311 primer.
    4) Apply Synko-Flex SF302 Preformed Plastic Adhesive Waterstop over primed areas. Place Synko-Flex to primed areas at an approximately 5/8" thickness and approximately 1 ½" width.
    5) Tightly butt strips together with 1" overlap or side lap.

3.5 PLACING CONCRETE

A. Notify Engineer/Architect a minimum of 48 hours prior to commencement of concreting operations.

B. Failure to notify Engineer/Architect may result in rejection of concrete placed without observation.

C. Place concrete in accordance with ACI 301.

D. Place pumped concrete in accordance with ACI 304.2R. Line coating mix to initiate pumping shall not be used in pour but shall be wasted.

E. Ensure reinforcement and embedded items are not disturbed during concrete placement.

F. Concrete with excessive honeycomb or embedded debris shall be rejected and replaced at no cost to OWNER.

G. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.

H. Placing During Hot Weather:
    1. Place concrete during hot weather conditions in accordance with ACI 305.1.

I. Placing During Cold Weather:
    1. Place concrete during cold weather conditions in accordance with ACI 306.1.

J. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.6 POOL WALL SHOTCRETE

A. Wet Mix Process
    1. The delivery equipment shall be of an approved design and size that has given satisfactory results in similar previous work.
    2. The equipment must be capable of discharging mixed material into the hose under close control, and it must be able to deliver a continuous smooth stream of uniformly mixed material at the proper velocity to the discharge nozzle, free from slugs of any kind.
    3. The nozzle shall be of a design and size that will ensure a smooth and uninterrupted flow of materials.
    4. Delivery equipment shall be thoroughly cleaned at the end of each shift.

B. Surface Preparation

1. Verify forms are true to line and dimensions, adequately braced against vibration, and constructed to permit escape of air and rebound during gunning operations.
2. Do not place shotcrete on any surface which is frozen, spongy, or where there is free standing water.

C. Alignment Control
1. Provide alignment wires to establish thickness and plane surface.
2. Install alignment wires at corners and offsets not established by form work.
3. Verify alignment wires are tight, true to line, and placed to allow further tightening.

D. Application
1. Ensure correct placement of reinforcement. Ensure sufficient clearance around reinforcement to permit complete encasement.
2. Allow easy access to shotcrete surfaces for screeding and finishing, permitting uninterrupted application.
3. Determine operating procedures for placement in close quarters, extended distances, or around unusual obstructions where placement velocities and mix consistency must be adjusted.
4. In shotcreting walls, begin application at bottom. Ensure work does not sag.
5. Hold nozzle as perpendicular to surface as work will permit, to secure maximum compaction with minimum rebound.
6. Follow routine that will fill and completely encase reinforcement, using maximum layer thickness.
7. Build up layers by making several passes of nozzle over work area. Completely encase reinforcement with first layer.
8. After initial set, remove excess material outside of forms and alignment lines.
9. Allow each layer of shotcrete to take initial set before applying succeeding layers.
10. Remove laitance that has taken final set, by sandblasting. Clean with air-water jet.
11. Sound work with hammer for voids. Cut out voids and replace with succeeding layers.
12. Keep rebound, and other loose or porous material out of new construction.
13. Remove rebound that does not fall clear to work. Discard salvaged rebound.
14. Remove trapped rebound at construction and expansion joints.

E. Protection of adjacent surfaces
1. Contractor shall take every possible precaution to protect adjacent concrete surfaces, equipment, etc., from being damaged by overshooting concrete. Overshot concrete and rebound materials deposited shall be removed at the Contractor's expense.

3.7 AQUATIC PLAY SURFACE CONCRETE

a. Aquatic Play Surface Concrete which does not have safety surfacing shall meet the following per Standards Australia AS-4586 utilizing the Slider 55 wet pendulum test method intended for wet surfaces subject to barefoot traffic:
b. Flat wet surfaces: slip resistance class P4, [SRV = 40 to 44]
c. Sloped wet surfaces: slip resistance class P5, [SRV = >44]

3.8 EXPANSION & CONTROL JOINTS

A. All control and expansion joints require PVC waterstop.

B. Installation of Joint Filler: At locations where joint sealant is to be applied, the pre-molded joint filler shall be installed in the joint accurately as detailed. Precut the pre-molded expansion joint filler to the required depth. Filler material shall be of sufficient width to completely fill the joint and shall be accurately cut to butt tightly against the waterstop and the side forms. Attach filler material to concrete with a bonding agent. Bonding agent shall be approved in writing by the joint sealant and joint filler manufacturer for compatibility.

C. Concrete shall be thoroughly vibrated along the joint form to produce a dense, smooth surface. Surface irregularities along the joint sealant cavity, due to improper concrete consolidation or faulty form removal, shall be repaired with an approved compound compatible with the joint sealant in a manner that is satisfactory to the sealant manufacturer.

D. All expansion and control joints require gun grade sealant. Cavities for joint sealant shall be formed with precut or pre-molded joint filler that can be removed as needed for sealant. Circular backer rod shall be used in joints as detailed to provide accurate shape for sealant.

3.9 CONSTRUCTION JOINTS

A. Construction joints shall be located as required for the contractor's scheduling, means and methods.

B. All construction joints require waterstop.

C. Contractor shall provide a submittal showing construction joint locations and detailing for review and approval.

3.10 ADHESIVE WATERPROOF BONDCOAT PLACEMENT

A. Clean and prepare surfaces and apply all products in accordance with manufacturer's recommendations.

B. Pool Renovations: Apply concrete densifier to all pool concrete surfaces receiving a tile finish and where indicated on drawings.

C. Apply adhesive waterproof bondcoat beneath gutter grating on the exposed sides and bottom of all concrete gutter trenches, and where indicated on drawings. Apply material in two coats (one horizontal and one vertical). Each layer shall be 1/16 inch in thickness.

D. Pool Renovations: Provide fiberglass mesh to bridge over cold joints and cracks in accordance with product manufacturer's recommendations.

E. Do not apply materials to frozen substrates or when temperatures are below 40 or above 105 degrees Fahrenheit.

3.11 CURING AND TREATMENT

A. Curing shall begin promptly to prevent drying of concrete. Curing shall continue for seven (7) days after placing.

B. Provide a moist cure for a full seven (7) days in accordance with ACI 308.1. Keep concrete slabs and walls continuously wet for a 7-day period. Intermittent wetting is not acceptable. Material shall completely cover the concrete surface and shall be weighted down to prevent shifting due to wind or other factors.

3.12 REPAIR OF VERTICAL SURFACE DEFECTS

A. Upon stripping of forms, vertical surfaces shall be inspected for defects caused by surface air voids, honeycombing, form tie holes, peeling, and fins.

B. Surface air voids shall be repaired with a unit packaged mixture of sand and cement mixed on job site with water and a unit of acrylic. Mixture shall be brushed uniformly on to surface and into voids. Where surface is to be exposed, surface finish of repair shall match adjacent surface.

C. Honeycombed and other defective concrete shall be removed down to sound concrete and patched to match adjacent surfaces. Cut edges perpendicular to surface at least 1 inch deep – no feathered edges allowed.
   1. Areas not subject to water shall be repaired similar to surface air voids as indicated above. A bonding agent shall be used prior to filling the holes. Patches shall be kept moist for a minimum of 7 days.

2. Areas subject to water shall be moist for a period of 24 hours prior to patching. Holes shall be filled with non-shrink grout and cured per recommendations by manufacturer. Concrete surface shall be prepared per recommendations by manufacturer.

D. Form tie holes shall be filled with non-shrink grout. Surface of concrete to prepared per recommendations by manufacturer. Grout shall be cured per recommendations by manufacturer.

3.13 FINISHING

A. Floor slabs shall not vary from level or true plane more than ¼ inch in 10 feet when measured with a straightedge. Floor slabs shall receive a broom finish to accommodate special aggregate mechanical bonding requirements.

B. After removal of forms and repair of defects, surfaces of concrete shall be given finishes specified below.

C. Rough Form Finish: Surface left with texture imparted by forms; form facing material not specified; tie holes and defects shall be patched; all fins shall be chipped or rubbed off. The surface shall be finished in such a way that will leave the surface for the substrate rough, coarse, and porous enough to ensure that subsequent application of the cementitious surface coating can achieve a good mechanical bond to the substrate similar to a broom finish.

D. Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of formed surface.

E. Final finish on formed surfaces shall continue uniformly across unformed surfaces.

3.14 WATER TIGHTNESS TEST

A. General
1. This test applies to the pool, the surge tank, and the gutter system. A water tightness test shall be completed on each pool, surge tank and gutter system, independently of each other, prior to the application of the pool finish.
2. The cost of the water shall be allocated as outlined in Specifications Section 13 11 14, Part 3, 3.02, F.
3. Contractor shall include and itemize these requirements in the overall construction schedule.
4. The Owner may elect to waive leak test requirements if schedule becomes a critical factor. Only the Owner may waive these requirements. If the Owner elects to waive these requirements the Contractor is still responsible for providing leak-free structures, and at a minimum, all specified applicable warranties shall apply.

B. Water Tightness Test Procedure
1. Preparation
   a. Visually examine the concrete structure and joints for potential leakage prior to fill. Contractor shall repair areas of potential leakage prior to fill.
   b. Allow the concrete structure to cure a minimum of 28 days, or as required to gain sufficient strength to withstand the test load, prior to initiating test.
   c. Securely seal all inlets/outlets and penetrations prior to fill.
   d. The test shall not be scheduled when the weather forecast indicates the water surface could freeze before the test is completed.
2. Fill
   a. Fill the pool with potable water from an approved water source, and then isolate the pool, the surge tank, and the gutter system. The water tightness test and measurement documentation shall begin after the test structure has been filled for a minimum of three (3) days to allow the concrete to absorb water and minimize absorption effects during the testing period.

b. Fill each structure to the design maximum liquid level or 4 inches below any fixed overflow level.
c. After the initial fill, remove ground water to a level below the bottom of the structure main drain or floor slab (below lowest concrete plane) utilizing the pool observation tube, the pool de-watering system, or the construction dewatering system. This shall be completed prior to the start of the water tightness test and maintained for the duration of the test.
d. For elevated pools with secondary containment structure, the secondary containment structure shall be monitored for the presence of water for the duration of the test. Groundwater elevation is not a factor in these pools.

3. Evaporation/Precipitation Measurement Procedure
   a. Partially fill a floating, restrained, calibrated (known volume and surface area), open container (hereafter "container" or "control container") with water and allow this container to float within the filled structure during the testing period. This will be used to measure total evaporation and precipitation.
   b. Mark and measure the change in container's water level. If the container water level has gone down (evaporation), this change shall be subtracted from each structure's water loss measurement. If the container water level has risen (rain), this change shall be added to each structure's water loss measurement.
4. Measurement
   a. Conduct all measurements with the Architect or Owner's representative present and document all measurements on the table below.
   b. Provide an as-built drawing or sketch the pool, surge tank, and gutter identifying measurement locations and the evaporation control container's location.
   c. The water surface elevation shall be recorded to within 1/16 of an inch, measured from a fixed point on the structure above the water surface.
   d. Average multiple sample locations for structures exposed to wind.
   e. Repeat and record the measurements for a total of three (3) consecutive days.

Measurement Times	Pool Measurements	Gutter System Measurements	Surge Tank Measurements	Control Container Measurements
12 Hrs.				
24 Hrs.				
36 Hrs.				
48 Hrs.				
60 Hrs.				
72 Hrs.				

5. Water Leakage
   a. Calculate water leakage as follows:
      1) Leakage [Gallons] = [7.481 x Structure Surface Area (SF)] x
      2) [Structure Loss Measurement* (FT) – Control Container Measurement (FT)].
      3) Structure loss measurement is a generic term referring to Pool Measurement, Gutter System Measurement or Surge Tank Measurement independently. Calculate the leakage from the pool, gutter, and surge tank independently.
   b. Add the measurements for two consecutive 12-hour periods to obtain the total daily loss due to leakage.
   c. Record Daily losses due to leakage for Day #1, #2, and #3 in the table below.

Total Daily Loss Due To Leakage	Pool Leakage	Gutter Leakage	Surge Tank Leakage
Day 1			
Day 2			
Day 3			

6. Submittal
   a. Provide test location as-built/sketch, measurement tables, and Water Leakage calculations to Engineer in the form of a submittal for review and records.
7. Allowable Loss from Leakage
   a. The allowable leakage rate for an unlined, open concrete structure (i.e. backfilled pool, gutter, and surge tank) shall not exceed 0.1 percent of the total water volume in a 24-hour period. (Example: 0.001 x 200,000-gallon pool = 200 gallons per 24-hour period.)

b. Elevated pools and gutters with a secondary containment vessel shall have no measurable loss; the drop in the water surface shall not exceed 1/8" over the three-day test period when adjusted for evaporation and precipitation.

8. Repair and Retest
   a. If the leakage volume calculated exceeds the "allowable loss" in section 7, Contractor shall locate and identify leakage points, repair the structure and provide documentation on the location of repaired areas.
   b. After proper curing of all repair work, re-test the water tightness of structure following the procedure specified in this section.

3.15 AQUATIC PLAY SURFACE SPECIAL INSTRUCTIONS

A. Once the surface is open for public use the contractor shall instruct the operator how to perform surface cleaning. Document instructions in project close out materials.

B. Instruct owner / operator on requirements for slip resistance performance validation requirements. Frequency of performance validation is dependent on project location, use, and wear of the surface. Provide a recommended testing interval, or as recommended by a performance validation testing agency. The performance validation testing and reporting shall be conducted in accordance with standards Australia AS 4663.

C. Instruct owner/operator that when the surface no longer meets the original friction classification, the owner shall restore the finish to meet the original specified slip resistance requirements.

END OF SECTION 131118

SECTION 131120 - POOL PIPE AND PIPE FITTINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED DOCUMENTS

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

1.3 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 D1784 - Standard Specification For Rigid Poly(Vinyl Chloride) (PVC) Compounds And Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
   5. ASTM F439 - Standard Specification For Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedules 80
   6. ASTM F441 - Standard Specification For Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
   7. ASTM F493 - Standard Specification For Solvent Cements For Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe And Fittings
   8. ASTM D2466 – PVC Plastic Pipe Fittings, Schedule 40, Injection Molded, Sizes Through 12”, NSF Listed. As manufactured by Spears Manufacturing Company, “or approved equal”.
   9. 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”.
   10. ASTM D2855 - Standard Practice For The Two-Step (Primer And Solvent Cement) Method Of Joining Poly (Vinyl Chloride) (PVC) Or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe And Piping Components With Tapered Sockets
   11. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
   12. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   13. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (Modified Proctor Maximum Dry Density)
   14. 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”.
   15. ASTM B88 – Seamless Copper Water Tube
   16. Eslon Engineering Manual for Plastic Piping Systems
   17. ASTM D2563 – Fabricated, Fiberglass Wrapped PVC Pipe Fittings 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”

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

1.4 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.
1) 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.
2) 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 watertight at all joints.
3) Leaks shall be repaired and tested repeatedly until leakage or infiltration is approved.
b. Provide documented records of all pipe pressure tests to the Architect/Engineer before covering with concrete. Records must identify each pipe description, recorded pressure readings, test date/time, and test durations.

1.5 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 shutdown and/or pool winterizing.

1.6 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

PART 2 - PRODUCTS

2.1 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.

2.2 PVC & CPVC PIPE & FITTINGS

A. Refer to Section 1.03 for applicable standards/requirements.

B. Refer to pipe schedule(s) on drawings for size and type.

C. PVC Pipe: All PVC Schedule 40 and schedule 80 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 consistently meeting and/or exceeding the quality assurance test requirements of these standards. The pipe shall be provided with plain ends in 20-foot cut lengths. All PVC pipe shall be certified by NSF International for potable water applications and marked accordingly.

D. PVC Sch40 Fittings: All PVC Schedule 40 white fittings shall be manufactured from PVC Type I cell classification 12454. All fittings of 12" diameter or less shall conform to ASTM D1784 for injection molded PVC Schedule 40 white fittings. All fittings greater than 12" diameter may be either injection molded or fabricated fittings produced in accordance with "Spears General Specification for Standard Fabricated Fittings (FAB-7-702)". All fittings shall be certified for potable water service by NSF International and manufactured in strict compliance to ASTM D2466.

E. PVC Sch80 Fittings: All PVC Schedule 80 fittings shall be manufactured from PVC Type I, cell classification 12454. All fittings of 12" diameter or less shall conform to ASTM Standard D1784 for injection molded PVC Schedule 80 fittings. All fittings greater than 12" diameter may be either injection molded or fabricated fittings produced in accordance with "Spears General Specification for Standard Fabricated Fittings (FAB-7-702)". All fittings shall be Certified for potable water service by NSF International manufactured in strict compliance to ASTM D 2467.

F. CPVC Pipe: All CPVC Schedule 80 pipe shall be manufactured from a Type IV, Grade I Chlorinated Polyvinyl Chloride (CPVC) compound with a Cell Classification of 23447 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM F441, consistently meeting the quality assurance test requirements of this standard. All pipe shall be provided with plain ends in 20 foot cut lengths. CPVC Pipe shall be certified by NSF International for potable water applications and marked accordingly.

G. CPVC Fittings: All CPVC Schedule 80 fittings shall be produced from CPVC materials, cell classification 23447 conforming to ASTM Standard D1784 for injection-molded fittings through 12", and shall be manufactured in compliance to ASTM F439 and Certified by NSF International for use with potable water service. All 14" through 24" fabricated CPVC fittings shall be produced in accordance with "Spears General Specification for Standard Fabricated Fittings (FAB-7-702)".

H. PVC Flanges: All PVC & CPVC flanges shall be designed and manufactured to meet CL150 bolt pattern per ANSI Standard B16.5 and rated for a maximum internal pressure of 150 psi, non-shock at 73°F.

I. Manufacturer:

J. As manufactured by Spears Manufacturing Company, "or approved equal".

2.3 THREAD TAPE

A. Teflon 2

2.4 PVC solvent cement

A. Joining method for PVC pipe and fittings shall be solvent cement welding. All PVC solvent cement shall be suitable for all class and pipe schedules that are to be utilized.

B. PVC solvent cement shall conform to ASTM D2564, shall have DWV, SW and U.P. Code listings and be certified by NSF International for potable water use.

C. PVC solvent cement shall conform to Low VOC emission requirements in accordance with SCAQMD Rule 1168/316A. PVC cement shall be certified by Underwriters Laboratories (UL) to UL 2818 GREENGUARD GOLD for low chemical emissions.

D. All PVC solvent cement shall be provided in a clear or gray color and have a three (3) year shelf life.

2.5 CPVC solvent cement

A. Joining method for CPVC pipe and fittings shall be solvent cement welding. All CPVC solvent cement shall be suitable for all class and pipe schedules that are to be utilized.

B. CPVC Solvent cement shall be manufactured in accordance with ASTM F493 and certified by NSF International for potable water applications.

2.6 WALL SLEEVES

A. Pipes penetrating all watertight 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”.

2.7 NON-SHRINK GROUT

A. Upcon High Flow, The Upco Company, Cleveland, Ohio; Masterflow 713, The Master Builder Company, Cleveland, Ohio; Duragrout, L & M Construction Chemicals, Inc., Omaha, Nebraska.

2.8 PIPE SIGNAGE

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

PART 3 - EXECUTION

3.1 PIPE INSTALLATION

A. Pool Pipe Trench Excavation
   1. General:
      a. Excavation for all pool systems and related piping shall comply with the following:
         1) Division 31 Earthwork Specifications for buried utilities.
         2) Project Geotechnical Report requirements for pipe trench preparation, backfilling, and engineered fill.
         3) 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 in 6-inch maximum loose lifts to a 12-inch minimum depth of cover above the pipe. Using small handheld or walk behind vibratory plate tampers, compact the initial backfill zone to a level no higher than ¾ of the pipe diameter, taking care not to contact the pipe/s. Do not compact the initial backfill layer directly 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 unless approved by Engineer and Client and meeting special transition fittings within these specifications.
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.
5. 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.
6. All gutter lines shall drain by gravity to the surge tank.
7. All above grade outdoor piping shall be painted, in accordance with the manufacturer's recommendations, to protect against ultraviolet degradation.

D. PVC/CPVC Pipe & Fittings Installation
1. General: All PVC pipe connections shall be flanged or solvent welded. PVC welding is not allowed without prior approval of the Architect/Engineer. Refer to ASTM D 2855, Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings for the basic techniques and requirements for making solvent cement pipe joints. Make adjustments as required to the methods and tools used according to size of piping. Consistent, quality joints in PVC and CPVC piping products requires the following:
   a. The joining surfaces of pipe and fitting must be softened and made semi-fluid.
   b. Sufficient cement must be applied to fill the gap between pipe and fitting.
   c. Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.

2. Cutting the Pipe: Cut all pipe to a square face using mechanical cutting tools designed for plastic pipe. To ensure that the pipe is cut square, use a miter box when cutting with a saw. Do not damage pipe during cutting process. If damage or cracking is evident, cut off at least 2" of the pipe beyond any visible crack.
3. Deburring & Beveling: Remove all burrs and filings from the outside and the inside of the pipe using a suitable deburring/chamfering tool. Chamfer the outside end of the pipe to ease entry of the tube into the socket and minimize the chance of cement being wiped off the fitting.
4. Threaded joints: Threaded joints may be required to some equipment or special fittings. When required, 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.
5. Solvent Cementing Assembly: Solvent welding 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.
        1) 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.
        2) Use the applicable cement for the size of pipe and fittings being installed.
        3) Provide adequate crew size to properly handle and fit pipe installations.
        4) 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.
        5) 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.
    a. Follow manufacturer’s recommendations for specific product/application set time and cure time requirements. 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.
    b. Make provisions for expansion and contraction by way of swing joints or snaking.
    c. Protect plastic pipe from exposure to aromatic hydrocarbons, halogenated hydrocarbons, and most of esters and keytones that attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.

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.

3.2 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.

3.3 PRESSURE TESTING

A. Pressure test all piping in accordance with Part 1.04B. requirements.

B. Submit pressure test records to Engineer/Architect in accordance with Part 1.04B. requirements.

END OF SECTION 131120

SECTION 131123 - POOL PIPE SUPPORTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe Hangers & Supports.

1.2 RELATED DOCUMENTS

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

1.3 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.

1.4 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.5 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

PART 2 - PRODUCTS

2.1 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.
8. Exposed/cut Ends: All galvanized channel supports or other metallic pipe support hardware that is cut shall be field treated to cold galvanize over all exposed/compromised areas with a 95% zinc rich paint to a 1.0 to 3.0 mil thickness.

B. Locations
1. In the Pool/Waterpark/Natatorium Room: All piping supports, connections and support hardware shall be type 304 stainless steel or better grade, ASTM A240.
2. Inside Surge/Collector Tanks & Gutters: All piping supports, connections and support hardware shall be type 304 stainless steel or better grade, ASTM A240.
3. In the Pool Mechanical Room: All piping supports, connections and support hardware shall be hot-dipped galvanized, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
4. Pump Support Pads: All pump equipment pad support channels and anchor hardware shall be type 304 stainless steel or better grade, ASTM A240.
5. Pool Chemical Rooms: All piping supports, connections and support hardware shall be fiberglass or type 304 stainless steel or better grade, ASTM A240.
6. Exterior Locations: All piping supports, connections and support hardware installed outside and exposed shall be hot-dipped galvanized, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.

PART 3 - EXECUTION

3.1 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. Exposed/cut Ends: All galvanized channel supports or other metallic pipe support hardware that is cut shall be field treated to cold galvanize over all exposed/compromised areas with a 95% zinc rich paint to a 1.0 to 3.0 mil thickness.

F. Comply with manufacturer's written instructions.

END OF SECTION 131123

SECTION 131124 - POOL VALVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Butterfly Valves

B. Ball Valves

C. Check Valves

D. Expansion Joint/Flexible Connector

E. Submerged Service Operators

F. Valve Operator Extension

G. Drainage Valves

H. Reducers

1.2 RELATED DOCUMENTS

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

1.3 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

1.4 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.

1.5 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

1.7 WARRANTIES

A. Standard Manufacturer's Warranty

PART 2 - PRODUCTS

2.1 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.

2.2 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, Dominion, Asahi/America, 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.

2.3 BALL VALVES

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

2.4 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.

2.5 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.

2.6 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.

2.7 VALVE OPERATOR EXTENSION

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

2.8 DRAINAGE VALVES

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

2.9 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.

2.10 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 labeled in accordance with the valve chart per Section 13 11 14.

PART 3 - EXECUTION

3.1 VALVE CONNECTIONS

A. Provide valves suitable for connection to adjoining piping.

B. Valve size shall be the same as the pipe size.

3.2 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

3.3 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 131124

SECTION 131125 - POOL CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pumps
   1. Flooded Suction

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

1.2 RELATED DOCUMENTS

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

1.3 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

1.4 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.

1.5 QUALITY ASSURANCE

A. To ensure a properly integrated and compatible system, the Equipment Manufacturer shall assume full responsibility for the warranty and proper operation of the pumps, pump motors, and/or accessory equipment within this Specification.

B. Acceptable Products and Manufacturer: ASC Pumping Equipment Inc. (West Bend, WI; Appleton, WI; & Kansas City, MO: https://ascpump.com/) and/or 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.

1.6 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. Pump sub-base and motor riser drawings. Include dimensioned drawings of the stainless steel sub-base and the motor riser support required for each pump installation. Drawings to include plan and section views to scale showing length, width and height dimensions, material specification, and required mounting holes. Coordinate these drawings and the design of these components with the pump supplier to assure a proper and level installation for each pump/motor.
6. 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.

1.7 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.9 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. Flooded Suction Pumps
1. Pump failure of any pump component directly attributable to materials and/or workmanship within one (1) year after substantial completion shall be repaired or replaced by the pump manufacturer at no cost to the Owner.
2. Motor failure of any motor component directly attributable to materials and/or workmanship within three (3) years after substantial completion shall be repaired or replaced by the pump manufacturer at no cost to the Owner.

PART 2 - PRODUCTS

2.1 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. Flooded Suction Pumps
a. Pump internal materials shall be as follows:
1) Casing – Ductile Iron (ASTM A536)
2) Impeller – 316 Stainless Steel
3) Shaft – 316 Stainless Steel
4) Shaft Sleeve – 316 Stainless Steel
b. Coating: All internal cast iron wetted parts shall be sandblasted and coated per the coating manufacturer's recommendations with Scotchkote 134 or equal product.
c. Casing
1) The casing will be of the end suction design with tangential discharge outlet. For suction piping diameters of 2" or greater, the suction and discharge shall be bolt through flanged connections. Flange connections shall be ANSI 125# rated with NPT gauge tapings.
2) The casing shall have tapped and plugged holes for priming and draining. The casing bore shall be large enough to allow "back pullout" of the impeller without disturbing the casing or suction and discharge piping. The casing shall be supported by casing feet to avoid pipe strain.
d. Impeller: The impeller shall be of the enclosed type, vacuum cast in one piece. It shall be finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings and irregularities. The impeller shall be dynamically balanced. The impeller will be keyed to the shaft, and fastened with 316 stainless steel washers, gasket and cap screw.
e. Mechanical Seal: Shaft sealing shall be accomplished by means of a John Crane Type 21 or equal mechanical seal with solid silicone carbide face/primary ring; solid silicone carbide seat/mating ring; 316 stainless drive band, retainer and spring; and Buna-N elastomers.
f. Shaft: The impeller shall be direct coupled to the 316SS motor shaft. The motor shaft shall be machined to provide a key way and drilled and tapped to accept the impeller fastener. Stub shafts are not acceptable.
g. Shaft Sleeve: The pump shaft shall be fitted with a 316SS shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an 0-ring and shall be positively driven by a pin to the key way. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.
h. Pump / motor must mount on the same plane and preserve back-pull-out design. 304SS MOTORIZER shall be supplied when pump mounting feet and motor feet do not align.

i. Pump nameplate shall be engraved via computer on 316SS data plate.
j. Pump support:
   1) Concrete Pump Pad: Install a reinforced cast in place concrete pump pad for leveling purposes and to assure the motor is raised above the equipment room floor.
   2) Sub-base: Provide a 316SS sub-base beneath the pump and connected to the concrete pump pad to assure a level installation and support for the pump and motor.
   3) Motor Riser: Provide a 316SS motor riser connected to the sub-base to assure a level installation and support for the pump motor. The motor riser shall be mechanically connected to the pump sub-base support to allow removal of motor and pump impellor without removal of pump sub-base support or pump piping.
   4) Manufacturer: Pump sub-base and motor riser supports fabricated/manufactured by ASC Pumping Equipment Inc.
k. Motor
   1) The motor shall be a NEMA-JM configuration motor meeting current NEMA and IE3 Premium Efficiency standards and shall be totally enclosed fan cooled (TEFC). NEMA –JP configurations shall only be used on large pumps (Aurora 6x8x13.5 & 8x10x13.5) only.
   2) The motor shall have a service factor of a least 1.15. The service factor is reserved for variations in voltage and frequency.
   3) Motor must be rated for use with a Variable Frequency Drive and meet the NEMA MG1 Standard, Part 30.
   4) Motors shall have 316SS shaft
   5) Motors must achieve 15:1 constant torque turndown.
   6) Motors shall come equipped with internal shaft grounding brush.
   7) Motors Frames 326 and below shall have removable feet to achieve F1, F2, & F3 field convertible conduit box position.
   8) Motor Conduit box shall have NPT threaded entry
   9) 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.
   10) Electrical requirements including phase, frequency, and voltage are indicated on the Drawings.

2.2 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

3.1 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. Secure the pump and motor as recommended by the manufacturer using mechanical connections provided on the pump and motor feet. See the Pool (PL) Drawings for additional pump installation details and requirements, including concrete pump pad, sub-base, and motor riser supports. The sub-base and motor riser supports are critical for proper vertical alignment and to allow removal of motor and pump impellor without removal of pump sub-base support or pump piping. Installations of the Aurora 3801 Series end suction pump without the sub-base, and motor riser supports will not be accepted.

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.

3.2 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.

3.3 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 - 131125

SECTION 131134 - POOL VERTICAL FIBERGLASS FILTERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pool Vertical Fiberglass Filters

1.2 RELATED DOCUMENTS

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

1.3 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)

1.4 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.

1.5 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.

1.6 CERTIFICATIONS

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

1.7 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.

1.8 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.

1.9 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

2.1 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.

2.2 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:

#20 SILICA SAND

Effective size: 0.45 mm (0.018 in.)

Uniformity coefficient: 1.5

Mean diameter: 0.616 mm (0.0243 in.)

Standard deviation: 0.110 mm (0.00432 in.)

Grain Sphericity: GRTR 0.7

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

END OF SECTION 131134

SECTION 131137 - POOL CHEMICAL SYSTEMS AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Chemical Controller with the following sensors:
   1. pH Sensor
   2. ORP Sensor
   3. Temperature Sensor
   4. Flow Sensor

1.2 RELATED DOCUMENTS

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

1.3 QUALITY ASSURANCE

A. The controller shall carry the following product certifications:
   1. NSF Standard 50
   2. UL 61010-1

1.4 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submittals required: For each type of manufactured material and product indicated. Provide Submittals indicating equipment provided, dimensions, material specifications, wiring diagrams and all accessory components including sensors.

1.5 SUBSTITUTIONS

A. Refer to General Conditions, Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Conditions, Division 01.

1.7 WARRANTIES

A. Controller shall be covered by manufacturer’s 5-year warranty.

B. ORP and pH sensors shall be covered by manufacturer’s 2-year warranty.

C. Other sensors and flow cell components shall be covered by manufacturer’s 1-year warranty.

D. Chemical feed pumps shall be covered by manufacturer's 2-year warranty.

E. A factory trained/authorized representative shall provide training to the owner. The control system shall be provided with on-site start-up, on-site operator training, and 1-year on-site warranty service performed by a representative trained and authorized by the controller manufacturer.

PART 2 - PRODUCTS

2.1 All products listed as basis of design are acceptable, as are approved equivalents by project manager.

2.2 CHEMICAL CONTROLLER

A. The water chemistry control system shall provide continuous monitoring and control of the water chemistry and related disinfection equipment.
   1. The controller shall continuously monitor and control pH. Chemical feed shall be configurable for manual, automatic, proportional, and on/off modes.
   2. The controller shall continuously monitor and control sanitizer based upon the ORP reading, the free chlorine sensor, or both. Chemical feed shall be configurable for either on/off or time-based proportional feed.
   3. The controller shall have a programmable superchlorination function, based upon ORP or ppm superchlorination setpoint, which is triggered manually.
   4. The controller shall have a programmable dechlorination function, based upon ORP or ppm dechlor setpoint, which is triggered either manually or by the completion of the superchlorination function.
   5. The controller shall compute the Langelier Saturation Index and the Ryznar Saturation Index based upon sensor data and/or manual entered by the operator.
   6. The controller shall continuously monitor, display, and datalog system flow, maintaining a total flow volume. A Low Flow Alarm shall be operator settable, which can be programmed to disable chemical feeds.
   7. The controller shall also have a Minimum Flow Rate setting to turn off heater whenever system flow is less than this programmed minimum level. The controller shall also manage the heater on/off status based on real-time water temperature reading.

B. The standard display shall be a backlit transflective LCD that will continuously display information related to the following:
   1. All installed sensor readings
   2. Set points, with current control status
   3. All active alarms, including time activated

C. The flow sensor shall be used to prove flow to the chemical controller to prevent dosing of chemicals during a system low flow/no flow condition.

D. The controller shall automatically abort a Manual or Scheduled Turndown upon declining water chemistry and return to the standard programmed circulation rate to maintain optimal water quality. Declining water chemistry is signaled by any of the alarm conditions.

E. The controller shall signal all alarm conditions with the following indicators:
   1. A bright flashing LED on the front of the controller.
   2. Each active alarm listed on the LCD display along with time activated.
   3. Email and text alarm notifications.

F. The controller inputs are as follows:
   1. The controller shall have inputs available for pH, ORP, Temperature, free chlorine, and flow sensors.
   2. The controller shall come with a minimum of (3) fully assignable digital inputs available for items other than those listed above.

G. The controller outputs are as follows:
   1. The controller shall have integral line or dry contact 5A solid-state relay outputs capable of switching 3A under all normal operating conditions available for Acid or Co2 feed and sanitizer feed pumps.
   2. The controller shall come with a minimum of (2) fully assignable integral line or dry contact 5A solid-state relay outputs capable of switching 3A under all normal operating conditions available for items other than those listed above.
   3. All relays must account for the effects of the temperature gradient inside the IP66 or NEMA 4X enclosure. Systems that utilize relays that are not de-rated must submit an engineering evaluation justifying the use of relays at their full, optimal-condition capacity. All solid-state relays shall have a provision for an electrical interlock with the circulation pump motor starter.
   4. The controller shall come with a minimum of (8) separately isolated 4-20mA output signals.
   5. The controller shall be capable of expanded capabilities with optional expansion package.

H. Required controller safety features:
   1. The controller shall have built-in limits to the amount of time any relay control output may be forced on (i.e. in “Manual On” mode).
   2. The controller shall have programmable high and low alarm settings for pH, ORP, temperature, low flow & no flow. The controller shall have a programmable lockout of sanitizer feed upon pH high or low alarm.
   3. The controller shall activate a No Flow alarm when the dedicated sample stream flow switch indicates there is insufficient flow through the sample stream. This No Flow alarm shall lockout all chemical feed control operations.
   4. The controller shall have a dedicated Emergency Off button on the front panel of the system, which immediately halts all chemical feeds and control outputs when pressed. This feature shall require entry of a security access code.

I. Required controller remote communication and access features:
   1. The controller shall have the ability to allow field upgrades and updates and programming as needed. Controller must be capable of being accessed via remote communication.
   2. The controller shall have a means to preserve data logs during power outages, for input level recording and events. All input levels shall be recorded and maintained for 365 days on the controller, with a sample taken every minute. The controller shall record and maintain the events over the last 365 days recording all alarms, parameter changes, user logins, and operational cycles related to all control features.
   3. The controller shall also support the following types of connection to 3rd party applications such as EMS, BMS, BAC and SCADA systems:
      a. 1) MODBUS TCP/IP
      b. MS/TP (RS485)
      c. TCP/IP (Ethernet) BACnet connection
      d. The connection shall support access to Inputs (current readings), System Information, Set Points, Alarm Points, Control Status and Alarms. Set Points and Alarm Points shall be modifiable from the 3rd party application via the selected interface.
   4. The controller shall come with an integral Wi-Fi module.
   5. The controller shall be Windows 10 compatible or include the necessary software and apps to allow for the real-time monitor/ of the following via personal computer, smartphone, or tablet device:
      a. Auto-Polling – to allow automatic download of data logs.
      b. Graphical Operator’s Console – to display current readings, setpoints, alarm points and control status mode.
      c. Data Logging
      d. Email and text alarms notifications.
   6. The controller shall require security access codes.

J. The controller shall be housed in an IP66 or NEMA 4X polycarbonate enclosure. All high-voltage wiring shall be performed in a separate IP66 OR NEMA 4X enclosure that precludes access to the controller electronics.

2.3 pH SENSOR

A. The controller shall provide a measurement of pH by utilizing a sensor with the following characteristics:
   1. 2 – 12 sensing range
   2. operating temperature range of 32-140 °F (0-60°C)
   3. operating pressure range of 0 - 60 psi (0 TO 4.1 bar)
      a. The controller shall continuously monitor, display and data log pH with minimum 0.1 resolution.

2.4 ORP SENSOR

A. The controller shall provide a measurement of ORP by utilizing a sensor with the following characteristics:
   1. 0 to 999 mV sensing range;
   2. operating temperature range of 32- 140° F (0-60°C)
   3. operating pressure range of 0- 60 psi (0 TO 4.1bar)
      a. The controller shall continuously monitor, display and data log ORP with minimum 6mV resolution.

2.5 TEMPERATURE SENSOR

A. The controller shall provide a measurement of water temperature by utilizing a sensor with the following characteristics:
   1. 32 – 212°F (0 – 100°C) sensing range
   2. Operating temperature range of 32 – 212°F (0 – 100°C)
   3. Operating pressure range of 0-145 psi (0-10 bar)
      a. The controller shall continuously monitor, display and data log temperature with 5/9 °C (1°F) resolution.

2.6 CIRCULATION FLOW SENSOR

A. The controller shall provide a measurement of pool circulation flow rate and volume by utilizing a flow sensor with the following characteristics:
   1. Paddle wheel flow sensor
   2. O-ring seal
      a. The controller shall continuously monitor, display and data log flow rate with 0.45 lpm (0.1 gpm) resolution.

PART 3 - EXECUTION

3.1 CHEMICAL CONTROLLER INSTALLATION

A. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the owner. The control system shall be provided with on-site start-up, on-site operator training, and 1-year on-site warranty service performed by a representative trained and authorized by the controller manufacturer.

B. Provide coordination and instructional training of the chemical controller's remote use functions and alarms with Owner's designated staff and information technology personnel.

C. Calibration of chemical controller shall be executed only after the monitored pool temperature has been established to within 4 degrees of the design temp, or as required by the manufacturer's installation instructions, if more stringent.

3.2 CHEMICAL STORAGE INSTALLATION

A. Tank shall be hydrostatically tested at time of installation.

3.3 MANUALS

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

END OF SECTION 131137

SECTION 131140 - POOL HEATING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gas-fired Pool Heaters

1.2 RELATED DOCUMENTS

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

1.3 DESCRIPTION OF WORK

A. Heating system for swimming pool. Coordinate all venting, interlocking and control wiring for pool heaters with HVAC Contractor.

1.4 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

1.5 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

1.7 WARRANTIES

A. Standard Manufacturer’s Warranty

PART 2 - PRODUCTS

2.1 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.

2.2 THERMOMETERS

A. Thermometers shall have an adjustable angle and separable 304 stainless steel 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 Celsius 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

3.1 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.

END OF SECTION 131140

SECTION 131142 - PERIMETER OVERFLOW GUTTER GRATING

PART 1 - GENERAL

A. A perimeter overflow gutter system consisting of a continuous grating covered overflow channel as shown in documents shall be installed. The gutter shall be level throughout.

1.2 SECTION INCLUDES

A. PVC Parallel grating

B. PVC Perpendicular grating

C. Polymer / High Density Polyethylene (HDPE) Grating

1.3 RELATED DOCUMENTS

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

B. Division 13 11 Pool specifications apply to this section

C. Division 13 11 18 Pool Concrete

D. Division 13 11 43 Pool Stainless Steel Gutter

1.4 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
3. NSF – National Sanitation Foundation Standard 50
4. MAHC – Model Aquatic Health Code

1.5 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submit Shop Drawings, clearly indicating make, model, type, and size of grating

C. Submit 4” x 4” samples of each of MFG. standard colors

1.6 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to General Requirements and Division 01.

1.8 WARRANTY

A. Manufacturer's Ten-Year Warranty, prorated after one year.

B. Grating installation shall be completed in accordance with all manufacturer's requirements for warranty coverage.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide perimeter overflow gutter grating type as identified and detailed in the drawings.

B. Perimeter overflow gutter grating shall be provided from a single manufacturer.

C. Materials shall meet product requirements within these specifications.

2.2 PARALLEL OVERFLOW GUTTER GRATING - PVC

A. The grating surface bars shall run parallel to the pool wall.

B. The grating shall be formed from molded, modular, interlocking, UV-stabilized PVC bars. The top surface of the grating bars shall be raised, water-shedding, slip-resistant and shall meet the IBC Classification C for Wet-Barefoot inclining platform (ramp) test for swimming pool surroundings.

C. Grating bars shall be a minimum of 15/32" (12mm) wide and an outside depth of 1.0" (25.4mm) with a middle depth that varies, dependent on grating width and load strength requirements.

D. Grating design shall meet ASTM D790-10 or ANSI/AS3996 Class A for covers and grates with load exceeding 10kN (2,248lb).

E. The grating shall provide at least 37.5% open area per foot for unrestricted water flow. The space between the bars shall not exceed 3/8" (9.5mm) and shall comply with IBC child finger/toe entrapment guidelines.

F. Grating width shall allow the insertion of the touchpad holding brackets between the grating and the gutter lip.

G. All inside and outside corners and custom radii sections under 3-feet inside diameter (short radius section) shall be custom fabricated and strengthened by the manufacturer.

H. Fasteners shall be SS-316, provided by the manufacturer, and installed per manufacturer instructions and as shown on drawings.

I. Colors selected by the Architect/Owner from manufacturer's standard colors.

J. Acceptable manufacturers:
   1. Daldorado LLC
   2. Lawson Aquatics

2.3 PERPENDICULAR OVERFLOW GUTTER GRATING - PVC

A. The grating surface bars shall run perpendicular to the pool wall.

B. The grating shall be formed from molded, modular, interlocking, UV-stabilized PVC bars. The top surface of the grating bars shall be raised, water-shedding, slip-resistant and shall meet the IBC Classification C for Wet-Barefoot inclining platform (ramp) test for swimming pool surroundings.

C. Grating shall be a minimum of 15/32” (12mm) wide and an outside depth of 1.0” (25.4mm) with a middle depth that varies, dependent on grating width and load strength requirements.

D. Grating design shall meet ASTM D790-10 or ANSI/AS3996 Class A for covers and grates with load exceeding 10kN (2,248lb).

E. The grating shall provide at least 37.5% open area per foot for unrestricted water flow. The space between the bars shall not exceed 3/8” (9.5mm) and shall comply with IBC child finger/toe entrapment guidelines.

F. Grating width shall allow the insertion of the touchpad holding brackets between the grating and the gutter lip.

G. All inside and outside corners and custom radii sections under 3-feet inside diameter (short radius section) shall be custom fabricated and strengthened by the manufacturer.

H. Fasteners shall be SS-316, provided by the manufacturer, and installed per manufacturer instructions and as shown on drawings.

I. Colors selected by the Architect/Owner from manufacturer’s standard colors.

J. Acceptable manufacturers:
1. Daldorado LLC
2. Lawson Aquatics
3. RenoSys

2.4 POLYMER / HDPE OVERFLOW GUTTER GRATING

A. The grating shall be machined from a marine grade polymer or High Density Polyethylene (HDPE) sheets using 1” thick, UV- stabilized material. Material must meet or exceed ASTM D696 for Coefficient of Linear Expansion of material.

B. The top surface of the grating shall be raised, water-shedding, slip-resistant and shall meet ASTM D2047 slip resistance (wet) with a nominal value of 0.62.

C. Grating design shall meet ASTM D790-10 or ANSI/AS3996 Class A for covers and grates with load exceeding 10kN (2,248lb).

D. The grating shall include machined slots providing at least 37.5% open area per foot for unrestricted water flow. The openings shall not exceed 3/8” (9.5mm) and shall comply with IBC child finger/toe entrapment guidelines. Direction of slots may be parallel and/or perpendicular to the pool wall as indicated in drawings.

E. Grating width shall allow the insertion of the touchpad holding brackets between the grating and the gutter lip.

F. All inside and outside corners and custom radii sections under 3-feet inside diameter (short radius section) shall be custom fabricated and strengthened by the manufacturer.

G. Fasteners shall be SS-316, provided by the manufacturer, and installed per manufacturer instructions and as shown on drawings.

H. Colors selected by the Architect/Owner from manufacturer's standard colors.

I. Acceptable manufacturers:
   1. Paddock Pool Equipment Company
   2. RenoSys
   3. Natare Corporation

PART 3 - EXECUTION

3.1 GENERAL

A. Inspect project conditions prior to installation. Concrete support ledge must meet the grating manufacturer's minimum width requirements. Concrete surface shall be clean and level to allow a level grating installation. Report conditions detrimental to grating installation in writing to Architect prior to initiating installation.

B. Install grating per manufacturer's instructions. Include manufacturer's PVC grating accessories (PVC curb angle, supports, hand-holds, fasteners and other accessories) as required by project conditions and/or as detailed in drawings.

C. Installation shall not allow water flow beneath the grating and into the gutter trench. Follow manufacturer's installation methods and use manufacturer's approved sealant as required between grating and pool wall surface on the front skimming edge to assure water uniformly skims over the top skimming edge.

D. Provide templates for corners or other conditions for shop fabrication to the manufacturer, per manufacturer's requirements. Field fabrication of corners and short radius sections is not permitted.

E. Gap width between individual grating sections shall not exceed the specified machined opening width or width between bars. Gap width between grating and other surfaces shall not exceed 5/16" (8mm).

F. The skimming edge elevation at the face of the pool wall shall be within 1/8" +/- of the pool static water elevation and must provide continuous skimming around the entire pool perimeter.

G. Install manufacturer's fasteners to anchor grating. Space fasteners as indicated in drawings. Locate fasteners more frequently if required by code or manufacturer requirements.

H. Protect grating from damage and concrete splatter. Clean grating of all dirt, debris, concrete splatter, and staining per manufacturer's instructions. Replace grating that becomes permanently marked, damaged, or stained during the construction process.

END OF SECTION 131142

SECTION 131145 - POOL RAIL GOODS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rail Goods
   1. Hand rails
   2. Grab rails
   3. Ladders
   4. Wave Pool Ladders
   5. Therapy Rails
   6. Stanchions

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

1.2 RELATED DOCUMENTS

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

1.3 REFERENCES

1.4 DESCRIPTION OF WORK

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

1.5 QUALITY ASSURANCE

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

1.6 SUBMITTALS

A. Refer to General Requirements and Division 01.

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

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.

1.7 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.9 WARRANTIES

A. Pool Equipment
1. Manufacturer's Standard Warranty

PART 2 - PRODUCTS

2.1 GENERAL

A. All rails and ladder components and anchors shall be designed to meet or exceed the structural loads required by IBC Chapter 16 or local code, whichever is greater.

B. All rails and ladder dimensions shall be in accordance with the current edition of the applicable State and local code/s.

C. 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.

D. 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

2.2 MATERIALS OF CONSTRUCTION

A. Hand Rails, Grab 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) 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. Ladders, Wave Pool Ladders
1. All rail products specified in this section shall be 316L stainless steel.
2. All rail goods with a grip surface shall be 1.90” 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.
6. Ladder frames shall be fabricated with smooth, wrinkle-free bends.
7. All steps shall have raised non-skid rubber insert treads. The width of the steps is as follows:
   a. Ladders 5”
8. Ends of all steps shall be curved to fit the OD of the ladder frames.
9. The bolts for attaching the ladder steps shall have smooth, rounded heads and the underside of the head shall be curved to fit the OD of the tubing.
10. Cross-braces shall be notched and welded to the ladder frames.
11. Joints shall be cleaned and blended to match the finish of the pipe.
12. Ladder connections at lower ends shall be as shown on drawings.
13. See details on drawing for additional information and dimensions.

C. Therapy Rails
1. All rail products specified in this section shall be 316L stainless steel.
2. Shall be 1.90” OD, 0.065” wall thickness
3. The surface of the therapy rails 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. Supply with return ends.

D. 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 4’-6” or 8’-0” tall and provided with a 2” ring on the top surface and a 2” ring on sliding collar.

E. 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.

F. 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

3.1 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 goods 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 131145

SECTION 131146 - POOL EQUIPMENT

PART 1 - GENERAL

1.1 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.

1.2 RELATED DOCUMENTS

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

1.3 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.

1.4 DESCRIPTION OF WORK

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

1.5 QUALITY ASSURANCE

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

1.6 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:
         1) Location
         2) Flow rates

3) 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.

1.7 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Refer to General Requirements and Division 01.

1.9 WARRANTIES

A. Pool Equipment
1. Manufacturer's Standard Warranty

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

PART 2 - PRODUCTS

2.1 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

3.1 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 131146

SECTION 131160 - POOL QUARTZ AGGREGATE FINISH

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Includes but is not limited to the complete installation of a quartz aggregate finish as designated in the plans and specifications within strict accordance to manufacturer instructions and listed references.

1.2 RELATED DOCUMENTS

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

1.3 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 Plasterer's Council "Pool Plaster Technology", Phone # 866-483-4672, www.mpconline.org
   2. National Spa and Pool Institute "Start Up Do's and Don'ts for Newly Plastered Swimming Pools; Why You Should Use Plaster in Your Swimming Pool; Care Tips for New Swimming Pool Plaster and Technical Manual", Phone # 703-838-0083.

1.4 QUALITY ASSURANCE

A. The installer shall provide documentation providing a minimum of five (5) successful installations of similar scope and complexity with current contact information and phone number.

B. The installer shall be a member of the National Plasterer's Council in good standing.

C. The installer shall provide documentation/certification that the laborer's performing the work on site have been factory trained by the pool finish manufacturer.

D. The installer shall provide a letter of reference from the pool finish manufacturer indicating installer is a manufacturer certified applicator.

E. The installer shall have the right to reject the concrete surface if it does not meet the manufacturers requirements for a suitable subgrade. Installation of the pool finish indicates acceptance of surface by the applicator with regards to future warranty claims.

1.5 SUBMITTALS

A. Refer to General Requirements and Division 01.

B. Submit product literature and sample colors for Quartz Aggregate Finish and manufacturer approved bond coat forty (40) days prior to use. Quartz Aggregate material shall be listed in the material submitted.

C. Submit all documents required above for experience and qualification.

D. Provide three (3) 3'x3' onsite mock-ups of varying grades of coarseness for Owner's approval. The pool contractor is responsible to coordinate approval of mock ups prior to the quartz aggregate pool finish installation.

1.6 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.7 DELIVERY, STORAGE, AND HANDLING

A. If material is stored, it must be in a cool, dry area, protected from the elements.

1.8 WARRANTIES

A. It shall be noted that the pools may be subject to be drained for prolonged periods of time for normal maintenance and cleaning.

B. Provide Manufacturer's Product Warranty on the Quartz Aggregate Pool Finish Product. The pool finish manufacturer shall acknowledge that the pool(s) are subject to be drained completely for winterization and periods during normal maintenance and shall guarantee the pool finish for five (5) years covering any defects caused by product failure.

C. Provide Special Project Application Warranty on the Quartz Aggregate Finish Application. The pool finish installer shall acknowledge that the pool(s) are subject to be drained completely for winterization and periods during normal maintenance and shall guarantee the pool finish application for two (2) years covering any defects caused by the application of the product not limited to: abnormal cracks (other than closed shrinkage cracks that may appear), discoloration, hollow spots and de-lamination.

D. Special Project Warranty on Concrete Structure and Special Aggregate Finish: The Pool Contractor shall guarantee for two (2) years repair of the special aggregate finish covering any defects, cracks and/or leaking in the pool shell.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS

A. Sun Stone by:

B. CLI Industries, Inc.

C. P.O. Box 593704

D. Orlando, FL 32859,

E. (407) 851-2660.

F. www.clindustries.com

G. Approved Equal

2.2 INSPECTION/MEETINGS AND PREPARATION

A. Schedule a pool finish pre-installation conference before applying the pool finish.
   1. Attendees: Manufacturer's representative, Pool Finish Installer, Contractor and its superintendent and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the work.
   2. Agenda: Review the manufacturer's application instructions and discuss items of significance that could affect progress and installation, including but not limited to the following:
      a. Construction schedule
      b. Critical work sequencing
      c. Accessibility
      d. Designation of responsible personnel qualified to do the work
      e. Concrete surface preparation requirements
      f. Bond coat curing and application
      g. Pool Finish application and surface preparation
      h. Finishing methods as recommended by the manufacturer to include exposing the aggregate
      i. Verify and discuss proposed work force is adequate to complete the installation as recommended by the manufacturer
      j. Verify pool mechanical and chemical system is prepared for immediate start up after filling the pool
   3. Record significant discussions and agreements and disagreements of the conference, and the approved schedule. Promptly publish and distribute any issues or discrepancies to the Architect/Engineer prior to installing the pool finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. All pool finish work must strictly follow manufacturer installation guidelines, references and recommendations.

B. Environmental conditions must comply with manufacturer's requirements, and finish may not be applied to frozen or frost laden surfaces or when the temperature is 40 degrees F or due to fall to 40 degrees within 24 hours.

C. The filtration and chemical system must be ready for startup and operating immediately after the pool is filled for pool finish curing per manufacture instruction.

D. The pool finish applicator shall coordinate with the pool shell concrete contractor, specific concrete finish requirements for the pool finish application.

E. It is the applicator's responsibility to ensure that the concrete substrate is adequate for proper bonding of pool finish in accordance with manufacturer recommendations.

F. Prepare all pool surfaces to receive the quartz aggregate finish per manufacturer recommendation.

G. A brush or roll on bonding coat produced and approved by the pool finish manufacturer is required to be applied to the entire pool structure where the pool finish is to be applied. The manufacturer's approved bond coat must be installed and cured in accordance with manufacturer instructions prior to applying the quartz aggregate finish. No exceptions. Do not apply any waterproofing agent/s to the concrete substrate. The bond coat shall be placed directly on the concrete substrate.

H. Adding any supplements to the manufacturer's pre-bag mix is strictly prohibited unless manufacturer's approved written documentation is submitted and is pre-approved by the pool Architect/Engineer.

3.2 APPLICATION

A. All pool finish work must strictly follow manufacturer installation guidelines, references and recommendations.

B. Apply the quartz aggregate finish so that it is flush with the pool gutter, tiles and other embedded items as detailed in the plans and specifications.

C. The pool finish must be installed to a thickness and tolerance between 3/8” to 1/2” or as recommended by the manufacturer.

D. Finish quartz aggregate in a workmanlike fashion. Trowel surface smooth. Proceed with application to natural breaks.

E. No hollow areas, discolored or delaminated areas will be acceptable, any and all hollow areas must be chipped out and repaired, patching shall be done in a quality workmen’s like fashion. If hollow spots are detected where individual patching required will reduce the overall aesthetic value, it will be the Architect/Engineers discretion to have an entire area between breaks removed and replaced.

F. All pool floors and horizontal surfaces shall have a slip resistant finish. Slip resistance shall meet Dynamic Coefficient of Friction (DCOF) value of WET:> 0.42. Abrasive resistance shall meet a DCOF value of WET:>0.60.

G. The contractor is responsible for all brushing/cleaning, chemical monitoring and other requirements set forth by the manufacturer installation and curing instructions. This shall not be the responsibility of the owner.

H. The installing contractor shall guaranty the finish to be free of sharp edges and splatter that may cause cuts on swimmers’ feet.

END OF SECTION 131160

SECTION 131161 - POOL CERAMIC TILE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Porcelain Ceramic Pool Tile

1.2 RELATED DOCUMENTS

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

1.3 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.

1.4 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.

1.5 SUBSTITUTIONS

A. Refer to General Requirements and Division 01.

1.6 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.

1.7 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 finish 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 tile, setting materials, adhesives, and grouts are suitable for intended use in submerged, swimming pool environment.

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 at least 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

1.8 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.

1.9 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 in accordance 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: Two (2) years after Substantial Completion, or manufacturer's system warranty, if longer.
   2. Warranty Period: Fifteen (15) years after Substantial Completion, or manufacturer's system warranty, if longer

PART 2 - MATERIALS

2.1 GENERAL

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

B. ANSI 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.

2.2 POOL CERAMIC TILE

A. Indoor Pool Ceramic Tile
   1. Agrob Bucthtal, Dal-Tile - Keystone or equal as scheduled.
      a. Provide impervious tile with water absorption rate of less than .5% per ASTM C373. Sizes, types, and slip resistance as scheduled, see end of this section [PL101].
      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.

2.3 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. Custom Building Products, Huntington Beach, CA.
   2. Laticrete International, Inc., Bethany, CT.
   3. MAPEI Corporation, Deerfield Beach, FL.

2.4 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. Thick Bed Mortar mixed with Patching & Leveling Latex Additive, by Custom Building Products
   2. Laticrete 226 thick bed mortar mixed with Laticrete 3701 Mortar Admix, by Laticrete International.
   3. MAPEI, 4 to 1 Mud Bed Mix mixed with MAPEI, Planicrete AC, by MAPEI Corporation.

2.5 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.

2.6 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. CEG-Lite by Custom Building Products
2. Laticrete SpectraLock Pro Grout by Laticrete International.
3. Kerapoxy CQ by MAPEI Corporation.

2.7 ELASTOMERIC JOINT SEALANT

A. Provide as required by TCNA guidelines, and as indicated on drawings, conforming to ASTM 920 and ASTM C 794

B. Acceptable products:
1. Commercial 100% Silicone Sealant by Custom Building Products
2. Latasil by Laticrete International
3. Mapesil by MAPEI Corporation

2.8 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. RedGard by Custom Building Products
2. Laticrete Hydroban by Laticrete International.
3. Mapelastic AquaDefense by MAPEI Corporation.

2.9 WALL PATCH & RENDER MORTAR

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

B. Acceptable Products:
1. Custom Float Bedding Mortar by Custom Building Products
2. Laticrete 3701 Fortified Mortar Bed by Laticrete International
3. Planitop 330 Fast by MAPEI Corporation.

2.10 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. Aqua Mix Grout Release by Custom Building Products
2. Stonetech Grout Release by Laticrete International.
3. UltraCare Grout Release by MAPEI Corporation.

C. Epoxy Grout Haze Remover.

1. Aqua Mix Non-cement Grout Haze Remover
2. Stontech Epoxy Grout Haze & Coating Stripper by Laticrete International
3. UltraCare Epoxy Grout Haze Remover by MAPEI Corporation

2.11 MIXING MORTAR AND GROUT

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

2.12 EXTRA MATERIALS

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

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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: All Pools

D. Install slurry bond coat.

E. Do not seal substrate unless required by manufacturer.

F. Prime substrate if required by manufacturer.

3.4 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.
7. Tile bond coat coverage: Minimum 95% contact area with tile and substrate.

B. Thin set method
1. Apply mortar or adhesive with notched trowel using scraping motion in single direction 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.
8. Maintain ambient temperature above 50 F and below 100F for 72 hours after installation.

D. Grouting
1. Allow tile to set a minimum of 72 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

C. Allow tile finish to set for 14 days prior to submerging tile.

3.9 TILE SCHEDULE

A. See Tile schedule, following [on PL101], for tile information.

END OF SECTION 131161

SECTION 131413 - SLIDE REFINISH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SLIDES DESCRIPTION

A. Slide A: Open Slide.

1.3 PROJECT SCOPE

A. Scope of Work: Following are the specifications and requirements for the refinishing of a one body slide flume. All bidders will be required to make a detailed on-site inspection to fully understand and document the slide conditions and the resurfacing.
   1. Re-caulk all flume seams.
      a. Remove all caulk from all seams and re-caulk all seams.
   2. Gelcoat slide interiors.
      a. Gel-coat entire interior fiberglass flumes and exterior shoulders and splash extensions and repair minor chips, scratches and blemishes.
   3. Paint exterior fibrous strand matt finish of entire flume exterior.
      a. Provide paint colors per owner color selection.
   4. Refer to General and Supplementary conditions.

1.4 QUALITY ASSURANCE

A. All bidders shall have a minimum of five (5) projects with a proven five (5) year record of competence and experience in the restoration of similar slides of this size and complexity.

B. The contractor shall provide proof of competency and an updated contact list with current information and/or letters of recommendation from past clients of having successfully completed repairs of similar slides for a minimum of 5 slides of similar size and complexity.

C. Performance Criteria: Certain sections of the Specifications contain performance criteria rather than product descriptions. It shall be the obligation of the Contractor to ensure that all criteria are satisfied, and the burden or proof of conformance shall rest with the Contractor. The Architect/Engineer shall require complete 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 Contractor is cautioned that he will be required to bid and provide a finished product meeting all stated criteria.

D. All work of this Section shall be performed solely by the qualified slide repair contractor and repaired to industry standards.

E. The contractor in providing their bid warrants that they are licensed to do work in the project's state and municipality and holds appropriate professional registrations, certifications, permits and/or other requirements having jurisdiction.

F. Qualification of Workmen: At least one (1) person who is thoroughly familiar with the materials, methods and equipment being utilized shall be present at all times during the construction to direct and monitor the work.

G. The contractor shall indemnify and hold harmless the architect and the owner from any and all actions caused by or related to the repair, fabrication and installation of the work of the work.

1.5 ADDITIONAL BID DOCUMENT REQUIREMENTS

A. Additional Bid Document Requirements – Submit the following with completed Bid Forms:
1. The contractor shall provide written proof of competency and an updated contact list with current information and/or letters of recommendation from past clients of having successfully completed repairs of similar slides for a minimum of 5 slides of similar size and complexity.
2. Contractor is required to visit the site and review existing conditions, access for equipment required to do the work prior to bidding and shall include all costs for such equipment and access in their bid.
3. Contractor to provide proof of insurance, liability and workman's comp to satisfy the Rockford Park Districts Insurance Requirements.

1.6 EXISTING SITE CONDITIONS

A. The contractor is responsible to familiarize themselves with the existing body slide flume, site conditions and access for equipment required to do the work prior to bidding and shall include all costs for such equipment and access in their bid.

1.7 USE OF SITE

A. General
1. The contractor will restrict his construction to the general area shown on the drawing.
2. Access and egress shall be coordinated with the Owner and controlled so as not to conflict with the normal operations of the facility.

1.8 JOB CONDITIONS

A. Protection:
1. Use all means necessary to protect existing work and, in the event of damage, immediately make all repairs and replacements necessary, subject to approval of the Architect/Engineer and at no additional cost to the owner.

B. Store Products:
1. Contractor shall assume full responsibility for the protection and safe keeping of products under this contract stored on the site.

1.9 SUBMITTALS

A. Submit in accordance with Division 0.

B. Submit documentation as outlined under subsection 1.3 A "Quality Assurance".

C. Submit paint finish color samples and paint finish information and cut sheets.
1. Color Selection: Colors will be selected by owner from a full range of colors as supplied by the contractor. Each slide flume will be finished in a separate color.

D. Submit gel-coat finish sample.
   1. Contractor to provide 12” x 12” mock up sample of the final gel coat finish with each color selection for Owner’s for approval for each color.
   2. Color Selection: Colors will be selected by owner from a full range of colors as supplied by the contractor.

E. Qualifications of Contractors Foreman or Superintendent.

1.10 STORAGE OF MATERIALS

A. Store materials on platforms off ground; protect materials against the elements. Handle and store materials in a manner to prevent intrusion of foreign material. Protect all material hereinafter specified until used. Any material which has deteriorated, or which has been damaged shall not be used.

1.11 GUARANTEE/WARRANTY

A. All workmanship and materials are to be warranted for a period of 2 years.

B. Installer to provide a minimum 5-year warranty for all exterior paint adhesion.

PART 2 - PRODUCTS

2.1 FIBERGLASS FLUME FINISH MATERIALS

A. Gel Coat:
   1. Polyester-based gel coat material with U.V. inhibitors
   2. Manufacturer: Cook Composites-Polymers (CCP) “Polycor” series, or equal.
   3. Color: Color shall be integral to the gel coat with UV inhibitors. Riding surface color shall match the exterior/underside surface color. Provide color samples and verify color selection with owner.

B. Exterior Fiberglass Flume Paint Finish - Paint finish shall only be applied to the rough exterior/underside fiberglass surfaces, as indicated on drawings, and shall not be applied to gel coat finishes.
   1. Paint Materials: Two Part- Aliphatic Poly-Siloxane Epoxy Paint. High Solids epoxy siloxane. Include primer as recommended by the manufacturer.
   2. Manufacturer: Sherwin - Williams Poly-siloxane XLE - 80, or equal

C. Joint Adhesive Sealant: Fiberglass joint connections shall be made watertight using waterproof non-shrink caulking with suitable adhesion to fiberglass. Silicone sealants will not be permitted.
   1. Joint sealant/adhesive material: Premium-grade, high-performance, moisture-cured, 1-component, polyurethane-based, non-sag elastomeric sealant.
   2. Products:
      a. Sikaflex®-1A with Sikaflex Primer 449,
      b. 3M 5200,
      c. Alternative manufacturers standard to the slide manufacturer specifications and approved as equivalent by architect/engineer

PART 3 - EXECUTION

3.1 GENERAL

A. The performance of this work shall comply with the following governing and regulatory authorities.

1. Department of Labor (OSHA).
2. State Department of Public Health.
3. All State and Local Building Codes.
4. Any other agency that has legal jurisdiction.

3.2 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect the installed slide and promptly inform the Owner's Representative of any repairs required beyond the scope of work described above.

3.3 FLUME RESURFACING - RE-GELCOAT INTERIOR

A. All finish work must strictly follow industry standards, references and recommendations.

B. The contractor is responsible for adequately protecting adjacent existing structures as required from overspray or damage.

C. Repair all defects such as voids, cracks, chips, delaminations, high spots, bad joints, holes and fractures are to be repaired using proper materials.

D. Fiberglassing over seams within the riding surface is not permitted.

E. Surface Preparation
1. Sand entire gel coat surface with 100 grit sand paper or as prescribed in gel coat manufacturer's preparation guidelines to provide a mechanical bond surface for the new gelcoat to adhere.
2. Remove caulking from all slide joints to ¼ inch minimum below slide surface, clean, lightly sand and blow out all joints with compressed air followed by washing with acetone.
3. Clean entire surface of dust and debris by means of pressure wash followed by acetone wash.
4. Take appropriate steps to control overspray by means of overspray canopy.

F. Gel Coat Placement
1. Gel coat shall not be reduced or modified from the manufacturer's formulation by adding monomers.
2. Gel coat shall be applied with an airless spray system in increments of 5 mils or less per layer (rolling or brushing is not permitted).
3. Apply gelcoat by means of spray coat application to cleaned and prepped surface, to a total thickness of 20 to 24 mils wet, usually achieved by application of two spray coats. State of the art spray equipment is utilized allowing excellent control of the entire spray process and catalyzing of the gelcoat. Final coat uses an additive as a flow agent and UV protectant.
4. Entire surface is to be de-burred (small bits of organic debris often find their way into the uncured gelcoat, creating tiny burrs that must be removed) and any imperfect areas smoothed and touched up.
5. Wet sand gelcoat surface to a 600 to 1000 grit followed by a power buffing to produce a smooth glossy finish.
6. Apply primer and joint adhesive sealant in between each flange connection. Tool finish sealant to leave a smooth, leak-free joint/seam.
7. Flume joints shall be properly connected so as to avoid abrupt edges that may cause irritation.
8. Sanding within the slide surface should be minimized to maintain adequate gel coat thickness and gloss. Any sanded areas shall be polished to a high gloss until undetectable.
9. All flumes shall be properly cleaned and surfaces smooth finished, and complete with all the necessary sections prior to use of the slide.
10. Final gel coat thickness (Including existing gel-coat thickness) is to be 20-25 mils thick as measured using a "wet film thickness gauge" (minimum of two locations per flume segment). Record thickness results in close-out documents as required in section 3.4 "Owner Instruction and Close Out".

11. The sprayed surface is to be sanded free of SAG (“orange peel”), wrinkles, porosity pinholes, craters, fisheyes, and airborne debris.

G. Additional Gel Coat Materials
1. Supply 1 quart of matching colored gel coat for each slide flume and color to accommodate minor touch up and repairs.

3.4 EXTERIOR FIBERGLASS FLUME PAINT FINISH MATERIALS.

A. Paint finish shall only be applied to the rough exterior/underside fiberglass surfaces and shall not be applied to gel coat finishes.

B. Apply primer and paint finish as recommended by paint manufacturer.

C. Extra Stock:
1. Provide 2 gallons of matching paint for each color to accommodate future touch-up and repairs.

3.5 FLUME BUFFING, POLISHING AND WAXING

A. All finish work must strictly follow industry standards, references and recommendations.

B. The existing gel-coat surface is to be buffed to a “glass like” finish consistent per industry standards.

C. Flumes shall be inspected by owner or owner’s representative to ensure a smooth blemish free finish prior to acceptance of work.

D. The contractor is responsible for adequately protecting adjacent existing structures as required from damage and buffing compound residue.

3.6 REPAIR OF MINOR CHIPS, CRACKS, SCRATCHES AND BLEMISHES

A. All finish work must strictly follow industry standards, references and recommendations.

B. All minor chips, cracks, scratches and blemishes shall be repaired as necessary with fiberglass and/or gel coat. The final finish is to be blended, sanded and buffed as necessary to match the remainder of the slide flume finish.

3.7 OWNER INSTRUCTION/CLOSE OUT

A. The contractor shall deliver two complete sets of maintenance instructions bound together in a complete manual for the owner. Including, but not limited to the following:
1. Written narrative on the slide finish maintenance.
2. Written warranty and contact information.
3. Written maintenance information and recommended maintenance program.
4. The Contractor shall provide the Owner with unit price for complete yearly slide finish maintenance services, including all labor and materials required.
5. Water balancing, flow adjustments and commissioning for operations to be performed by the slide designer/engineer. Required flow adjustments and settings to be marked and recorded.
6. Written slide certification by slide manufacturer/designer.

3.8 CLEAN UP AND PROTECTION

A. After work of this section has been completed, clean-up work area and remove all equipment, excess materials, and debris. Protect slide from damage until time of final completion. Remove and replace 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. Cleaning all sanding debris, overspray and other construction related materials off adjacent areas.
2. Remove all old unused slide components of site.
3. Repairing of any damaged items related to work.
4. Cleaning and waxing the of new slide flume work.
5. Re-establish all disturbed areas to prior condition.

END OF SECTION 131413

TROY AQUATIC PARK MAINTENANCE IMPROVEMENTS

CITY OF TROY RECREATION

460 WEST STAUNTON DRIVE TROY,
OHIO 45373

BID SET - 04/10/26

OWNER:

CITY OF TROY
100 S MARKET STREET
TROY, OHIO 45373
(T): (937) 335-1725
www.troyohio.gov

ARCHITECT:

MSA SPORT
15 W. CHERRY STREET
SUITE 300
COLUMBUS, OH 43215
(T): (513) 241-5666
www.msaarch.com

POOL CONSULTANT:

WATER TECHNOLOGY INC.
100 PARK AVE
BEAVER DAM, WI 53916
(T): (920) 887-7375
www.watertechnologyinc.com

MEP & STRUCTURAL ENGINEER:

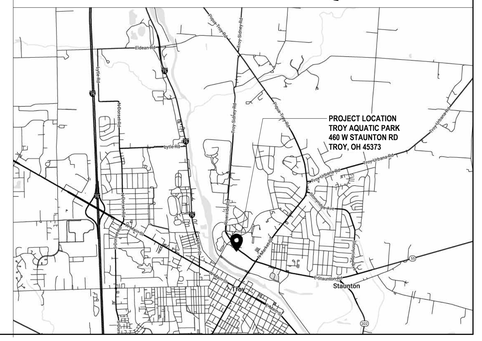
KORDA / NEMETH ENGINEERING
1650 WATERMARK DRIVE
COLUMBUS, OH 43215
(T): (614) 487-1650
www.korda.com

ALTERNATES

ALTERNATE 01: PROVIDE ADDED COST (ADD ALTERNATE) TO OBSCURE DUMPING ON EXISTING PLAY STRUCTURE.
ALTERNATE 02: PROVIDE ADDED COST (ADD ALTERNATE) TO PROVIDE INTERIOR GEL COAT RE-FINISH AND EXTERIOR UV RESISTANCE PAINT ON DOUBLE FLUME SLIDE.
ALTERNATE 03: PROVIDE ADDED COST (ADD ALTERNATE) TO PROVIDE AND INSTALL ADA CHAIRLIFT.
ALTERNATE 04: PROVIDE ADDED COST (ADD ALTERNATE) TO REMOVE EXISTING POOL DECK LOCKERS AND REPLACE WITH NEW AS SPECIFIED.
ALTERNATE 05: PROVIDE ADDED COST (ADD ALTERNATE) TO REMOVE AND REPLACE EXISTING DOORS AT POOL MECHANICAL BUILDING WITH NEW FRP FRAMES AND DOORS. ADD ALTERNATE SHOULD ALSO INCLUDE DOOR HARDWARE AS SPECIFIED.
ALTERNATE 06: PROVIDE ADDED COST (ADD ALTERNATE) TO PROVIDE INTERIOR GEL COAT RE-FINISH AND EXTERIOR UV RESISTANCE PAINT ON DROP SLIDE AT LAP LANES.

SHEET INDEX

VICINITY MAP



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TROY AQUATIC PARK MAINTENANCE IMPROVEMENTS
CITY OF TROY RECREATION
460 WEST STAUNTON DRIVE TROY, OHIO 45373

NO.	DATE	ISSUED / REVISION
	01/09/26	DD SET
	04/10/26	BID SET
1	04/22/26	ADDENDUM 01

PROJECT NO. **25306.00**

DRAWING TITLE:
COVER SHEET

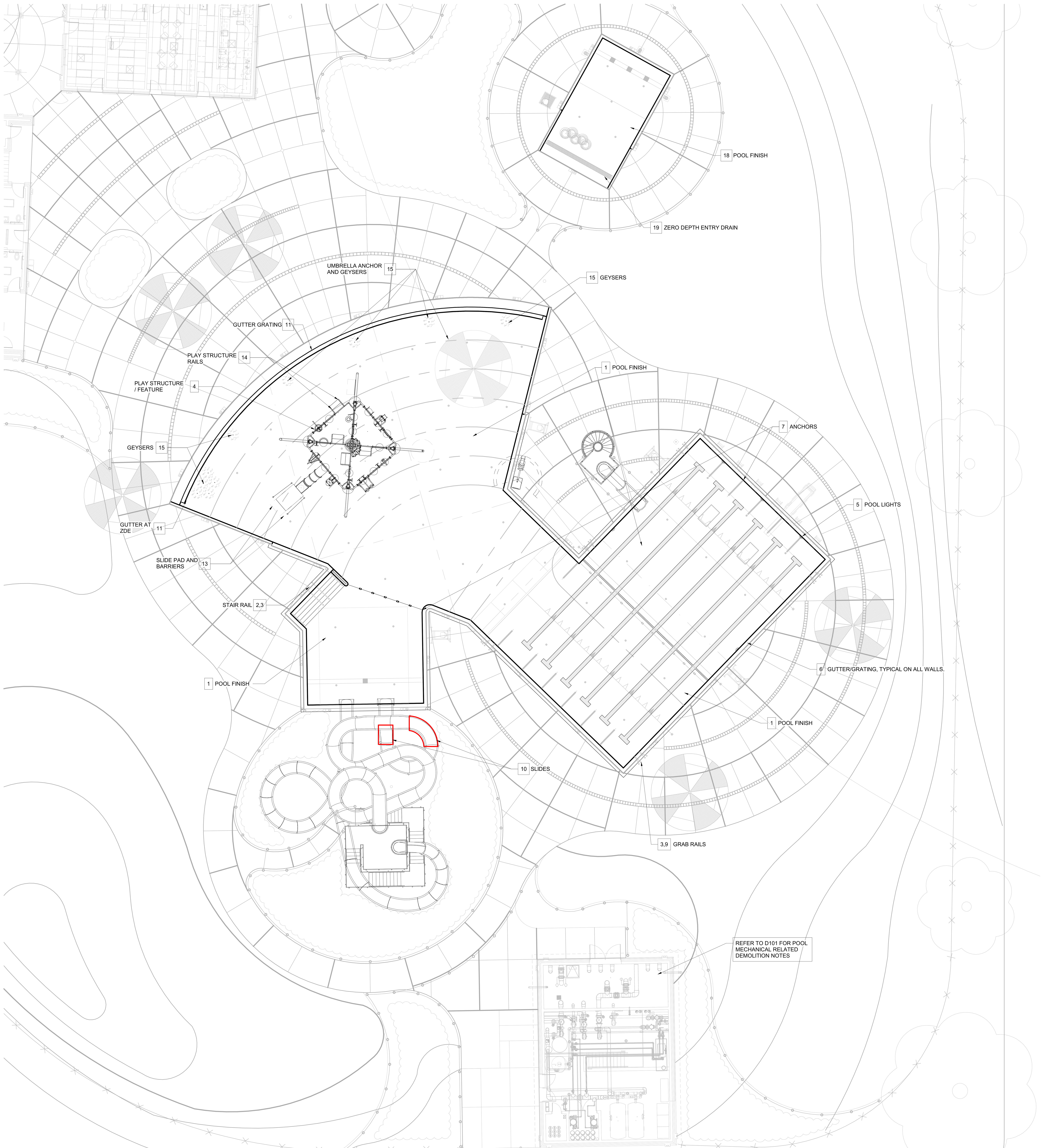
G0.00

CHECKED BY: AWJ

DRAWN BY: TED

Autodesk Docs://25306.00_City of Troy Aquatic Park Improvements & Maintenance/25294 - City of Troy OH R24.rvt

4/13/2026 10:40:03



1 D100 DEMOLITION PLAN VIEW
3/32" = 1'-0"

GENERAL DEMOLITION NOTES:

1. ALL CONDITIONS SHOWN ON THIS DRAWING ARE EXISTING. OWNER AND ARCHITECT ASSUME NO RESPONSIBILITY FOR ACCURACY OR COMPLETENESS OF INFORMATION SHOWN. ORIGINAL CONSTRUCTION DOCUMENTS FOR EXISTING FACILITY ARE ON FILE AT THE OWNER'S OFFICE FOR REVIEW. CONTRACTORS ARE RESPONSIBLE TO VISIT THE SITE AND REVIEW ALL DOCUMENTS PRIOR TO SUBMITTING THEIR BID TO COMPLETELY FAMILIARIZE THEMSELVES WITH ALL CONDITIONS.
2. DEMOLITION DRAWINGS ARE INTENDED TO BE SCHEMATIC IN NATURE, AND MAY NOT DESCRIBE ALL MISCELLANEOUS WORK NECESSARY TO COMPLETE THE DEMOLITION AND NEW WORK. CONTRACTOR SHALL INCLUDE THIS MISCELLANEOUS NECESSARY WORK IN BASE BID.
3. CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING POOL EQUIPMENT AS INDICATED IN DEMOLITION KEYNOTES AND PLAN. SEE DRAWING NOTES FOR EQUIPMENT THAT SHALL BE REUSED IN PLACE AND EQUIPMENT THAT SHALL BE RELOCATED AND REUSED.
4. CONTRACTOR TO VERIFY ASBESTOS TEST REQUIREMENTS AND CONDUCT ANY REQUIRED TESTING PRIOR TO CONSTRUCTION.
5. UNLESS NOTED OTHERWISE ON THE PLAN, CONTRACTOR SHALL DISPOSE OF ALL REMOVED EQUIPMENT AND MATERIALS IN A LEGAL MANNER OFF SITE. COPIES OF ALL MANIFESTS SHALL BE GIVEN TO THE OWNER SHOWING FINAL DISPOSAL LOCATION OF ALL MATERIALS.
6. CONTRACTOR SHALL MAINTAIN DUST CONTROL INSIDE AND OUTSIDE OF THE BUILDING AT ALL TIMES.
7. CONTRACTOR SHALL PROTECT ALL CATCH BASINS, SEWER INLETS, ETC., FROM DEBRIS AND SEDIMENTATION DURING DEMOLITION.
8. CONTRACTOR SHALL LIMIT DISRUPTION TO THE INDICATED WORK AREA, AND TAKE CARE TO PROTECT, AND NOT DISRUPT, THE SURROUNDING AREA.
9. CONTRACTOR IS RESPONSIBLE FOR COORDINATING AND TERMINATING EXISTING ELECTRICAL POWER, WATER, AND GAS LINES WITH LOCAL UTILITIES.
10. REFER TO ALL OTHER DRAWINGS FOR FURTHER DETAIL ON NEW CONSTRUCTION REQUIREMENTS.

DEFINITIONS:

A. ***REMOVE***: REMOVE AND LEGALLY DISPOSE OF ITEMS EXCEPT THOSE INDICATED TO BE REINSTALLED, SALVAGED, OR TO REMAIN THE OWNER'S PROPERTY.
B. ***REMOVE AND SALVAGE***: ITEMS INDICATED TO BE REMOVED AND SALVAGED REMAIN THE OWNER'S PROPERTY. REMOVE, CLEAN, AND PACK OR CRATE ITEMS TO PROTECT AGAINST DAMAGE. IDENTIFY CONTENTS OF CONTAINERS AND DELIVER TO OWNER'S DESIGNATED STORAGE AREA.
C. ***REMOVE AND REINSTALL***: REMOVE ITEMS INDICATED; CLEAN, SERVICE, AND OTHERWISE PREPARE THEM FOR REUSE; STORE AND PROTECT AGAINST DAMAGE. REINSTALL ITEMS IN THE SAME LOCATIONS OR IN LOCATIONS INDICATED.
D. ***EXISTING TO REMAIN***: PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY THE OWNER OR ARCHITECT, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION AND THEN CLEANED AND REINSTALLED IN THEIR ORIGINAL LOCATIONS.
E. ***ABANDON:*** PERMANENTLY REMOVE FROM SERVICE AND MAINTAIN IN PLACE. FOR PIPING, ABANDONED PIPES SHALL BE BLOWN OUT, DISCONNECTED FROM OTHER PIPING AND DISCONNECTED FROM THE POOL WALL/TANK WALL. PIPING ENDS SHALL BE CAPPED ON BOTH ENDS. FOR PIPE PENETRATING FINISHED SURFACES, CUT BACK PIPE SUCH THAT CAPS ARE A MINIMUM OF 3" BELOW FINISHED SURFACE. COVER WITH NON-SHRINK, NON-METALLIC GROUT AND SPECIFIED FINISHES. ABANDONED PIPING SHALL BE IDENTIFIED IN RECORD DRAWINGS PROVIDED BY THE CONTRACTOR.

DEMOLITION KEYNOTES (POOL A)

1	REMOVE ALL EXISTING POOL FINISHES (FLOOR, STAIRS, AND ALL WALLS) INCLUDING CONTRASTING TILE AND LANE LINES/MARKERS. EXISTING COMPLIANT MINIMUM RADIUS REQUIREMENT TO BE MAINTAINED AT ALL WALL/FLOOR JOINTS DURING REMOVAL AND REINSTALLATION OF POOL FINISH. REMOVE TILE AND EPOXY DOWN TO BASE CONCRETE. SEE PHOTO 1&2/D101.
2	REMOVE AND REINSTALL HANDRAILS AT POOL STAIRS (QTY 4).
3	ALL ANCHORS FOR HANDRAILS AND LADDERS ARE EXISTING TO REMAIN.
4	REMOVE AND REINSTALL PLAY STRUCTURE AT ZERO DEPTH ENTRY AS NEEDED TO PROPERLY REMOVE AND REINSTALL POOL FINISH. ALL COMPONENTS OF THE PLAY STRUCTURE THAT ARE REMOVED SHALL BE STORED AND PROTECTED BY THE CONTRACTOR FOR REINSTALLATION.
5	REMOVE AND REINSTALL ALL UNDERWATER POOL LIGHT ASSEMBLIES (QTY 5) AS REQUIRED FOR REMOVAL AND INSTALLATION OF NEW POOL FINISH.
6	REMOVE EXISTING GUTTER GRATING. EXISTING CONCRETE GUTTER TO REMAIN. SEE PHOTO 1&2/D101.
7	EXISTING LANE LINE ANCHORS AND SAFETY ROPE ANCHORS TO REMAIN.
8	NOTE REMOVED
9	REMOVE AND REINSTALL ALL GRAB RAILS AT LAP POOL AREA (QTY 5).
10	REMOVE (2) EXISTING FLUME SECTIONS AT BODY SLIDE AS INDICATED AND REPLACE WITH NEW. REPLACED FLUME SECTIONS TO HAVE MATCHING FINISH TO REST OF SLIDE.
11	REMOVE EXISTING GUTTER GRATING AT ZERO DEPTH ENTRY AREA. REPLACE WITH NEW GUTTER GRATING PER DETAIL 2/PL101.
12	NOTE REMOVED
13	REMOVE EXISTING SLIDE EXIT PAD AND BARRIERS.
14	REMOVE EXISTING HANDRAILS AT PLAY STRUCTURE STAIRS (BOTH SIDES).
15	GEYSERS ARE EXISITNG AND TO REMAIN IN PLACE. UMBRELLA AND GROUND SLEEVE TO BE REMOVED AND SAVED FOR REINSTALLATION. SEE PL101 FOR NEW INSTALLATION DETAILS
16	JOINT REPAIR WORK - SEE PL200 FOR ALL LOCATIONS: CUT AND REMOVE OR CHIP OUT CONCRETE OF POOL FLOOR AND WALL ON EACH SIDE OF EXPANSION JOINTS. CHIP OUT CONCRETE AT BASE OF WALL TO SALVAGE EXISTING PVC WATERSTOPS FOR NEW WELD REPAIR. VERIFY CONDITION OF FLOOR & WALL REINFORCING STEEL PRIOR TO REPAIR. REVIEW WITH ENGINEER FOR THE OPTION TO SALVAGE EXISTING FLOOR AND WALL STEEL IF POSSIBLE. REFER TO PL210 FOR NEW INSTALLATION DETAILS. CLEAN AND PREP SURFACE FOR POOL FINISHES.
17	GUTTER WALL REPAIR WORK - SEE PL200 FOR ALL LOCATIONS: REPAIR FRONT GUTTER WALL AS INDICATED IN PLAN ON PL200 AND KEYNOTE 1. CLEAN AND PREP SURFACE FOR POOL FINISHES.

DEMOLITION KEYNOTES (POOL B)

18	REMOVE ALL EXISTING POOL FINISHES (FLOOR AND ALL WALLS) INCLUDING CONTRASTING TILE AND DEPTH MARKERS. TILE ON TOP OF POOL WALL AT ZERO DEPTH AREA TO BE REMOVED AND REPLACED WITH NEW. REMOVE TILE AND EPOXY DOWN TO BASE CONCRETE. SEE PHOTO 5/D101.
19	ZERO DEPTH ENTRY DRAIN GRATING IS EXISTING TO REMAIN. SEE PHOTO 4/D101.

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TROY AQUATIC PARK MAINTENANCE IMPROVEMENTS

CITY OF TROY RECREATION

460 WEST STAUNTON DRIVE TROY, OHIO 45373

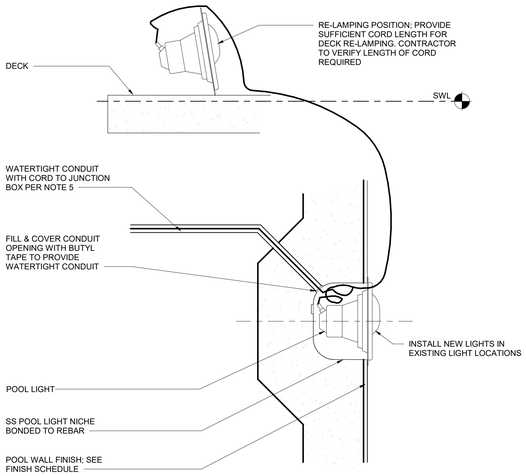
NO.	DATE	ISSUED / REVISION
1	04/10/2026	BID SET
1	04/22/2026	ADDENDUM 01

PROJECT NO. **25294**

DRAWING TITLE:

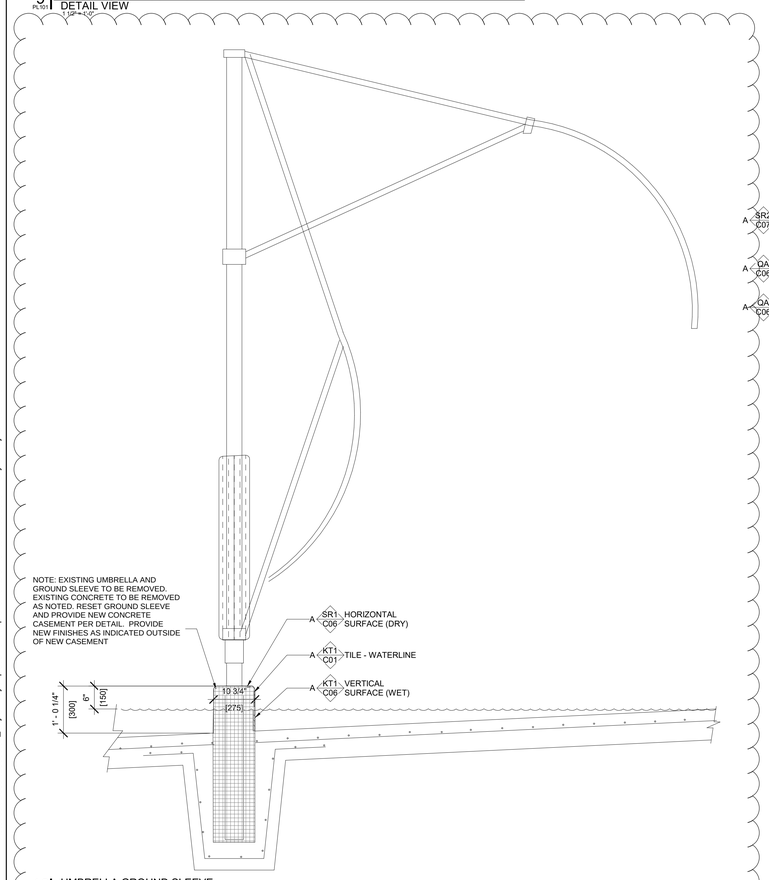
DEMOLITION PLAN

D100

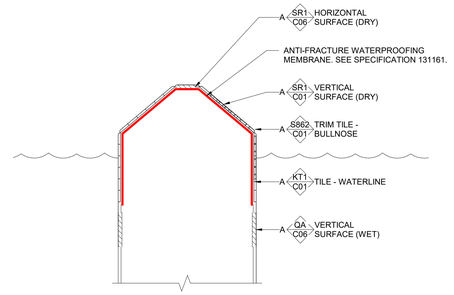


NOTES:
1. POOL LIGHTS AT LOCATIONS AS INDICATED ON PLAN BY THIS SYMBOL.
2. LIGHT FIXTURES WITH CORD AND CONDUIT ATTACHED ARE FURNISHED AS SPECIFIED BY THE POOL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. ALL OTHER ELECTRICAL MATERIALS (WATERTIGHT CONDUIT, JUNCTION BOXES, SWITCHES, ETC) ARE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR PER NEC CODE ARTICLE 680. POOL LIGHTS SHALL BE GFI PROTECTED PER NEC ARTICLE 680.

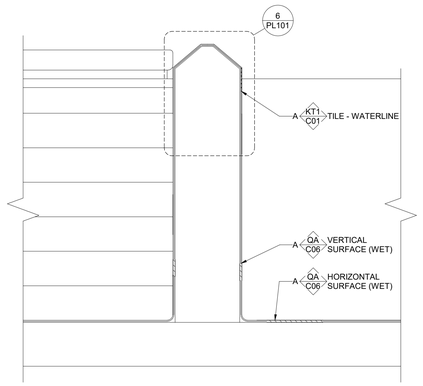
9 | PL101 FLUSH MOUNT POOL LIGHT
DETAIL VIEW
1/2" = 1'-0"



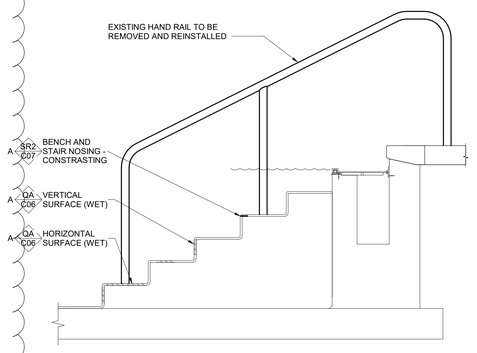
10 | PL101 UMBRELLA GROUND SLEEVE
DETAIL VIEW
3/4" = 1'-0"



6 | PL101 COMMON WALL FINISH
DETAIL VIEW
NOT TO SCALE



7 | PL101 COMMON WALL
DETAIL VIEW
NOT TO SCALE



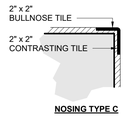
8 | PL101 POOL STAIRS
DETAIL VIEW
NOT TO SCALE

LEGEND - FINISHES & COLOR CODES - POOL A

AREA	FINISHES		COLORS		NOTES
	FINISH ID	FINISH	COLOR ID	COLOR	
BENCH AND STAIR NOSING - CONSTRASTING	SR2	2"x2" SLIP RESISTANT TILE	C07	CONTRASTING TO POOL FINISH	
CONTRASTING TILE BAND	SR1	1"x1" SLIP RESISTANT TILE	C07	CONTRASTING TO POOL FINISH	
DEPTH MARKERS - DECK	SR3	6"x6" SLIP RESISTANT TILE	C03	BLACK ON WHITE	
DEPTH MARKERS - NO DIVING	SR3	6"x6" SLIP RESISTANT TILE	C04	BLACK AND RED ON WHITE	
DEPTH MARKERS - WALL	CT1	6"x6" CERAMIC TILE	C03	BLACK ON WHITE	
HORIZONTAL SURFACE (DRY)	SR1	1"x1" SLIP RESISTANT TILE	C06	LIGHT COLOR	
HORIZONTAL SURFACE (WET)	QA	QUARTZ AGGREGATE	C06	LIGHT COLOR	COOL BLUE DIAMONDBRITE
LANE MARKERS - FLOOR	SR1	1"x1" SLIP RESISTANT TILE	C07	CONTRASTING TO POOL FINISH	
LANE MARKERS - WALL	SR1	1"x1" SLIP RESISTANT TILE	C07	CONTRASTING TO POOL FINISH	
TILE - WATERLINE	KT1	1"x1" KEYSTONE TILE	C01	AS SELECTED BY ARCHITECT	
TRIM TILE - BULLNOSE	S862	1"x1" S-862 BULLNOSE TRIM TILE	C01	AS SELECTED BY ARCHITECT	
VERTICAL SURFACE (DRY)	EP	EPOXY PAINT	C01	AS SELECTED BY ARCHITECT	
VERTICAL SURFACE (DRY)	SR1	1"x1" KEYSTONE TILE	C01	AS SELECTED BY ARCHITECT	
VERTICAL SURFACE (WET)	KT1	1"x1" KEYSTONE TILE	C06	LIGHT COLOR	
VERTICAL SURFACE (WET)	QA	QUARTZ AGGREGATE	C06	LIGHT COLOR	COOL BLUE DIAMONDBRITE

LEGEND - FINISHES & COLOR CODES - POOL B

AREA	FINISHES		COLORS		NOTES
	FINISH ID	FINISH	COLOR ID	COLOR	
DEPTH MARKERS - DECK	SR3	6"x6" SLIP RESISTANT TILE	C03	BLACK ON WHITE	
DEPTH MARKERS - NO DIVING	SR3	6"x6" SLIP RESISTANT TILE	C04	BLACK AND RED ON WHITE	
DEPTH MARKERS - WALL	CT1	6"x6" CERAMIC TILE	C03	BLACK ON WHITE	
HORIZONTAL SURFACE (DRY)	SR1	1"x1" SLIP RESISTANT TILE	C06	LIGHT COLOR	
HORIZONTAL SURFACE (WET)	QA	QUARTZ AGGREGATE	C06	LIGHT COLOR	COOL BLUE DIAMONDBRITE
TILE - WATERLINE	KT1	1"x1" KEYSTONE TILE	C01	AS SELECTED BY ARCHITECT	
VERTICAL SURFACE (WET)	QA	QUARTZ AGGREGATE	C06	LIGHT COLOR	COOL BLUE DIAMONDBRITE

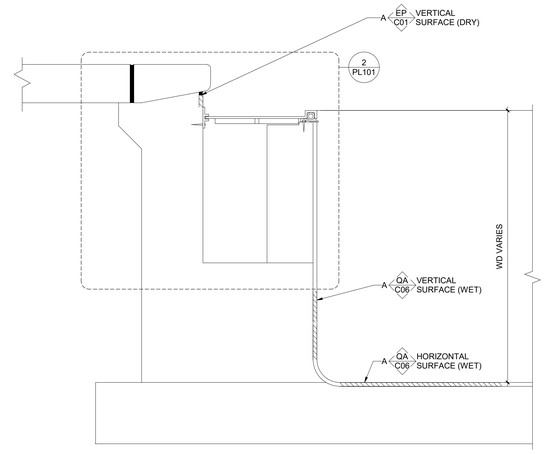


NOSING TYPE C

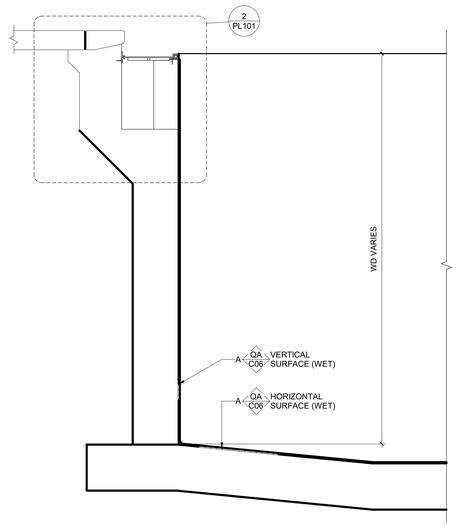
NOTES:
1. NOSING: 2" MIN. CONTRASTING TILE BAND REQUIRED ON TREAD NOSING AND TOP OF RISER UNLESS OTHERWISE NOTED.

FINISH NOTES:
1. FINISHES PER SCHEDULE UNLESS OTHERWISE INDICATED.
2. VERTICAL SURFACE (WET) AND HORIZONTAL SURFACE (WET) SHALL BE AT LEAST 6.5 ON THE MUNSELL COLOR VALUE SCALE. CONTRASTING COLORS SHALL HAVE A MUNSELL VALUE OF 0 TO 4.
3. ALL HORIZONTAL SURFACES MUST BE SLIP RESISTANT AND COMPLY WITH THE ANSI A137.1 AND ANSI A326.3 STANDARD USING THE ANSI A326.3 DYNAMIC COEFFICIENT OF FRICTION (DCOF) TESTING METHOD:
3A. ON WET LEVEL SURFACES (<=2%), PROVIDE A WET DCOF =/> 0.42.
3B. ON WET SLOPED SURFACES (>2%), PROVIDE A WET DCOF =/> 0.65.
4. DESIGN WATERLINE SHALL HAVE A MAXIMUM CONSTRUCTION TOLERANCE WHEN FINISHED OF +/- 1/4" FOR POOLS AND SPAS WITH ADJUSTABLE SURFACE SKIMMING, AND +/- 1/8" FOR POOLS AND SPAS WITH NONADJUSTABLE SURFACE SKIMMING.
5. REPLACE TILE WITH NEW WITH EPOXY SETTING MATERIALS & GROUT, USE FACE MOUNTED TILE. SEE POOL TILE SPECIFICATION (13 11 61 3.04 POOL CERAMIC TILE INSTALLATION) FOR INFORMATION REGARDING WATERPROOFING MEMBRANE INSTALLATION BENEATH POOL TILE.

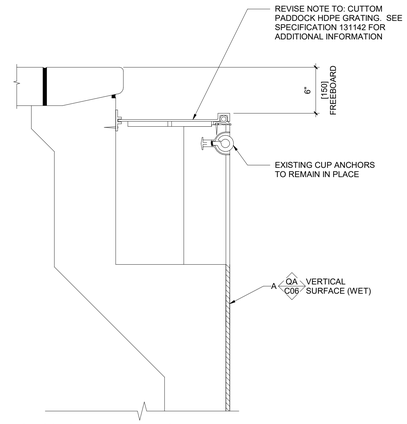
1 | PL101 BENCH AND STAIR NOSING CONTRASTING
DETAIL VIEW
NONE



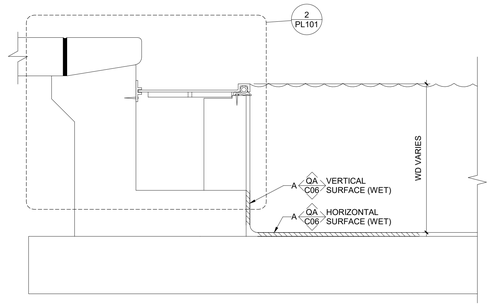
4 | PL101 STANDARD GUTTER WALL
DETAIL VIEW
NOT TO SCALE



5 | PL101 DEEP END GUTTER WALL
DETAIL VIEW
NOT TO SCALE



2 | PL101 POOL GUTTER WALL FINISH
DETAIL VIEW
NOT TO SCALE



3 | PL101 SHALLOW GUTTER WALL
DETAIL VIEW
NOT TO SCALE

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TROY AQUATIC PARK MAINTENANCE IMPROVEMENTS

CITY OF TROY RECREATION
460 WEST STAUNTON DRIVE TROY, OHIO 45373

NO.	DATE	ISSUED / REVISION
1	04/10/2026	BID SET
1	04/22/2026	ADDENDUM 01

PROJECT NO. **25294**

DRAWING TITLE:
GENERAL DETAILS AND SCHEDULES

PL101

CHECKED BY: AWJ

DRAWN BY: T.ED

SCHEDULE - BASIS OF DESIGN - POOL A

POOL ID	EQUIPMENT ID	EQUIPMENT	QTY	MANUFACTURER	DESCRIPTION
A	01	SAFETY PAD	1	RENOSYS	4" THICK SOFTSIDE SLIP RESISTANT PADDED SAFTEY FLOORING WITH SAFETY NETTING - W4129004
A	02	SAFETY BARRIERS	1	PARAGON AQUATICS, SPECTRUM AQUATICS, SR SMITH OR EQUAL	4 SAFETY BARRIER STANCHIONS W\ NETTING - W0011412 - 114' X 45'
A	03	HANDRAIL	1	PARAGON AQUATICS, SPECTRUM AQUATICS, SR SMITH OR EQUAL	W1505061 RAILS/STAIRS LEFT
A	04	HANDRAIL	1	PARAGON AQUATICS, SPECTRUM AQUATICS, SR SMITH OR EQUAL	W1505062 RAILS/STAIRS RIGHT
A	05	POOL LIFT	1	SR SMITH, AQUA CREEK, OR EQUAL	PAL PACKAGE (CALIFORNIA LIFT PACKAGE) INCLUDES ARMREST PACKAGE AND SPINE BOARD. MUST BE ADA COMPLIANT WITH A LIFTING CAPACITY OF 300 LBS. PROVIDE BATTERY CHARGER, EXTRA BATTERY, AND TOTAL COVER. REFER TO ALTERNATE #3 FOR ADDITIONAL INFORMATION

POOL DATA - POOL A (EXISTING POOL)

DESCRIPTION	QTY	UNITS
WATER SURFACE AREA	9,909	SQUARE FEET
POOL VOLUME	298,371	GALLONS
TURNOVER	60 AND 300	MINUTES
TOTAL CIRCULATION FLOW	1,768	GPM
FILTRATION RATE	12.86	GPM/SF
SURGE VOLUME	6,609	GALLONS

POOL DATA - POOL B (EXISTING POOL)

DESCRIPTION	QTY	UNITS
WATER SURFACE AREA	600	SQUARE FEET
POOL VOLUME	3,871	GALLONS
TURNOVER	30	MINUTES
TOTAL CIRCULATION FLOW	130	GPM
FILTRATION RATE	11.01	GPM/SF

ALTERNATE #1:

1. REFINISH EXISTING PLAY STRUCTURE AT ZERO DEPTH ENTRY. CLEAN, PREP SURFACE AND APPLY NEW UV RESISTANT COATING ON ALL PLAY STRUCTURE ELEMENTS INCLUDING STRUCTURE SUPPORTS AND DECKING.

ALTERNATE #2:

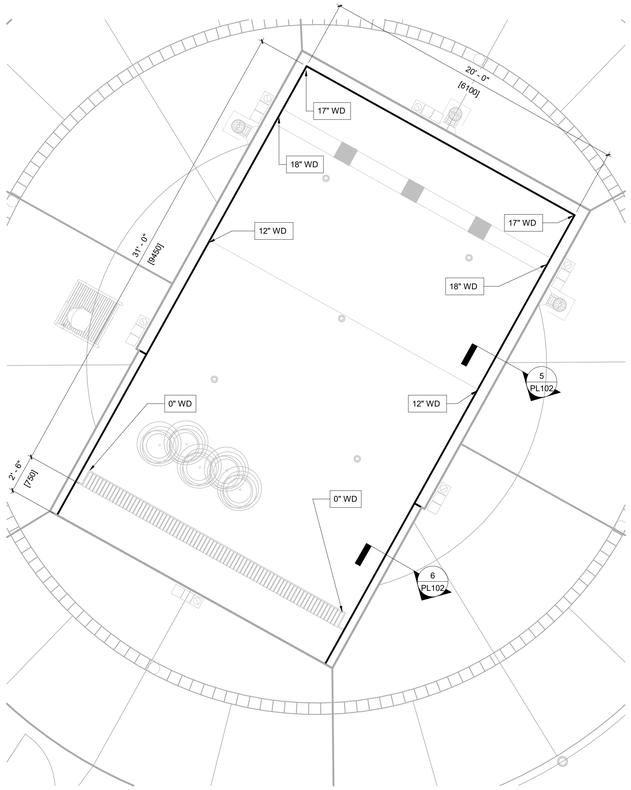
1.PREP AND APPLY NEW INTERIOR GEL COAT AND EXTERIOR UV RESISTANT PAINT AT EXISTING (2) EXISTING SLIDE FLUMES (BODY SLIDE, TUBE SLIDE)

ALTERNATE # 3:

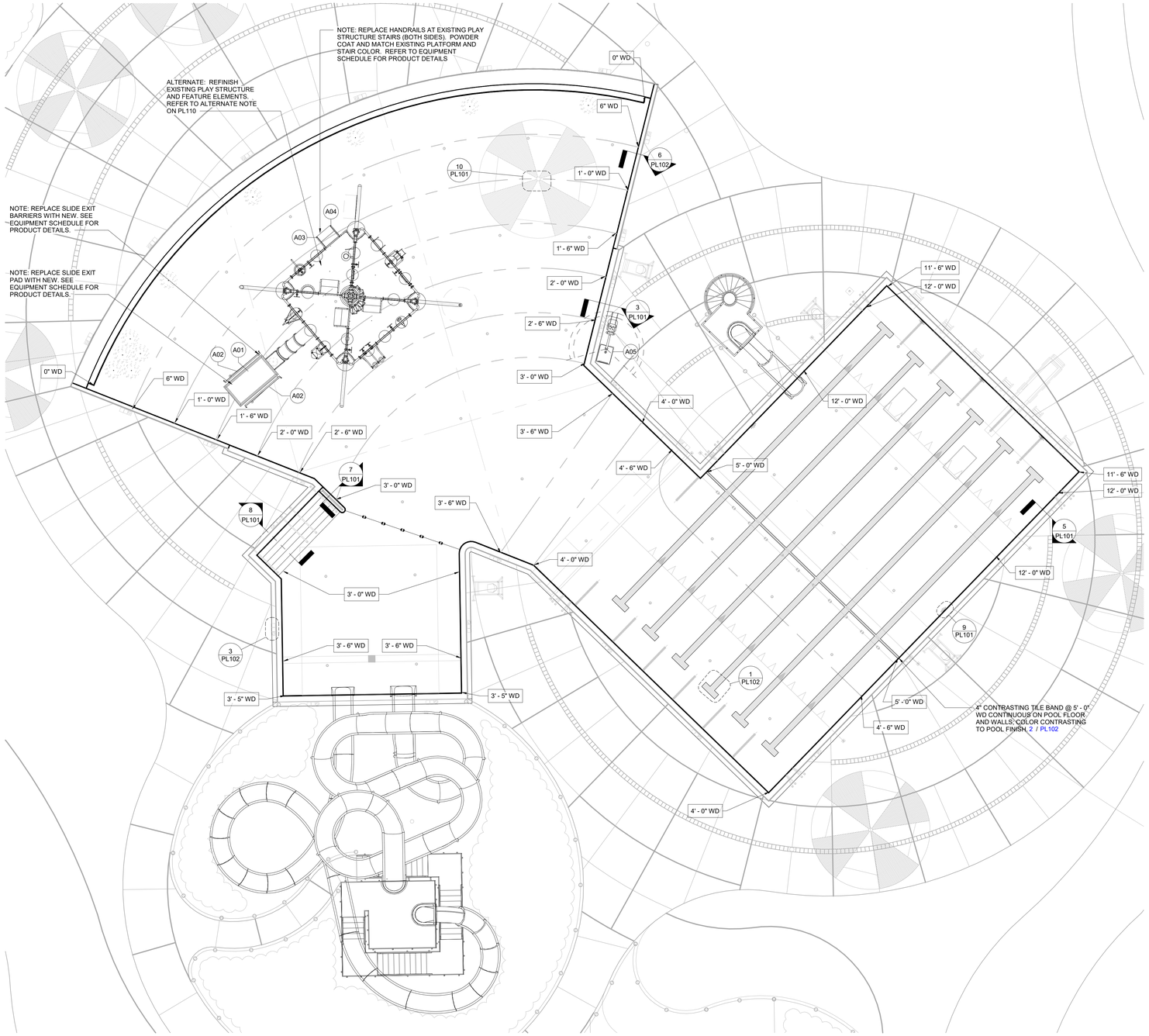
1. BASE BID - OWNER TO PROVIDE ADA POOL LIFT AS SCHEDULED. ALTERATE - CONTRACTOR TO PROVIDE FURNISH AND INSTALLATION OF SCHEDULED ADA POOL LIFT.

ALTERNATE #6:

1.PREP AND APPLY NEW INTERIOR GEL COAT AND EXTERIOR UV RESISTANT PAINT AT EXISTING DROP SLIDE



2 PL110 POOL B - EXISTING WADING POOL
PLAN VIEW
1/4" = 1'-0"



1 PL110 POOL A - EXISTING LEISURE POOL
PLAN VIEW
1/8" = 1'-0"

DIMENSIONING NOTES:

1. ALL DIMENSIONS ARE SHOWN FROM POOL FINISH TO POOL FINISH (THIS SHEET)
2. DIMENSIONS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY AND ARE APPROXIMATE IN NATURE. CONTRACTOR SHALL BE RESPONSIBLE TO FIELD VERIFY ALL DIMENSIONS PRIOR TO AND REQUIRED FOR FABRICATION OF ANY POOL RELATED COMPONENTS.

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PROJECT NO. **25294**

DRAWING TITLE:

POOL DIMENSION PLANS

PL110

4/13/2026 10:40:14 Autodesk Docs://25306.00_City of Troy Aquatic Park Improvements & Maintenance/25294 - City of Troy OH R24.rvt