

**North Port Aquatic Center
(Butler Park Aquatic Center)**

**100% Construction Documents
Project Manual**

DECEMBER 2017



Request for Bid No. 2018-35

Released for Bid March 2018

Kimley»Horn

Project Manual

for

Butler Park Aquatic Center North Port, Florida

City of North Port
4970 City Hall Boulevard
North Port, Florida 34286
Phone: (941) 429-7028
Contact: Derek Applegate

The logo for Kimley-Horn, featuring the word "Kimley" in a dark blue serif font, followed by a red double arrow pointing right, and the word "Horn" in a red serif font.

2201 West Royal Lane, Suite 275
Irving, Texas 75063
Phone: (214) 420-5600
Contact: Mark Hatchel – Project Manager/Lead Designer

1777 Main Street
Suite 200
Sarasota, FL 34236
Phone: (941) 379-7600
Contact: Peter Van Buskirk

December 2017

Wannemacher Jensen Architects, Inc.
(Architect)
180 Mirror Lake Drive
St. Petersburg, Florida 33701-3214
Phone: (727) 822-5566
Contact: Jeff Jenner

Counsilman-Hunsaker
(Aquatic Planning and Design)
10733 Sunset Office Drive, Suite 400
Saint Louis, Missouri 63127-1019
Phone: (314) 894-1245
Contact: Scott Hester

Colwill Engineering
(MEP/HVAC)
4750 East Adamo Drive
Tampa, Florida 33605
Phone: (813) 241-2525
Contact: Dan Sutyak

Master Consulting Engineers
(Structural Design)
5523 West Cypress St., Suite 200
Tampa, Florida 33607
Phone: (813) 287-3600
Contact: James Mehltrittter

Butler Park Aquatic Center

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BUTLER PARK AQUATIC CENTER – CITY OF NORTH PORT, FL

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PART I

BIDDING REQUIREMENTS



City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



May 9, 2018

ADDENDUM 6

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

DUE DATE: MAY 15, 2018 @ 2:00 PM

City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

Bidders are hereby notified that this addendum shall be made part of the above-named bid and contract documents. The following changes to the above bid are issued to modify, and/or clarify the bid and contract documents (the deletions are as ~~striketroughs~~ and additions as underlined). These items shall have the same force and effect as the original documents, and bids to be submitted on the specified date shall conform with the additions, deletions and revisions as listed herein.

ITEM #1: In review, of the Bidder Checklist...it references to fill out and sign a Statement of Organization form that we aren't able to find within the project manual or follow up addenda issued to date. Can you please advise on where to find that or send us a copy if still needed as part of the overall submission package?

ANSWER #1: PLEASE SEE ATTACHED FORM: Statement of Organization form

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Keith Raney for Alla V. Skipper

Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173

E-mail: askipper@cityofnorthport.com

Receipt of Addendum No. 5 shall be noted within the Bid Form in the appropriate section.
End of Addendum No. 6

STATEMENT OF ORGANIZATION

(Information Sheet for Transactions and Conveyances Corporation Identification)

The following information will be provided to the City of North Port for incorporation in legal documents. It is; therefore, vital all information is accurate and complete. Please be certain all spelling, and capitalization is exactly as registered with the state or federal government.

Company Name _____

Telephone # _____ E-Mail _____ Fax # _____

Main Office Address _____

City _____ State _____ Zip Code _____

Address of Office Servicing City of North Port, if different than above: ☐ SAME AS ABOVE

Office Address _____

City _____ State _____ Zip Code _____

Telephone # _____ E-mail _____ Fax # _____

Name & Title of Firm Representative _____

Federal Identification Number: _____

Bidder shall submit proof that it is authorized to do business in the State of Florida unless registration is not required by law.

(Please Check One)

Is this a Florida Corporation:

☐ Yes or ☐ No

If not a Florida Corporation,

In what state was it created:

Name as spelled in that State:

What kind of corporation is it:

☐ "For Profit" or ☐ "Not for Profit"

Is it in good standing: ☐ Yes or ☐ No

Authorized to transact business
in Florida: ☐ Yes or ☐ No

State of Florida Department of State Certificate of Authority Document No.: _____

Does it use a registered fictitious name: ☐ Yes or ☐ No

Names of Officers:

President: _____ Secretary: _____

Vice President: _____ Treasurer: _____

Director: _____ Director: _____

Other: _____ Other: _____

Name of Corporation (As used in Florida):

(Spelled exactly as it is registered with the state or federal government)

Corporate Address:

Post Office Box: _____

City, State Zip: _____

Street Address: _____

City, State, Zip: _____

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me this _____ day of _____, 20____, by

_____ who ☐ is personally known to me or ☐ has produced his/her driver's license as identification.

Notary Public - State of Florida

Print Name: _____

Commission No: _____

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

(THIS PAGE MUST BE COMPLETED AND SUBMITTED)



City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



May 4, 2018

ADDENDUM 5

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

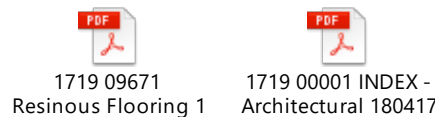
DUE DATE: MAY 15, 2018 @ 2:00 PM

City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

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ITEM #1: Attachments to Addenda #4 – Answer 14 were imbedded in the document as an image and were inadvertently not attached. SEE ATTACHMENTS FOR RESINOUS FLOORING AND ARCHITECTURAL SPECIFICATIONS IN RESPONSE,

A14: Section 1719 09671 RESINOUS FLOORING 180417 (Revised 04.17.2018) replaces Section 1719 09671 RESINOUS FLOORING 17115. Specification Section 09672 RESINOUS FLOORING (Add Alternate One) 171115 is deleted. Specification Section 1719 00001 INDEX – Architectural 180417 (Revised 04.17.2018) which replaces Section 1719 00001 INDEX – Architectural 180222. (See Attached)



ITEM #2: NOTE: SWFWMD has approved the ERP Permit.

ITEM #3: QUESTIONS/ANSWERS

1. I have noticed that YKK is an acceptable manufacture for specification section 08411 Aluminum-Framed Entrances & Storefronts. Is YKK an acceptable manufacturer for specification section 08511 Aluminum Windows? **YES**
2. Detail 9 Sheet SP1.7 illustrates a custom opening in the face of the bulkhead for a 96" touch pad. If 96" touchpads are not part of the future purchase of the school, these openings need not be this large

(a standard opening would accommodate a 78" touchpad at a lesser cost). These 96" custom openings in the bulkhead are costly. Please advise if these openings in the bulkhead are required at the dimensions shown in this detail or should they be smaller? **YES – Provide 96" Openings.** Further, are these openings required on both sides of the bulkhead? **NO**

Addendum # 4 Questions:

3. Question Q41 was dealing with the subject of VFD's, not UV units. Please provide specifications for the VFD's to be furnished for the twelve (12) pumps.

For Clarification, the VFD's will be provided and installed by the Swimming Pool Contractor and Should be Provided by One of the Approved Pump Manufacturer's Turnkey with the Twelve Pumps Specified on the Swimming Pool Plans and Division 13 Specifications. The Electrical Contractor will be responsible for connecting power to the VFD and Pumps.

Below is a written spec. for the VFDs for the pool pumps. It's important to note that the electrical design needs to provide power to and from each VFD and pool pump. Furthermore, if remote start/stop switches or e-stops are part of the electrical design, interface with the VFD's will be required.

- A. Variable Frequency Drive Starters provided and mounted by the Swimming Pool Contractor. All low voltage control wiring connections (below 120V) to the respective pool systems shall be provided by the Swimming Pool Contractor. Line voltage and/or high voltage (120V and above) connections and interlocks shall be provided by the Electrical Contractor.**
- 1. Provide VFD starters for all pool pumps. VFDs shall be a product of H2Flow Controls, Pentair AcuDrive, Neptune Benson, or approved equal.**
 - a. The basis of Design: Eco-Flo-C by H2 Flow Controls.**
 - 2. It is the contractor's responsibility to ensure that all equipment is provided with the correct operating voltage and that all interconnected electrical and electronic equipment shall adequately communicate and operate the specified pumping equipment. All equipment installations shall meet or exceed the requirements of the National Electric Code and all other local and state regulations.**
 - 3. Specified equipment in this section shall be mounted in accordance with manufacturer's requirements and in a suitable location where indicated on the plans or approved by the Architect/Engineer. All electronic equipment installed where a corrosive atmosphere may exist shall be enclosed in NEMA 4 stainless steel or NEMA 4X nonmetallic enclosures. In other locations NEMA 12 enclosures are acceptable. The programmable and display features of all electronic equipment shall be accomplished via NEMA 4X enclosed key pads and operator backlit LCD Graphical/Alpha/Numerical Displays. VFD's installed within a supplementary panel shall not be vented or cooled from the ambient external air. With the exception of the VFD's heatsink and water-resistant heatsink fan, the VFD's electronics shall be fully sealed within the NEMA 12 or higher enclosure. So called 'NEMA 12 or NEMA 4 Vented' enclosures are not permitted.**
 - 4. The VFD shall convert incoming fixed frequency three-phase AC power into a variable voltage and variable frequency three phase output utilizing pulse width modulation. Advanced Space Vector Control will be utilized to reduce motor heating and provide precise control of the AC motor.**
 - 5. The VFD shall be capable of adjusting the pump motor speed based upon specific flow requirements. A 4-20 milliamp output signal from a Programmable Aquatic Controller, PLC,**

- electronic flow meter transmitter or another electronic device shall supply the required flow information to the VFD to regulate motor speed. The VFD shall be capable of interfacing to this analog output signal be commissioned to achieve a 'constant flow' condition. The VFD shall also be provided with a manually operated potentiometer to adjust the pump speed in the case of an electronic communication failure.
6. Electronic equipment shall be supplied with a phase rotational check capability. The contractor shall also be required to assure that a phase rotational check is accomplished with the bypass switch, herein specified, in the across the line position to assure correct rotation when connected to all motor power sources.
 7. The VFD shall include a built-in Line Filter to mitigate harmonic distortions being transmitted back through the supply lines.
 8. The VFD shall utilize DC link reactors to filter out bus ripple and provide smooth DC power to the transistor section.
 9. The VFD shall utilize IGBT transistors to produce a pulse width modulated output. SCR output stages are not acceptable.
 10. The VFD shall have a full load amp rating which exceeds or meets NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, and shall be able to provide 110% of its variable torque rating and 150% of its constant torque rating for one minute.
 11. The VFD shall utilize space vector control to reduce motor harmonics and torque ripple.
 12. The VFD shall include the ability to reliably protect the pump from any of the following abnormal pump conditions: Run Dry/Loss of Prime; Cavitation; Dead head/Closed Valve; Worn impeller; Blocked Filter; Bearing Failure/Wear Detection. Protection using measured current (Amps), as a method for these protective features shall not be acceptable.
 13. The VFD shall provide a display with selectable readout of parameters, including: Speed; Torque; Electrical Power; Current; Output Voltage; Frequency; Heatsink Temperature; Motor Temperature; Run Time; Energy Consumed; Mains Time.
 14. The VFD shall include the capability for copying of settings when multiple similar pumps are involved. Settings established in one VFD shall be transferred to the others via a removable keypad.
 15. All VFDs shall be provided with a bypass function to allow for pump motor operation by bypassing the variable frequency drive. Bypass mechanism may be internal to the VFD cabinet or provided in a separate enclosure with NEMA rating equivalent to the specified drive enclosure. NEMA 12 'vented' panels are not acceptable. The bypass shall be UL listed as a motor disconnect device.
 16. Three Motor Contactors shall be included. Contactor A is required to be in series with the Line Power supply and the VFD, Contactor C is required to be in series with the VFD and the motor and Contactor B is required to bypass the VFD. In 'VFD' operation, contactors A and C are engaged and contactor B is open. When in 'Bypass' mode, contactors A and C are open and contactor B is engaged.
 - a. All contactors shall be appropriately rated for the supply voltage and pump motor specified and shall be in accordance with NEC standards.
 - b. Contactor B shall include an appropriately rated Motor Overload.

- c. **Resettable pump motor overload protection shall be provided for both the VFD and across the line sources of power to all motors.**
- 17. **A Control Power Transformer shall be included so as to provide the necessary control voltage required to operate the Motor Contactors. The VFD panel or separate Bypass panel, shall include a door mounted 3-position lockable selector switch. The switch shall be labeled: VFD-OFF-BYPASS. The switch is to require a key to move from one position to another. Two keys shall be provided to the customer. The Bypass panel shall be manufactured in accordance with and approved to UL508.**
- 18. **All applications shall require the inclusion of an appropriately rated Line Reactor to reduce harmonic distortion. The Line Reactor shall be housed in an enclosure according to the manufacturer's instructions, taking careful note of the device radiated heat and the chemical environment in which it may be installed. Pentair Acu-Drive includes as standard a built in DC Link Reactor (equivalent to 5% Line Reactor). Where this is insufficient, a separate larger Line Reactor shall be provided.**
- 19. **All applications that will have a cable length between the VFD and the Pump Motor which exceeds 300 feet shall require the inclusion of an appropriately rated Motor Protection Filter (dV/dt filter). When included, the Motor Protection Filter shall be housed in an enclosure according to the manufacturer's instructions, taking careful note of the device radiated heat and the chemical environment in which it may be installed.**
- 20. **Installations in locations where a Power Disconnect is not within 'line of sight' of the VFD Control Panel, or where deemed necessary by local electrical codes, shall require the installer to provide a suitably rated Circuit Breaker Disconnect.**
- 21. **The VFD shall be UL listed to accept a supply voltage of -15% / + 10% of its stated supply rating.**
- 22. **The VFD shall be electronically lockable in order to prevent unauthorized or unintended program changes.**
- 23. **Motors to which the VFD is to be installed shall have a minimum insulation of "Class F".**
- 24. **User Interface for initial programming and day to day operation.**
 - a. **The VFD shall include a programmable Controller with an operator backlit LCD Graphical / Alpha / Numerical Display. The Controller shall comprise the following features:**
 - b. **Real Time Clock**
 - c. **Password protection**
 - d. **Hard-wired tamper protection feature**
 - e. **Custom software to control the VFD via a Modbus communication network.**
 - f. **Automatic Flow Control. The Controller and VFD are to automatically adjust the pump's speed in order to compensate for a filter becoming dirty. The system is to maintain a minimum flow (GPM) required to meet State mandated turnover rates.**
 - g. **Programmable speeds for daytime and nighttime turnover rates.**

- h. **Non-volatile memory. All programmed parameters as well as the real time clock settings shall be maintained in the event of a power outage.**
 - i. **The Controller shall be capable of interfacing to an analog output signal from a Flow Transducer and displaying measured flow in GPM**
 - j. **Automatic reset of alarms caused by power brown outs/power loss**
 - k. **External input for seasonal/unoccupied speed**
25. **Equipment specified in this section shall be programmed and tested under power after connection to the required motor by a factory trained technician.**
4. Please clarify the answer to question A41. Are the UV units shown in the chart on pg 13150-32 still to be provided? **YES**
5. Regarding Q19/A19, please provide new Master's drawings for the correct surge tank at the Lazy River. **Provide the Lazy River Surge Tanks per the Dimensions on Counsilman-Hunsaker (Pool Mechanical) SP 5.3 and Provide the Tank Structure per the Wall Thickness and Reinforcing Steel on Masters (Structural) SP4/6. Detail revisions will be reviewed and marked up during the Shop Drawing Submittal Process.**
6. Regarding the answer to Q25, please understand that the risk for the dewatering is solely on the contractors. Our dewatering operations could fill these existing ponds not to mention the addition of heavy rains or a tropical system. If our dewatering operations fill these ponds, are these ponds allowed to overflow through the three (3) existing overflow structures? **YES**
7. Regarding the answer to Q45, please provide details for the barrier required below the Bowl Slide. **After further review, no barrier will be required below the Bowl Slide. The slide will be provided with to comply with proper head clearance above the pool deck.**
8. To confirm what we understand in the answer to Q63, we are not to use detail W29 on Sheet SP4.6 to construct the Lazy river surge tank. Please confirm. **Provide the Lazy River Surge Tanks per the Dimensions on Counsilman-Hunsaker (Pool Mechanical) SP 5.3 and Provide the Tank Structure per the Wall Thickness and Reinforcing Steel on Masters (Structural) SP4/6. Detail revisions will be reviewed and marked up during the Shop Drawing Submittal Process.**
9. SP-16 on page 35 of the Project Manual indicates that the Prime Bidder is to be fully licensed to do business in the State of Florida and currently be licensed as a Certified General Contractor in the State of Florida. This project consists of all single-story structures. Certified Building Contractor (CBC) License allows for this license type to construct structures up to and including three (3) stories. If a prime bidder holds a Certified Building Contractor (CBC) license he is licensed to build the North Port Aquatic Center. Therefore will contractors with Certified Building Contractor (CBC) licenses be allowed to bid as a prime? **Yes**
10. Is "Builder's Risk Insurance" required on this project?
Contractor will need to obtain Builder's Risk Insurance during vertical construction phase of the project.

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Alla V. Skipper

Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173

E-mail: askipper@cityofnorthport.com

Receipt of Addendum No. 5 shall be noted within the Bid Form in the appropriate section.
End of Addendum No. 5

SECTION 09671 – RESINOUS FLOORING

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Work described in this section includes surface preparation and installation of Silikal reactive resin industrial floor system.
- B. See drawings for locations and quantities.

1.2 RELATED WORK - SPECIFIED ELSEWHERE

- A. Division 3 - Cast-in-Place Concrete.
 - 1. See paragraphs in Article 1.8 for requirements for new concrete.
- B. Division 9 – Exterior and Interior Painting

1.3 SYSTEM DESCRIPTION

- A. The Silikal 62 SLF is a 4-6mm (3/16"-1/4") thick troweled surfacing composite of Silikal 100% reactive binder resin and Silikal Fillers with specified Silikal primer and topcoat.
- B. The Silikal coating system shall cure completely and be available to normal operations in no more than 90 minutes at Temperatures as low as 0 °C. after application of the final coat.
- C. The finished Silikal floor coating system shall be uniform in color combinations, texture, and appearance. All edges that terminate at walls, floor discontinuities, and other embedded items shall be sharp, uniform, and cosmetically acceptable with no thick or ragged edges. The Contractor shall work out an acceptable masking technique to ensure the acceptable finish of all edges.
- D. See other Article 3 paragraphs for number and thicknesses of each coat/layer in each system.
- E. All resins must be manufactured and tested under an ISO 9001 registered quality system and ISO 14001 ecology management system.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Acceptable manufacturer: Silikal GmbH, Germany.
- B. Applicator Qualifications:
 - 1. Pre-qualification requirements: Only approved applicators, licensed by Silikal shall be considered for qualification. In no case will Silikal permit the application of any of its materials by untrained, non-approved Contractor or personnel.
 - 2. Each approved applicator shall have been qualified by the Manufacturer as knowledgeable in all phases of surface preparation.
 - 3. Each approved applicator must have three (3) years experience of installing resinous flooring systems and submit a list of five projects/references as a prequalification requirement. At least one of the five projects/ references must be of equal size, quantity, and magnitude to this project as a prequalification requirement. Owner has the option to personally inspect the projects/references to accept or reject any of the Contractors prior to bid time as a prequalification requirement.
- C. Subcontractor Qualifications:
 - 1. The only approved and specified subcontractors for this resurfacing work shall be for shot-blast cleaning of the concrete substrate.

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- D. Acceptance Sample:
 - 1. Representative sample of the specified flooring system shall be submitted to the Owner prior to the bidding phase of the project. All bidders shall inspect the "acceptance sample" before submitting their bids.
 - 2. The installed flooring system shall be similar to the acceptance sample in thicknesses of respective filmlayers, color, texture, overall appearance and finish.
- E. Bond Testing:
 - 1. Surface preparation efforts shall be evaluated by conducting Bond Tests at the site prior to application of the flooring system(s).
 - 2. See Article 3.3, Paragraph B, or consult with Material Manufacturer for specific procedure.
- F. Pre-Job Meeting
 - 1. Owner requires a Pre-Job Meeting with representatives of Owner, Contractor/Applicator, and Material Manufacturer in attendance. The agenda shall include a review and clarification of this specification, application procedures, quality control, inspection and acceptance criteria, and production schedules. Applicator is not authorized to proceed until this meeting is held or waived by Owner.

1.5 REFERENCE STANDARDS

- A. ACI 308 - Standard Practice for Curing Concrete
- B. ACI 302.1R-80 - Guide for Concrete Floor and Slab Construction
- C. United States Department of Agriculture (USDA) and (Food and Drug Administration (FDA) authorization) for incidental contact with foodstuffs.

1.6 SUBMITTALS

- A. Acceptance Sample: As required by owner, one foot square (1 ft. by 1 ft.) sample of the specified acrylic flooring system applied to hardboard or similar backing for rigidity and ease of handling.
- B. Manufacturer's Literature: Descriptive data and specific recommendations for surface preparation, mixing, and application of materials.
- C. Manufacturer's Material Safety Data Sheets (MSDS) for each respective product to be used.
- D. Cleaning and Maintenance

1.7 DELIVERY, STORAGE, AND HANDLING

- A. All material shall be delivered in original Manufacturer's sealed containers with all pertinent labels intact and legible.
- B. Store materials in dry protected area between 25° and 80° Fahrenheit. Keep out of direct sunlight. Protect from open flame; keep all containers grounded.
- C. Follow all Manufacturer's specific label instructions and prudent safety practices for storage and handling.

1.8 PROJECT/SITE CONDITIONS

- A. Material, air, and surface temperatures shall be in the range of 32° to 85° Fahrenheit during application and cure, unless a special formulation is being used and Manufacturer has been consulted.
- B. Relative humidity in the specific location of the application shall be less than 85 percent and the surface temperature shall be at least 5 degrees above the dew point.
- C. Conditions required of new concrete to be coated.

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1. Concrete shall be moisture cured for a minimum of 7 days at 70° F. The concrete must be fully cured for a minimum of 28 days prior to application of the coating system pending moisture testing.
 2. Surface contaminants such as curing agents, membranes, or other bond breakers should not be used.
 3. Concrete shall have a "rubbed" finish; float or darby finish the concrete (a hard steel trowel is neither necessary nor desirable).
 4. Drains should be set to the concrete grade rather than raised to the finished grade of the topping.
- D. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing. Concrete R/H must be 85% or less as measured by protimeter. Readings greater than 5 by the Calcium Chloride method or 85% by protimeter, may require a preliminary treatment with Silikal RE40.
- E. Foodstuffs are the responsibility of the Owner and shall have been removed from the area of application by the Owner or his representatives.
- F. Vapor barriers and/or suitable means shall have been installed beneath grade slabs to prevent vapor transmission. Consult technical dept.

1.9 WARRANTY

- A. Silikal warrants that materials shipped to buyers are at the time of shipment substantially free from material defects and will perform substantially according to Silikal published literature if used strictly in accordance with Silikal's prescribed procedures and prior to expiration date.
- B. Silikal's liability with respect to this warranty is strictly limited to the value of the material purchased.
- C. Silikal has no responsibility for the application and processing of products and is under no circumstances liable to any third party whatsoever.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Silikal GmbH, Germany
- B. No substitutions allowed.

2.2 MATERIALS

- A. Silikal 62 SLF Self Leveling Flake Flooring
1. Moisture Vapor Treatment (if required)
Silikal RE40
 2. Saturating Primer/Silikal Coat:
Silikal R41 with Additive I
 3. Patching/Sloping (if required)
Silikal R17 Polymer Concrete
 4. Coving (if required):
Silikal HK20 with #10-#12 mesh dry silica sand.
 5. Topping:
Silikal R62 SL, consisting of Silikal R62 resin and Silikal Filler
 6. Topcoat(s):
Silikal R71re Colorless Silikal Topcoat Resin.
 7. Silikal Flakes for broadcasting: Color/s to be chosen by owner.
 8. Aluminium Oxide (if required)

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2.3 PRODUCT PERFORMANCE CRITERIA

- A. Silikal RE40
1. Percentage Reactive Resin100%
 - Percentage Solids100%
 2. Water Pressure Resistance (3 days at 72 psi)Passed
 3. Resistance to Diffusion Against H₂O0.3g/m² • day
 4. Tensile Bond Strength.....475 psi
- B. Silikal R41 With Additive I
1. Percentage Reactive Resin100%
 - Percentage Solids100%
 2. Water Absorption, Wt. % (ASTM D570):less than 0.6
 3. Tensile Strength, psi (ASTM D638):.....3,550 psi.
 4. Tensile Modulus, psi X 10 to the 5th (ASTM D638):2.1
 5. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):0.000035
 6. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm:1015
Surface Resistance, ohm:.....1012
 7. Water Vapor Transmission (DIN 53122), g/cm-hr-mm Hg X 10⁻⁹: 1.4
- C. Silikal R17 Polymer Concrete
1. Percentage of reactive resin100%
 2. Water Absorption, Wt. % (ASTM D570):0.02
 3. Tensile Strength, psi (ASTM D638):.....1,200 psi.
 4. Tensile Modulus, psi X 10 to the 5th (ASTM D638):.....1.2
 5. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696) psi x10⁻⁶:18
 6. Compressive Strength, psi (ASTM C39).....7,800 psi.
(ASTM C109).....9,200 psi.
- D. Silikal R62 SL Topping
1. Percentage of reactive resin:100%
 - Percentage of solids:100%
 2. Water Absorption, Wt. % (ASTM D570):0.04
 3. Compressive Strength, psi (ASTM C109):6,000-8,000 psi.
(ASTM D695): 6,000 psi.
 4. Tensile Strength, psi (ASTM D638): 1,050 psi.
 5. Tensile Modulus, psi (ASTM D638):.....720,000 psi.
 6. Flexural Strength, psi (ASTM D790):3,500 psi.
 7. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):0.000019
 8. Electrical Resistivity, (ASTM D257) Volume Resistance, ohm-cm:1014
 9. Chemical Resistance, ASTM D543:
Effect of weak acids:none
Effect of strong acids:.....slight
Effect of alkalis:.....none
Effect of salt solutions:.....none
Effect of oil, grease:.....none
Effect of sunlight (UV radiation):.....none
- E. Silikal R71re Colorless Topcoat Resin
1. Percentage Reactive Resin:.....100%
 - Percentage Solids:.....100%
 2. Water Absorption, Wt. % (ASTM D570):0.5
 3. Tensile Strength, psi (ASTM D638):.....3,555 psi.
 4. Tensile Modulus, psi (ASTM D638):.....210,000 psi.
 5. Coefficient of Thermal Expansion (ASTM D696) in./in./deg. F:.....0.000035
 6. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm:1015

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Surface Resistance, ohm:.....	1012
7. Water Vapor Transmission (DIN 53122) g/cm-hr-mm Hg X 10-9:.....	1.43
8. Chemical Resistance, ASTM D543:	
Effect of weak acids:.....	none
Effect of strong acids:	slight
Effect of alkalis:.....	none
Effect of salt solutions:.....	none
Effect of oil, grease:	none
Effect of sunlight (UV radiation):	none

2.4 PRODUCT INSTALLATION & APPLICATION CRITERIA

- A. All Silikal Material Systems Excepting Moisture Vapor Treatment:
 - 1. Pot Life at 68° F.:.....10-15 minutes
 - 2. Cure Time at 68° F.:.....60 minutes
 - 3. Recoat Time at 68° F.:.....60-90 minutes

2.5 MIXES

- A. Follow manufacturer's prescribed procedures and recommendations.

PART 3 – EXECUTION

3.1 PREWORK INSPECTION

- A. Examine all surfaces to be coated with Silikal material systems and report to the Owner and/or Engineer any conditions that will adversely affect the appearance or performance of these coating systems and that cannot be put into acceptable condition by the preparatory work specified in Article 3.3.
- B. Do not proceed with application until the surface is acceptable or authorization to proceed is given by the Engineer.
- C. In the event that Applicator has employed all acceptable methods of surface preparation and cannot remedy adverse conditions that would lead to failure of the installation, Applicator shall withdraw from the contract and Owner will be financially responsible only for preparation efforts.

3.2 GENERAL

- A. Material storage area must be selected and approved by Applicator and Owner or his representative.
- B. Owner will furnish electricity and water for use by Applicator.
- C. If existing ventilation is inadequate, Applicator will provide sufficient ventilation to allow complete air exchange every five (5) minutes.
- D. Owner shall provide means for disposal of construction waste.
- E. Applicator will protect adjacent surfaces not to be coated with masking and/or covers. Owner's equipment shall be protected from dust, cleaning solutions, and flooring materials.

3.3 PREPARATION

- A. Surface Preparation - General
 - 1. Concrete substrate must be clean and dry. Dislodge dirt, mortar spatter, paint overspray, and other dry surface accumulations and contamination by scraping, brushing, sweeping, vacuuming, and/or compressed air blowdown.
 - 2. New concrete: See Article 1.8, Paragraph C, for requirements.

Butler Park Aquatics Center

3. Surfaces that are heavily contaminated shall be cleaned with the appropriate degreaser, detergent, or other appropriate cleaner/surfactant followed by thoroughly rinsing with fresh water to remove the accumulation prior to mechanical cleaning efforts. Mechanical cleaning will not remove such deposits, but only drive them deeper.
 4. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing and no more than 85% R/H as measured by Protimeter
- B. Bond Testing
1. The applicator shall evaluate all surface preparation by conducting bond tests at strategic locations.
 2. Mix six (6) ounces of the primer to be used in the application with 5% by volume Silikal Powder Hardener. Add #10-#12 mesh, dry quartz sand until an easily trowelable mixture is obtained. Apply palmsized patties 1/8" to 1/4" thick.
 3. After one (1) hour at (68° F.), patties must be cured tack-free and cooled to ambient temperature of concrete. Remove patties with hammer and chisel and examine fracture/delamination plane. Concrete with fractured aggregate must be attached to the entire underside of the patty.
 4. If only laitance or a small amount of concrete is attached or if interface between patty and substrate is tacky, further substrate preparation is required.
 5. If further surface preparation is required, bond tests shall be conducted again when this has been completed.
 6. If no amount or kind of surface preparation produces satisfactory bond tests, the applicator shall report that to the Owner, Engineer, and Manufacturer.
- C. Mechanical Surface Preparation and Cleaning
1. All accessible concrete floor surfaces shall be mechanically blast cleaned using a mobile steel shot, dust recycling machine such as BLASTRAC®, or approved equivalent. All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a profile similar to 40 grit sandpaper and exposing the upper fascia of concrete aggregate.
 2. Floor areas inaccessible to the mobile blast cleaning machines shall be mechanically abraded to the same degree of cleanliness, soundness, and profile using vertical disc scarifiers, starwheel scarifiers, needle guns, scabblers, or other suitably effective equipment.
 3. After blasting, traces or accumulations of spent abrasive, laitance, removed toppings, and other debris shall be removed with brush or vacuum.
 4. Conduct Bond Tests to check adequacy of surface preparation. See Article 3.3, Paragraph B, (Bond Testing).
 5. Application of the respective specified material system(s) must be completed before any water or other contamination of the surface occurs.

3.4 INSTALLATION

- A. Application of Silikal 62 SLF flooring system consists of:
1. applying moisture vapor treatment (if required)
 2. applying the primer,
 3. applying coving (if required),
 4. performing patching and sloping with polymer concrete (if required),
 5. re-priming polymer concrete areas
 6. applying the topping, broadcasting the Silikal Flakes.
 7. applying the topcoat(s),
Time for curing (45 - 60 minutes) shall be allowed between each coat.
Thicknesses are specified below.
- B. Open only the containers of component materials to be use in each specific application as needed. Refer to Manufacturer's data sheets for pot-life/temperature relationship to

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determine size of batches to mix and mix ratios for each respective coat of the system.

- C. Measure, add, and mix the Silikal BP-Powder Hardener into the respective resin components in the proportions recommended by the Material Manufacturer. Pot life is short, so mix only as much material at a time as can be easily and efficiently applied.

3.5 MOISTURE VAPOR TREATMENT (IF REQUIRED)

- A. Mix moisture vapor treatment products as recommended by manufacturer.
- B. Pour out all resin onto the concrete surface and spread it with a squeegee. After a short operating time (appr. 10 minutes) the excess must be removed with the squeegee. The remaining resin can be rolled out with a lint free resin proof roller. **Resin films as well as the building of puddles have to be avoided!**

The waiting time between the coats depends on the absorbency of the substrate and is normally between one and three hours. Before applying the second coat if required, the impregnation of the first coat into the substrate should be evident.

- C. If required, repeat the above process. During application of the treatment take care that there is no film building at the surface. The surface texture has to be maintained after every step.

3.6 PRIME COAT

- A. Mix primer components according to manufacturer's instructions.
- B. Pour the mixture batches onto the floor surface and use a 9" or 18" wide, 1/2" - 3/4" thick-napped, solvent resistant paint roller to roll out the material at a rate of 100 sq. ft./ gal. to form a uniform, continuous film, ensuring that all crevices, cracks, other surface discontinuities have been saturated and coated. Use a paint brush to reach areas inaccessible to the roller. Work quickly and deliberately; the pot life is short (10 -15 minutes). Do not leave any "puddles"; roll out any such accumulations.
- C. Allow the primer coat to cure.
- D. If any of the concrete has absorbed all of the primer or if the concrete still has a dry look, reprime these areas before applying the next layer.

3.7 COVING

- A. Surface Preparation
 - 1. If concrete walls are to be painted prior to installation of cove base, the bottom portion of the walls shall remain uncoated to the height of the cove base to insure a proper bond to the concrete wall.
 - 2. If walls are constructed of a non-compatible material or if a coating exists, a backer board of 1/2" cement board cut to the desired height of the cove base needs to be installed. The top of the backer board should be cut at a 45° angle to create a "beveled" edge.
 - 3. If a backer board needs to be installed it shall be fastened using a high grade construction adhesive as well as counter sunk screws or concrete masonry anchors.
- B. System Description
 - 1. Cove base shall be installed according to manufacturer's recommendations and shall be:
 - a) Application area requires prime coat according to Article 3.7.
 - b) Trowel-On Cove Base consisting of a trowel applied radius/base mix with a termination strip installed at the top of the base.
 - 2. Cove base will receive a broadcast and top coat consistent with flooring system.

3.8 PATCHING/SLOPING (IF REQUIRED)

- A. Mix polymer concrete components as recommended by the Material Manufacturer.
- B. Use mixture to repair any damaged concrete, or to slope any areas as needed.

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- C. Once cured, material must be re-primed before next layer is applied.

3.9 TOPPING

- A. Size the batches, and mix according to Manufacturer's instructions. The entire batch should be poured and spread at once, i.e., do not let material set in pail.
- B. Spread the topping material with a gauge rake set to a depth of 3/16". Lightly trowel to a uniform thickness of 3/16" as necessary.
- C. If necessary, roll with a porcupine roller to release trapped air.
- D. Broadcast Silikal flakes into the fresh material before it begins to cure. Broadcast by hand, or use a backpack type blower or sand blast pot to achieve an even broadcast. The flakes must 'rain' down and not be thrown into the wet base coat.
- E. Allow the topping to cure.
- F. Remove excess flakes by sweeping, "blow-down", and/or vacuuming.

3.10 TOP COAT

- A. Apply with clean rollers at a rate of 80 - 90 sq. ft./gal. in the same way as the Silikal Primer was applied as described in this section.
- B. (If Required) Broadcast aluminium oxide, or other suitable material into wet topcoat resin; size and rate as determined by owner.
- C. Allow topcoat to cure. Floors without aluminium oxide broadcast may be lightly sanded if required. Vacuum all dust, paying particular attention to edges and corners.

3.11 SECOND TOP COAT

- A. Apply with clean rollers at a rate of 100 - 125 sq. ft./gal. in the same way as the Silikal Primer was applied as described in this section.
- B. Allow topcoat to cure.

3.12 FIELD QUALITY CONTROL/INSPECTION

- A. Applicator shall request acceptance of surface preparation from the Engineer before application of the prime/seal coat.
- B. Applicator shall request acceptance of the prime coat from the Engineer before application of subsequent specified materials.

3.13 CLEANING

- A. Applicator shall remove any material spatters and other material that is not where it should be. Remove masking and covers taking care not to contaminate surrounding area.
- B. Applicator shall repair any damage that should arise from either the application or clean-up effort.

3.14 COATING SCHEDULE

- A. Moisture vapor treatment shall be Silikal RE40 application rate shall be approximately 220 sq. ft. per gallon (approx. 7 mils)
- B. Primer shall be Silikal R41 with Additive I Application rate shall be approx. 100 sq.ft. per gallon (approx. 16 mils).
- C. Patching/Sloping material shall be R17
- D. Flexible membrane shall be Silikal RV368 applied with a gauge rake set at 1/16" for a rate of

Butler Park Aquatics Center

- 40 sq. ft. per batch.
- E. Coving shall be Silikal HK 20 per manufacturer's recommendations.
 - F. Body coat shall be Silikal R62 SL, applied with a gauge rake set at 1/8" for a rate of 40 sq. ft. per batch. Flakes to be broadcast into the uncured topping. Broadcast the flakes at the rate of 0.15 – 0.25 pounds per sq. ft.
 - G. Clear topcoat shall be Silikal R71re ; apply at the rate of 80 - 90 sq. ft. per gallon for the first coat and 90 - 120 sq. ft. per gallon for the second application.

END OF SECTION 09671

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BUTLER PARK AQUATIC CENTER

GENERAL CONTRACTOR'S REQUEST FOR SUBSTITUTION

Request No. _____ Date _____

Project Name: North Port Aquatic Center (Buttler park Aquatic Center)

Project Name: _____

Contractor Name and Address: Marathon Engineering Corporation -DBA- Gold Medal Construction Corporation

Hereby requests approval of the following product or system as an "approved substitution."

Specification Section No. 09671 Page(s) 2 Paragraph 2.1

Drawing No (s). n/a Detail or Section No (s). n/a

USE SEPARATE FORM FOR EACH SUBMITTAL

Name and description of submittal for substitutions.
DecoFloor Quartz Aggregate System DFL-130 Seamless resinous flooring system

Manufacturer: Gold medal construction Corporation

Address: 5615 2nd Street West Lehigh Acres, FL 33971

Telephone: 239 303 7378

Vendor: Same as above

Address: _____

Telephone: _____

Are maintenance services and replacement parts available through vendor? not typically

Differences between proposed substitution and specified item? Same durability, less cost, single source product+instalation, Better warranty Local Company, Completely renewable, Zero VOC, Better for the environment.

For finish materials and prefinished equipment, list the colors available for the proposed substitution: See color selections available, attached.

Manufacturer's guarantees of the proposed and specified items are:

☒ Same ☐ Different Explain differences on an attachment.
Probably better in so far as we supply the material and install the

KIMLEY-HORN flooring. One source. We totallySUBSTITUTIONS AND PRODUCT OPTIONS
Stand behind our products and installation the owner 01630-4
is fully protected, No excuses.

BUTLER PARK AQUATIC CENTER

Reason for not giving priority to specified item:

Equivalent resinous seamless flooring product, environmental friendly, renewable and Zero VOC with anticipated cost savings. Product is produced and installed by manufactures forces located < 100 miles from project site.

Substitution affects other material or systems: ☒ No ☐ Yes (If yes, attach complete data.)

Enclosed data is (with specific marks related to substitution):

☒ Catalog ☐ Drawings ☐ Sample ☐ Tests ☐ Reports (Samples if requested)

☒ Other substitution request with side by side comparison and backup data

List items or elements that are the same as the specified item.

Attach list of similar projects using the product attachment. Include Owner, and Owner's representative to contact.

State effects of substitution on construction schedule, and changes in other work or project.

What license fees or royalties are required?

The undersigned states that the function, appearance, quality and results are equivalent or superior to the specified items and that Substantial Completion will not be affected.

Submitted by:

Contractor's Signature George Hrunka President/CEO
Marathon Engineering Corporation-DBA Gold medal
Firm construction corporation.

5615 2nd Street West, Lehigh Acres FL 33971

Address

(239) 303-7378

Telephone

4/17/2018

Date

Owner's Signature: George Hrunka President / CEO

For the Design Professional

☐ Accepted ☐ Accepted as noted
☒ Not accepted ☐ Received late

By: MH/NO CD

Date: 5/4/18

Remarks: PROVIDE SPECIFIED SYSTEM.



City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



May 2, 2018

ADDENDUM 4

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

DUE DATE: MAY 15, 2018 @ 2:00 PM

City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

Bidders are hereby notified that this addendum shall be made part of the above-named bid and contract documents. The following changes to the above bid are issued to modify, and/or clarify the bid and contract documents (the deletions are as ~~striketroughs~~ and additions as underlined). These items shall have the same force and effect as the original documents, and bids to be submitted on the specified date shall conform with the additions, deletions and revisions as listed herein.

ITEM #1: QUESTIONS/ANSWERS

Q1: So looking at the drawing for the Play Structure it appears as a AP250, but in the Spec it states an AP150 and no mention of a theme? Should I go with no theme and an AP150 so I can compete with everyone else?

A1: See response A2 below.

Q2: I have a couple questions referring to the Play Structure and the slide tower.

- 1) The drawing in the packet show an AP250, but the Specifications request an AP150? Also, there is no mention of the play structure having a Theme?
- 2) We understand the alternate for the bowl, however with that alternate should the tower still be built so the bowl can be added in the future?

A2: 1) AP250TB with Beach Theme, including city logo on the dump bucket, palm trees, surfboard and graphics to match.
2) Yes.

Q3: Are the 2 buildings to be priced separately?
If so, will they be ordered and built simultaneously for best construction economy?

A3: Yes, the buildings are to be priced separately and yes, they will be ordered together.

- Q4: Locker elevation on Sheet No. AB5.1 indicates 4" high base over concrete pad. Typically either concrete pad **OR** 4" base is used. Is it the intention of this design to use both, resulting in elevating lockers to 8" above floor?
- A4: All the lockers are to set on concrete bases and that manufactured curbs are not required.**
- Q5: Life Safety Plans indicate only 1 fire extinguisher for each building. Appears insufficient. Please advise if additional fire extinguishers are required.
- A5: Fire extinguisher requirements will comply with NFPA-10. More may be needed. The final locations will be based on accessibility and need.**
- Q6: Life Safety Plan Legend for each building refers to FE – Fire Extinguisher. No reference to FEC – Fire Extinguisher Cabinet.
- A6: See A7. No fire extinguisher cabinets are required.**
- Q7: Spec section if offered for stainless steel cabinets. Are cabinets required for each fire extinguisher? Can equal Stanley products be an acceptable manufacturer for this project also? **Yes**
It will give the owner at least two manufacturers quotes to choose from allowing for more competitive pricing on the project.
I have attached catalogs for your review—Stanley equal lock products to Schlage "L" series shown per the specifications are shown in catalog ST-CH-0005 above, QMS & QME series, pages 12-17; door closers, equal to LCN4040 shown per the specifications are the Stanley QDC100 series, pages 71-73 in catalog ST-CH-0005; exit devices equal to the Von Duprin 99 series shown per the specifications are Stanley Apex2000 series, listed in the Apex 2000 series catalog above.
- A7: No fire extinguisher cabinets are required. Fire extinguishers shall be wall mounted with a bracket. Stanley is an acceptable manufacturer for the hardware.**
- Q8: Could the City provide a copy of the plan holder list?
- A8: See Addenda #2 which is available on the City FTP site and www.demandstar.com to date. To date, According to Demandstar 1062 suppliers were notified, 52 planholders have obtained specs/plans and an additional 37 suppliers were added to the list from various sources by Purchasing.**
- Q9: The pool structural drawings by Master Consulting Engineers (structural concrete drawings Sheets SP4.1, SP4.2, SP4.3 and SP 4.4) show 180 degree bar bends at the recessed steps. These bars are #5 and #6 bars (see attached bar bend dimensions from CRSI). There is not enough space to provide 180-degree bends at the recessed steps. Please advise. Further, these sheet designations by Master should be revised because there other pool drawings that have the same designation.
- A9: Any required reinforcing steel revisions can be submitted in the shop drawings which will be reviewed by the Structural Engineer.**
- Q10: We have downloaded the plans for the North Port Aquatic Center on 2 different occasions and we continue to get the following messages from Acrobat when trying to view the documents:
1. Cannot find or create the font 'ArialMT'. Some characters may not display or print correctly.
 2. An error exists on this page. Acrobat may not display the page correctly. Please contact the person who created the PDF document to correct the problem.

It appears that most of our problems are associated with being able to view the complete content of pages 114 thru 149.

A10: See Addendum 2

Q11: My name is Sam Weber with Weber Group, Inc. We're a Design + Build company specializing in branding and theming for parks across the country and abroad. We were contacted about our interest in the Butler Park Aquatic Center expansion project. Although we don't believe we can be cost competitive on most of the current elements included in the plans, I do see an opportunity to offer our services for consideration.

The current expansion plans for the Park do not appear to include any branding or theming, which generate and increase revenue. I've prepared an informational packet on the many benefits of including branding and theming to municipal park projects, including examples of past projects and our process.

Please let me know if this is something you'd like to consider moving forward with your Park expansion.

<http://webergrouppinc.com/>

A11: No additional design consulting or theming is required.

Q12: My name is Alex Grizzle and I am a Design Consultant with Shade Systems Inc. in Ocala, Florida. We recently reviewed preliminary plans and specifications for your project for the North Port Aquatic Center – North Port, FL that will be bidding May 1st. In the plans it notes that the project will be utilizing shade structures at various locations. We would like to ask for your consideration of approving Shade Systems Inc. as an alternate for this project. I have attached preliminary drawings of the various structures for the bid.

Shade Systems Inc. has been providing shade structures, covers, tents, awnings, umbrellas, and shade canopies nationally for over a decade. Our product lines are perfect for playgrounds, pools, schools, and other outdoor spaces where people and children seek protection from the sun's harmful U.V. (Ultra Violet) rays.

- Our fabric shade structures and canopies are more affordable than traditional metal or wood shelters. Shade Systems Inc. feature a sturdy hurricane-rated metal frame with wind ratings of the shade installed of 90MPH and metal structural frame only of 165MPH. Our remarkable CoolNet™ fabric screens up to 99% of the sun's ultraviolet rays while still allowing children and adults to enjoy the outdoors for extended periods of time comfortably and safely.
- Our patented and time-tested **Turn-N-Slide™** fastening system makes it easy to install and remove the fabric canopies for winter or in case of severe weather. Add that each side of canopy has an independent cable that's pre-cut and looped at the factory - no continuous cables requiring in the field measuring and cutting. Our patented design includes a vandal-resistant hex key and requires only a common socket wrench - no special tools for installing or removing your canopy.
- We stand by our products with the industry best warranties of (20) year frame corrosion– (10) year fabric – (1) year for structural failure of any part not covered by one of the other warranties.

You can see that it is our commitment to design and manufacture outdoor shade systems which meet the customer's objectives for providing protection from the sun's ultra-violet rays, heat, glare, and hail. Our products will be built to exacting standards which deliver **QUALITY**, at an **ECONOMICAL** cost which ultimately provides the customer with long term **VALUE**.

The link below will also let you explore all the details above and show our full line of shade products that we can provide.

Thank you for your time and consideration. We hope that Shade Systems Inc. can be a shade solutions provider that provides the coolest solutions under the sun.

- A12: Request for substitutions of this type must be submitted through the general contractors. At this time, Shade Systems is not considered an equal to the structures specified.**
- Q13:** I would like to request a hardscape and site furnishings list for the above referenced project. We are a commercial manufacturer of commercial outdoor pool and patio furniture located in Ocala, Florida. I have request this previously from Clint Riley of Magnum Builders. Thank you for your assistance in this matter.
- A13: All site furnishings for this project are clearly described on the plans. See Sheets C5 through C11.**
- Q14:** We respectfully submit our substitution request for the resinous flooring as specified in section 09671 - RESINOUS FLOORING
Attached is the substitution request form from your project manual and our form appended to it.
Also attached is our literature providing additional information.
-
- Substitution
Request form DecoC
- A14: Section 1719 09671 RESINOUS FLOORING 180417 (Revised 04.17.2018) replaces Section 1719 09671 RESINOUS FLOORING 17115. Specification Section 09672 RESINOUS FLOORING (Add Alternate One) 171115 is deleted. Specification Section 1719 00001 INDEX – Architectural 180417 (Revised 04.17.2018) which replaces Section 1719 00001 INDEX – Architectural 180222. (See Attached)**
-
- 1719 09671
Resinous Flooring 1
-
- 1719 00001 INDEX -
Architectural 180417
- Q15:** Swimming pools 13150-3 1.03 Quality Assurance. A.1 Who do we send our qualifications to so we can be on the list of pre-approved contractors
- A15: Recreational Design & Construction, Inc. (RDC) is approved as a swimming pool contractor and is added to Division 13 of the specifications. Other swimming pool contractors will not be considered after the bid due date. The Bidder must include their swimming pool contractor on their bid form.**
- Q16:** In the soils reports, borings B4 & B5 are the borings located in the competition pool, the soils report have N.D. as the “water table depth”. can you help in providing the information.
- A16: No additional information is available.**
- Q17:** In the soils reports, borings B4 doesn’t have the Blow counts listed.
- A17: No additional information is available.**
- Q18:** To promote competition and economic pricing for the pool cementitious finishes, can products such as CL Industries ‘Krystalkrete’ and ‘Sunstone’ or Florida Stucco products be substituted for the SGM ‘Diamond Brite’? Both of these products (CL Industries and Florida Stucco) are utilized extensively and primarily in Florida in lieu of Diamond Brite. Both CL Industries and Florida Stucco can provide colored-quartz aggregates and pebble finishes similar to the SGM and Pebble Tec. These companies can also provide the bond coats required. If they are acceptable, we need color selections for pricing. Please advise.

A18: Pool finishes are to be bid per Specifications - Section 13153.

Q19: Referencing the Lazy River pool drawings Sheets SP0.0 and SP5.3 compared to Master Engineers drawing Sheet SP1.3 for the lazy river, the surge tanks are two different sizes. Please advise.

A19: Pool drawings SP0.0 and SP5.3 accurately detail the sizes of the Lazy River Surge Tanks.

Q20: Spec. Section 13150 pg 2 calls for “Construct the cast-in-place or pneumatically applied concrete for the pool shell(s) and cast in place surge tanks...” As an alternate method of construction for the surge tanks, can the surge tanks walls be constructed as pneumatically applied concrete? And, can the lids of the of the surge tanks be precast and then set -in place? Please advise.

A20: Surge tanks are to be constructed as designed as cast in place.

Q21: Spec. Section 03290 ‘Under Slab Vapor barrier’ calls for vapor barrier below slabs-on-grade. Is the vapor barrier required under the floors of the pools and surge tanks? Please Advise.

A21: Yes

Q22: Spec. Section 03010, Concrete for Pool Structures, does not specify a min compressive strength nor does it specify a water-to-cement ratio requirement. Please advise.

A22: All pool structures are to be a minimum compressive strength of 4000 psi. Mix designs to achieve the required strength are to be submitted for approval during construction.

Q23: Spec. Section 03370 Pneumatic Concrete for Swimming Pools does specify a min compressive strength (4000 psi) but does not specify a water-to-cement ratio requirement. Please advise.

A23: See response to question A22 above.

Q24: Spec. Section 13150 pp 67-69 calls for a water tightness test for the pool shells prior to the application of the plaster finish. Shotcrete walls are porous and would not pass this test. If the method of construction is pneumatically applied concrete for the pool walls, can the water tightness test be performed after the plaster finish of the pool? Please advise.

A24: The American Shotcrete Association defines shotcrete placed per ACI350 as watertight. All pools, gutter systems and surge tanks will be required to be tested per Section 13150 – Part 3.05.

Q25: For the construction of the pools and surge tanks, dewatering will be required which includes the pumping and discharge of ground water into the existing retention areas. Is this permissible? Once dewatering starts, we will be pumping water 24 hours a day 7 days a week. Further, One of the retention areas has existing three (3) overflow structures. In the event that the retention areas become full of water, is it permissible for the water to overflow into the adjacent wetlands to which these structures are connected? Further, even if we are to pump water around the clock, at some point we will get heavy rains or a hurricane which will completely fill these retention areas and we will no longer have any discharge capacity. Has SFWMD been contacted to review and approve the discharge of groundwater and have the issues raised above been addressed? Please Advise.

A25: Dewatering must comply with any City, State, and Local requirements. The pond adjacent to the pool is intended to be used for any project drainage discharge. The SFWMD permit is in review and to the best of our knowledge being approved at this time. Hope to have paperwork soon. This is the Environmental Resource Permit (ERP).

- Q26: The project documents call for precast coping at the Lazy River provided by Federal Stone or Dallas Cast Stone. Federal Stone is out of Maryland and Dallas Stone is out of Dallas Tx. Can precast coping by DC Kerckhoff who is located in Naples FL be approved for this product? Please Advise.
- A26: Provide pre-cast coping stone by Federal Stone or Dallas Stone. DC Kerkhoff is not an approved supplier.**
- Q27: Detail 3 on Sheet SP1.6 illustrates a recess upon which the pool deck is set or upon which the grate is to set. There is no dimension for these recesses. Please advise.
- A27: Refer to pool structural drawings for pool/deck structural interface.**
- Q28: Between Spec Section 13150 para 2.17 'Waterproofing' and Section 13153 'Swimming Pool Cementitious Finish' para 2.01, there is required in addition to the plaster finish, one coat of 'Bond Kote' and 2 coats of Aquaron CPSP with the Aquaron CPSP being applied prior to the Bond Kote. Are all these materials required? Please Advise.
- A28: Water proofing noted in Section 13150 Part 2.17 is for the surge tanks and backwash pit only. Aquaron CPSP is not noted in Section 13153.**
- Q29: Further to our prior question regarding the substitute of CL Industries or Florida Stucco products, Spec. section 13153 calls out two (2) different types of plaster finishes; Diamond Brite and Pebble Tec/Pebble Sheen. Is the Pebble Tec/Pebble Sheen product required on this project? Please Advise.
- A29: The intent of Section 13153 is to allow either Diamond Brite OR Pebble Sheen.**
- Q30: Spec. Section 13153 pg 3 is for the acrylic coating. Para 2.03.A under 'Primer' calls out "On old concrete, saturate..." Does this also apply to new concrete? Please Advise.
- A30: No, this does not apply to new concrete.**
- Q31: Sheet SP1.5 illustrates pace clocks, a timing system rough-in and a scoreboard. There is no specification for the timing system or scoreboard. Please advise.
- A31: Timing system is a future addition by the Owner. Timing system is a future addition. Only the electrical rough in for the future timing system is required.**
- Q32: Without a specification for the timing system, have the electrical plans accounted for this added system and if so are they adequate? Please Advise.
- A32: Further information can be requested during construction if required.**
- Q33: Spec Section 13150 pg 46-47 calls for nine (9) rear access step starting blocks (confirmed in detail 1/SP1.7). The drawings for the bulkhead show the starting blocks with a side-step (see detail 1/SP1.8). Are we to provide 9 blocks for the pool and 9 blocks for the bulkhead? Please Advise.
- A33: Correct – 9 Side Step Starting Blocks for the bulkhead and 9 Rear Step Starting Blocks for the pool deck.**
- Q34: Spec Section 13150 pp 48 under 'Pool Lift' calls for four (4) lifts but only 2 are shown on the plans (one at the Comp Pool and one at the Lazy River). Please advise.
- A34: Four (4) pool lifts are to be provided. Final locations will be shown on the final construction set issued to the selected General Contractor.**

- Q35: Spec Section 13150 pg 47-48 para H.1 and H.1.a calls for a custom color 'white' for the one-meter springboards. Duraform does not offer a custom color of any kind. Please advise.
- A35: Provide the dive stands in the standard Duraform color.**
- Q36: Spec Section 13150 pg 48 para J. calls for four (4) surge tank access hatches but there are only 3 surge tanks. Please advise.
- A36: Provide access hatches for any surge tanks required on the plans.**
- Q37:** We are requesting further clarification regarding the qualification requirement stated in addendum # 1. We believe it important to clarify the qualification requirement stated in addendum # 1 and throughout the Project Manual to state that the prime contractor can use the qualifications of (1) one of the pre-qualified pool contractor under spec section 13150 in combination with their own qualifications to meet the overall qualification requirement of this project. Therefore the formal question we are asking to be answered in addendum is as follows:
- Can the prime contractor use the qualifications of (1) one of the pre-qualified pool contractors in combination with their own experience with other definable features of work i.e. new vertical construction to meet the overall qualification requirements of the project?
- A37: Yes, the prime contractor and a pre-qualified pool contractor may combine their experience to meet the Minimum qualification requirements.**
- Q38: Electrical Drawings: EB-2.0 (Bathhouse Building Lighting Plan)
- Q38A: * The light fixture schedule has a note at the bottom that states the following: EC shall provide add alt. for LED option of light fixtures noted in schedule.
- A38A: No alternate for LED lighting is required.**
- Q38B: * Will an alternate LED light fixture schedule be provided?
- A38B: See A38A above.**
- Q38C: * If so, please send LED light fixture schedule with RFI response.
- A38C: See A38A above.**
- Q39: On plan C-11, 4'h and 8'h fence drawing indicate 1 3/4" sq rail and 1" sq picket, which is industrial grade. But on Note of same plan C-11, it calls for 3/8" sq. picket and commercial grade. Could you verify that which grade plan calls for?
- A39: Provide Industrial Grade.**
- Q40: On Detail 1/SP1.8, the starting block for the bulkhead shows an adjustable, angled backplate. Detail 1/SP1.7 does not show an angled backplate. Are adjustable backplates required?
- A40: No.**
- Q41: Spec Section 13150 pg 3 para F.2 calls for the "...motor starters [VFD's], auxiliary contacts, magnetic relays and other control devices..." to be furnished and installed by the electrical contractor. The electrical drawings, spec Sheet EF3.1, illustrates the twelve (12) VFD's for the pool pumps but there are no notes describing the

VFD's to be furnished, and, the electrical specifications also do not address the VFD's for the pool pumps. Please provide the specifications of the VFD's that need to be furnished.

A41: Remove Section 13150 – Part 2.06 – Item C (4) Lines b,c,d,e,& f.

- ~~a. The system for the Competition Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,600 GPM with 10" return to pool pipe size and be a model PMD320E1/10AW.~~
- ~~b. The system for the Lazy River Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 500 GPM with 6" return to pool pipe size and be a model PMD200D1/8AW.~~
- ~~c. The system for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 300 GPM with 4" return to pool pipe size and be a model PMD150D1/6AW.~~
- ~~d. The system for the Water Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,155 GPM with 8" return to pool pipe size and be a model PMD320E1/8AW.~~
- ~~e. The system for the Sprayground Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 158 GPM with 4" return to pool pipe size and be a model PMD150C1/4AW.~~

Q42: Sheet SP1.1 from Master Consulting Engineers depicts two (2) floor longitudinal construction joints and three (3) transverse floor construction joints for the Comp. Pool. Are we to place the construction joints in the walls at these same locations? And, are there any other requirements for constructions joints in the walls? These questions also apply to the Lazy River.

A42: Any joints in the floors shall also have joints in the walls. The Structural Engineer will verify final locations during shop drawing review.

Q43: Spec Section 13150 pg 55 para 2.20.A calls for "The Directional Jet No 1 VOR-305.4000 (10 required) ..." by Vortex. There are three (3) of these shown on Sheet SP3.0 at the Children's Pool and sixteen (16) shown on Sheet SP2.0 at the Lazy River for a total of nineteen (19). Please confirm the exact quantities required and the proper locations.

A43: The Lazy River has sixteen (16) Directional Jets. Children's Pool has three (3) Directional Jets. Locations will be shown on the final construction issued to the selected General Contractor.

Q44: Spec Section 13150 pg 59 para 'D' calls for 4 different Water Odyssey water features for the Children's Pool but these water features are not shown on the plans. Wavy Palm Trees and Directional Water Jets by Vortex are shown and floor bubblers are shown. Please advise.

A44: See A58.

Q45: For the Alternate 'Bowl Slide', will there be a barrier required around the bowl if the alternate is accepted? Code requires a barrier at the pool deck where head height is less than seven (7) feet.

A45: Yes.

Q46: The various details on the pool structural sheets by Master, specifically sheet SP4.4, calls for expansion joint material where the pool deck is setting in the recess of the pool beam. Is a sealant required at these locations?

A46: Sealant will be required on any joints.

Q47: Can you tell me if there will be any furniture needed for this project?

A47: Refer to Plans Sheets C5 to C11.

Q48: The current schedule for the project is a set date which places a significant risk on the contractor as we are not guaranteed a specific start date. Additionally, the rain day impacts are an additional burden on the contractor due to this "set date". We respectfully request that the City consider stipulating a number of work days from NTP rather than a firm date.

A48: The calendar days will be used in lieu of working days as per the project manual.

Q49: The current schedule is very aggressive based on the current market conditions along with the magnitude of the work involved with this project. The type of schedule can often times compromise the overall quality of the project while incurring a significant pricing increase on the bids. Would the City take into consideration a duration adjustment consistent with a project of this magnitude? Our initial estimate is a 12-month duration for a project of this size.

A49: See Addendum 3 for the revised and extended dates.

Q50: Based on the new plans and addendum's/future addendum's we respectfully request a bid date extension, as many supplier/subcontractors are not able to turn around pricing in such a quick manner.

A50: See Addendum 3 for the revised and extended dates

Q51: Please if a NPDES and SWFMD permit are in place for this project? Also, has the City applied for a dewatering permit?

A51: A SWFMD permit is in process. The General Contractor will be required to prepare and submit the NPDES and dewatering permits.

Q52: Please advise if the building permit is approved and ready for construction? City pays for all permit fees?

A52: The building permits are currently under review and should be completed soon. The City will be responsible for all associated permit fees.

Q53: Current site contains an existing playground structure. Is there a set date for removal by the City?

A53: The playground structure will be removed prior to construction by the City.

Q54: Sheet SP5.5, Detail 10, pool fill system shows a magnetic drive water meter that we are to provide but there is no model referenced in the spec's. Please advise.

A54: Water meter shall be a Sensus or Neptune Technology water meter with a re-settable totalizer. Water meter size to meet filter room fresh water line size shown on plumbing drawings.

Q55: Detail 4 Sheet SP1.7 of CH's drawings illustrate the two (2) 1-meter dive stands. This detail does refer to the structural drawings for the dive stand thickened slab but there is no detail. We need information regarding the dimensions, concrete thickness and reinforcing steel requirements for the thickened slab anchoring the stands. Please advise.

A55: Thicken pool deck to eighteen inches (18") and reinforce with a double mat of #4 reinforcing bars 12" on center.

Q56: On the Master Engineers' sheet SP4.4 ref details 'H', 'J' and 'K', the details are not taking into account the final plaster finish. Typically there are 2 rows of 2x2 tile; one row on each side of the joint. Then the sealant can be installed within the gap created by the tile. Please advise if these details should be revised.

A56: Provide one row of 2x2 tile on each side of any joints for a plaster stop and provide joint sealants at the joints in all walls and floors

Q57: Spec Section 13150 pp 31-32 call out UV units (para 4.b, c, d, e and f but these UV model numbers are confusing). The chart following these paragraphs call for only 3 UV units as does the schematics on Sheets SP6.0, SP6.1 and SP 6.2. Please clarify what the items in b, c, d, e and f are referring to.

A57: Remove Section 13150 – Part 2.06 – Item C (4) Lines b,c,d,e,& f.

~~a. The system for the Competition Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,600 GPM with 10" return to pool pipe size and be a model PMD320E1/10AW.~~

~~b. The system for the Lazy River Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 500 GPM with 6" return to pool pipe size and be a model PMD200D1/8AW.~~

~~c. The system for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 300 GPM with 4" return to pool pipe size and be a model PMD150D1/6AW.~~

~~d. The system for the Water Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,155 GPM with 8" return to pool pipe size and be a model PMD320E1/8AW.~~

~~e. The system for the Sprayground Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 158 GPM with 4" return to pool pipe size and be a model PMD150C1/4AW.~~

Q58: LAZY RIVER FILTERS

Project manual Pg. 13150-20 shows 2 ea. filters on the filter chart.

Plans SP5.1 shows 4 filters, stacked.

Which is correct?

A58: Four (4) Lazy River Filters are required.

	Units	Competition Pool	Lazy River Pool	Children's Pool
Volume	Gallons	526,507	221,496	18,133
Flow Rate	GPM	1,600	1,250	310
Filter Model		Four (4) 4896SHFFG	Two (2) Four (4) 4884SHFFG	One (1) 4284SHFFG
Filter Size	Sq. Ft.	128.0	126.8	27.4
Turnover Rate	Hours	5.38	2.95	.97
Filtration Rate	GPM/Sq. Ft.	11.20	9.86	11.31

Q59: CHILDREN'S PLAY FEATURES

Project manual Pg. 13150-59 shows "Playground Features By Water Odyssey"

Plan SP4.5 do not show these features or details of the features.

Are these features eliminated?

A59: Features identified in Section 13150 – Part 2.20 – Line D - Items 1,2,3, 4 & 5 are not required for this project.

~~A. Children's Pool Features~~

~~1. Sprayground Features by Water Odyssey, (512) 392-1155, <http://waterodyssey.com>, or approved equal.~~

~~2. Jet Way~~

~~a. Three (3) Required~~

~~b. Model Number: W011~~

~~c. Hydraulic: Maximum recommended, 4'-0" Height; 9 GPM @ 4 PSI per nozzle~~

~~3. Geyserino~~

~~a. One (1) Required~~

~~b. Model Number: W073~~

~~c. Hydraulic: Maximum recommended, 5'-0" Height; 75 GPM @ 8 PSI per nozzle~~

~~4. Aqua Arch~~

~~a. Four (4) Required~~

~~b. Model Number: W006~~

~~c. Hydraulic: Maximum recommended, 4'-0" Height x 7'-0" Throw; 5 GPM @ 3 PSI per nozzle~~

~~5. Water Cage~~

~~a. One (1) Required~~

~~b. Model Number: W012~~

~~c. Hydraulic: Maximum recommended, 4'-0" Height; 60 GPM @ 3 PSI per nozzle~~

Q60: CHILDREN'S POOL PALM TREES

Project manual Pg. 13150-56, 2.20 Water Features Support Section B. Wavy Palm Tree. Shows Vortex model VOR-0510.2XXX.

This model Wavy Palm does not have tipping coconuts.

Plan SP3.2 (Detail 5/SP3.2) shows the Wavy Palm Tree with tipping coconuts.

Are tipping coconuts wanted?

A60: Provide Wavy Palm by Vortex VOR-0510. Tipping coconuts are not required.

Q61. FILTRATION

Would Poltank filters be an acceptable substitution for the sand filters?

A61: Poltank is not acceptable for this project. Provide acceptable filters per Section 13150 Part 2.03

Q62: TIMING SYSTEM AND SCOREBOARD

Plans SP1.5 and SP1.8 reference both timing system and scoreboard.
Project manual does not contain and information on either.
Is timing system wanted?

A62: Scoreboards and timing systems are to be provided by the Owner. Electrical rough-in only shall be included in this project.

Q63: Referencing the details and sections for the Lazy River surge tank (Sheet SP4.6), recall from our earlier RFI that the master's SP drawings don't match CH's drawing with regard to the surge tank for the L River. Further, as we are evaluating the construction of the surge tank, Master Engineers shows a subfloor below the L River floor which is part of the L River surge tank structure. Is this really necessary? Can we recommend there be no subfloor that extends beyond the wall of the L River? This will be a very costly installation.

A63: Surge tank is to be constructed to match inside dimensions shown on SP5.3.

Q64: The drawing (AB1.4 & AF1.4)) calls for a Silikal Monolithic Flooring system with a Flake Blend. Spec. Section 9671 calls for: Basis-of-Design Product: Subject to compliance with requirements, provide the HSS DQB, 1/8-inch Decorative Quartz Broadcast Flooring System by Horizon Surface Systems as indicated on drawings. Flooring contractors are indicating that these are 2 different products and application methods.

A64: See A14.

Q65: There is also another spec 9672 that is to be bid as an alternate which is a different application than the other 2 applications. Please advise which product and application is correct. Also please clarify where spec. 9672 is to be used as the alternate and what alternate number.

A65: See A14.

Q66: I wanted to send a quick email to see if I can send quotes on playground equipment or shade here. I work with Little Tikes Commercial and would love to assist.

A66: No playground equipment is included in this project. The only approved shade structures are for USA Shade.

Q67: We would like for Blayne with Concure Systems, the leading manufacturer of flooring and concrete moisture prevention systems to be added to specifications section 03300.

A67: Alternate systems are not required. Provide flooring and admixtures as specified.

ITEM #2: DELETE SP-23 CRITERIA FOR AWARD and REPLACE with the Revised

SP-23 CRITERIA FOR AWARD: The award of this bid shall be to the overall lowest responsive, responsible bidder who in the judgment of the City, meets or exceeds the minimum requirements of these specifications. The basis of award shall be the Base Bid plus the Add Alternate Bid Item to be awarded. At the sole discretion, the City reserves the right to award none or the one Add Alternate Bid Item. The Contractor shall have no basis of claim for either the time or cost should the City elect to award none or one of the Add Alternate Bid Items.

Other consideration(s) of award may be local preference, qualifications, and references. Any unfavorable references may be cause to deem bidder non-responsive.

The City reserves the right to reject the bid proposal of any bidder who has previously failed to perform properly, or on time, contracts of similar nature; or who is not in a position to satisfactorily perform the contract. If, after bid opening, the lowest bidder is deemed non-responsive by the City, the bidder shall follow

protest of this bid in accordance with chapter 2, Article VIII Section 2-409 of the City of North Port Code of Ordinances. Failure to file a protest in accordance with above shall constitute a waiver of the right to protest.

Received 4/30/2018

ITEM #3:

SQ1: SUBSTITUTION QUESTION:

Request for Equipment Substitution:

In lieu of multiple individual components;

- 1 Variable drives
- 2 Chemical Controllers
- 3 Electronic Water Level Controllers
- 4 Lighting Controllers
- 5 Filter Controllers
- 6 Water Feature Controllers
- 7 Alarming
- 8 Remote Controlling
- 9 Data Logging

We would like to provide a "AQUASCADA" UL listed control center manufactured in the United States by "CPI". This is a complete, compact SCADA system designed to control all of the equipment instead of utilizing various multiple units. Please review the attached information and confirm if this would be acceptable for the Butler Park project. (see attached documentation)

SA1: AQUASCADA is not approved for this project. Provide the equipment as specified.

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Alla V. Skipper

Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173

E-mail: askipper@cityofnorthport.com

Receipt of Addendum No. 4 shall be noted within the Bid Form in the appropriate section.
End of Addendum No. 4

Member Name City of North Port
Bid Number RFB-2018-35-0-2018/AS
RFB NO. 2018-35 NORTH
PORT AQUATIC CENTER
('identified in the Plans
as': Butler Park Aquatic
Bid Name Center)

5 Document(s) found for this bid

52 Planholder(s) found.

Supplier Name	Address 1	City	State	Zip	Phone
A2 Group	18245 Paulson Dr	Port CHarlotte	FL	33954	9412062288
Ajax Building Corporation	1080 Commerce Boulevard	Midway	FL	32343	8502249571
AuMiller Pools LLC	8468 Tangelo Tree Dr.	Orlando	FL	32836	4078082660
Avalanche Waterslides	319 1st Street	Chamois	MO	65024	5733559234
ConstructConnect	3825 Edwards Rd	Cincinnati	OH	45209	8772271680
Construction Journal, Ltd.	400 SW 7th Street	Stuart	FL	34994	8007855165
Core & Main	590 Ferguson Drive	Orlando	FL	32805	4073837008
CREATIVE SIGN DESIGNS		TAMPA	FL		8008044809
D.L. Porter Constructors, Inc.	6574 Palmer Park Circle	Sarasota	FL	34238	9419299400
David Kuxhausen Construction LLC	PO BOX 21932	SARASOTA	FL	34276	9415363871
DeAngelis Diamond Construction, Inc.	8695 College Parkway	Fort Myers	FL	33919	2396319060
DEC CONTRACTING		fort Myers	FL	33907	2393324322
DEC Contracting Group, Inc.	1560 Matthew Drive	Fort Myers	FL	33907	1239332432
EARTH BALANCE	2579 N TOLEDO BLADE BLVD	NORTH PORT	FL	34286	9414267878
EarthBalance	2570 Commerce Parkway	North Port	FL	34289	9414267878
EMPEX WATERTOYS			FL		4805628220
Fowler Construction and Development	10491 Six Mile Cypress Parkway	Fort Myers	FL	33966	2392757000
GATES	27599 Riverview Cntr Blvd	Bonita Springs	FL	34134	2395933777
J. Kokolakis Contracting, Inc.	202 E. Center Street	Tarpon Springs	FL	34689	7279422211
JACARANDA AIR CONST INC	13114hello Darlin Drv	GLEN ST MARY	FL	32040	9045662653
Jon F. Swift, Inc.	2221 Eighth Street	Sarasota	FL	34237	9419516100

Kaufman Lynn	9410 Corkscrew Palms Circle	Estero	FL	33928	5614001680
KAUFMANLYNN CONSTRUCTION			FL		
Kelly Brothers, Inc.	15775 Pine Ridge Road	Fort Myers	FL	33908	2394827300
Link Systems LLC	5870 Hummingbird Court	Titusville	FL	32780	4074010031
Magnum Builders Of Sarasota, Inc.	4545 Northgate Court	Sarasota	FL	34234	9413515560
McGraw-Hill	3315 Central Ave	Hot	AR	71913	8506563770
McLeod Land Services	7405 28th Street Court East	Sarasota	FL	34243	9419221861
Natare Corporation	5905 W 74th Street	Indianapoli	IN	46278	3172223675
Nicole Martinez		Lantana Florida	AB		5618882027
NUSON ELECTRIC			FL		
Poolsure	1707 Townhurst	Houston	TX	77043	8008587665
Pricewaterhousecoopers LLP	300 Madison Ave	New York	NY	10017	6464714000
Quality Restoration and Renovations	1907 N 40th St	Tampa	FL	33605	8135171555
R H MOORE & ASSOCIATES INC	7834 DEPOT LANE	TAMPA	FL	33637	8003302333
RDC Design Build, LLC	3990 North Powerline Road	Fort Lauderdale	FL	33309	9545663885
Recreational Design & Construction, Inc.	3990 N Powerline Road	Fort Lauderdale	FL	33309	9545663885
Stantec Consulting Services, Inc.	901 Ponce De Leon Boulevard, Suite 900	Coral Gables	FL	33134	3054452900
Take a Chance Management Services	502 Main St	Denver	CO	80203	3034406703
Tandem Construction	5391 Lakewood Ranch Boulevard North	Sarasota	FL	34240	9419541599
The Pool Company	3077 20th St. E	Tacoma	WA	98424	2532088673
Under Construction Contractors LLC, Crystal Waters	4295 13th Lane Ne	St Pete	FL	33703	7275399651
V&H Construction, Inc.	6385 Presidential CT 202	Fort Myers	FL	33919	2399897633
Weller Pools LLC	1821 S Orange Blossom Trail	Apopka	FL	32703	4078808800
Weller Pools LLC	1821 S. Orange Blossom Trail	Apopka	FL	32703	4078808800
West Construction			FL		
West Construction, Inc. & West Architecture + Design, LLC	820 North 4th Street	Lantana	FL	33462	5615882027
Wharton-Smith	750 Monroe Road	Sanford	FL	32771	4073218410
Wharton-Smith, Inc.	750 Monroe Rd	Sanford	FL	32771	4073218410

White Water west			FL		
Whitewater West	6700 McMillan Way	Richmond	BC	V6W1J7	6042731068
Wright Construction Group, Inc.	5811 Youngquist Road	Fort Myers	FL	33912	2394815000



City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



April 18, 2017

ADDENDUM 3

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

BID OPENING

EXTENSION: ~~MAY 1, 2018 @ 2:00 PM~~ MAY 15, 2018 @ 2:00 PM

City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

Bidders are hereby notified that this addendum shall be made part of the above-named bid and contract documents. The following changes to the above bid are issued to modify, and/or clarify the bid and contract documents (the deletions are as ~~striketroughs~~ and additions as underlined). These items shall have the same force and effect as the original documents, and bids to be submitted on the specified date shall conform with the additions, deletions and revisions as listed herein.

ITEM #1: DUE DATES MODIFICATION

BID OPENING

EXTENSION: ~~May 1, 2018 AT 2:00 PM (EST)~~ May 15, 2018 AT 2:00 PM (EST)
4970 CITY HALL BOULEVARD, ROOM 302, NORTH PORT, FLORIDA
(Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter.)

QUESTIONS AND

CLARIFICATIONS DEADLINE: ~~April 23, 2018 at 2:00 PM.~~ May 4, 2018 at 2:00 PM.

ITEM #2: ADDITIONAL KEY DATES

- A. 5/23/2018 Agenda Item Due - Executed Contract from Contractor
- B. 6/12/2018 ~~Commission Meeting~~ – Contract Approval
- C. 6/15/2018 ~~Pre-Construction Meeting~~ at 10:00 am, City Hall, Room 244
- D. 6/22/2018 ~~Notice to Proceed~~ issued to Contractor
- E. 5/23/2019 ~~Substantial Completion~~ (335 days)
- F. 6/22/2019 ~~Final Completion~~ (365 days)

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Alla V. Skipper

Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173

E-mail: askipper@cityofnorthport.com

Receipt of Addendum No. 3 shall be noted within the Bid Form in the appropriate section.
End of Addendum No. 3



City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



April 17, 2017

ADDENDUM 2

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

DUE DATE: MAY 1, 2018 @ 2:00 PM






City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

Bidders are hereby notified that this addendum shall be made part of the above-named bid and contract documents. The following changes to the above bid are issued to modify, and/or clarify the bid and contract documents (the deletions are as ~~striketroughs~~ and additions as underlined). These items shall have the same force and effect as the original documents, and bids to be submitted on the specified date shall conform with the additions, deletions and revisions as listed herein.

ITEM #1: PROJECT PLANS

The original plans posted contained a font error after the download. The plans have been separated into 5 separate sets and are available for download.

Addenda #2 with the plans will be posted on the City FTP SITE at http://apps.cityofnorthport.com/ftpinfo/dnld_form.aspx (scroll to project titled RFB No. 2018-35 NPAC – ADD 2).

	RFB 2018-35 NPAC - ADD 2 - Architect	4/17/2018 12:15 PM	Adobe Acrobat Docu...	16,119 KB
	RFB 2018-35 NPAC - ADD 2 - CivilLandscape	4/17/2018 12:17 PM	Adobe Acrobat Docu...	34,786 KB
	RFB 2018-35 NPAC - ADD 2 - MEP	4/17/2018 12:07 PM	Adobe Acrobat Docu...	19,925 KB
	RFB 2018-35 NPAC - ADD 2 - Structural	4/17/2018 12:10 PM	Adobe Acrobat Docu...	13,580 KB
	RFB 2018-35 NPAC ADD 2 - Swimming Pool	4/17/2018 12:13 PM	Adobe Acrobat Docu...	16,397 KB

ITEM #2: CLARIFICATION:

Minimum Projects/Qualifications/References discussed at the pre-bid meeting were deleted and replaced in addendum #1. **Addendum #1 Q3 & A3 shall prevail.**

ITEM #3: ATTACHED pre-bid sign-in sheet and planholder list.

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Alla V. Skipper

Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173

E-mail: askipper@cityofnorthport.com

Receipt of Addendum No. 2 shall be noted within the Bid Form in the appropriate section.
End of Addendum No. 2

(OPEN TO PUBLIC)

NON-MANDATORY PRE-BID

RFB NO. 2018-35

NORTH PORT AQUATIC CENTER

SIGN-IN SHEET

APRIL 16, 2018 @ 10:00 AM

CITY HALL, ROOM 244

YOUR NAME/TITLE	COMPANY NAME	PHONE/E-MAIL
Alla Skipper, CPPB Contract Specialist <i>AS</i>	Finance Department/ Purchasing Division	askipper@cityofnorthport.com Ph. 941.429.7172
Derek Applegate <i>DA</i>	NDS/Project Manager	dapplegate@cityofnorthport.com 941.429.7028
Mark Hatchel <i>MH</i>	Kimley-Horn	Mark.Hatchel@kimley-horn.com 469.914.8722
Darrell Smith Utilities Construction Coordinator <i>DS</i>	Utilities	dsmith@cityofnorthport.com 941.628.8187 (cell), 941.240.8021 (office)
JERRY GALLAGHER WEST CONSTRUCTION <i>JG</i>	WEST CONSTRUCTION (subcontractor)	J.Gallagher@WESTCONSTRUCTIONINC. NET 561-319-3529
Isaac Kinder Gregg Brown <i>IK</i>	Nusons Electric (sub-c)	Isaac@nusonselectric.com 941-429-7925

YOUR NAME/TITLE	COMPANY NAME	TELEPHONE AND E-MAIL
JOHN MILLER DIRECTOR OF DEVELOPMENT	KAUFMAN LYNN CONSTRUCTION	(561) 400-1680 J.MILLER@KAUFMANLYNN.COM
CARYN HUFF PROJECT MANAGER	WHARTON-SMITH, INC. (Prime)	813. 240. 4165 chuff@whartonsmith.com
DOUG MASCH PRESIDENT	DEC CONTRACTING GROUP, INC. (Prime)	239.332.4322 DOUG@DECCONTRACTING.COM
Jack Over Exec. V.P.	(Sub) Weller Pools LLC	407.890.8800 x109 jache@wellerpools.com
Joe Cerone President	Karathana Design & Construction, Inc.	Joe@KDCDesignbuild.com 954-566-3885 (208)
Matt Ruzicka Owner	The Pool Company Inc	matt@thepoolcompanyinc.com 253.926.6875
CLAUDE ALLEN BUSINESS DEVELOPMENT	(Sub) Earth Balance Corp.	bids@earthbalance.com 941-426-7878
A.J. Ribas V.P./PM	(Prime) A ² Group, Inc.	ribasej@a2group.com 941-206-2293
Jose Mazon Estimator	(Prime) A ² Group, Inc.	mazonj@a2group.com 941-206-2293

(OPEN TO PUBLIC)

NON-MANDATORY PRE-BID

RFB NO. 2018-35

NORTH PORT AQUATIC CENTER

SIGN-IN SHEET

APRIL 16, 2018 @ 10:00 AM

CITY HALL, ROOM 244

YOUR NAME/TITLE	COMPANY NAME	PHONE/E-MAIL
Alla Skipper, CPPB Contract Specialist	Finance Department/ Purchasing Division	askipper@cityofnorthport.com Ph. 941.429.7172
Derek Applegate	NDS/Project Manager	dapplegate@cityofnorthport.com 941.429.7028
Mark Hatchel	Kimley-Horn	Mark.Hatchel@kimley-horn.com 469.914.8722
Darrell Smith Utilities Construction Coordinator	Utilities	dsmith@cityofnorthport.com 941.628.8187 (cell), 941.240.8021 (office)
<i>Meryl Greiner BUSINESS SUCS Coordinator</i>	<i>City of North Port Annual Sewer.</i>	<i>Cgreiner@cityofnorthport.com 941.429.7113</i>
<i>Samantha Wilson Commercial Estimator</i>	<i>Variety Fence</i>	<i>sam@varietyfencefl.com 941.746.3853</i>

Brian LaBranche
Estimator

Charles + Chase
dba. Performance
Electrical Services

(941) 308-1010
[blabranche@charles
andchase.com](mailto:blabranche@charlesandchase.com)

Member Name City of North Port
Bid Number RFB-2018-35-0-
RFB NO. 2018-35
NORTH PORT AQUATIC
CENTER ('identified in
Bid Name the Plans as': Butler

3 Document(s) found for this bid

46 Planholder(s) found.

Supplier Name	Address 1	City	State	Zip	Phone
A2 Group	18245 Paulson Dr	Port	FL	33954	9412062288
Ajax Building Corporation	1080 Commerce	Midway	FL	32343	8502249571
AuMiller Pools LLC	8468 Tangelo Tree Dr.	Orlando	FL	32836	4078082660
Avalanche Waterslides	319 1st Street	Chamois	MO	65024	5733559234
ConstructConnect	3825 Edwards Rd	Cincinnati	OH	45209	8772271680
Construction Journal, Ltd.	400 SW 7th Street	Stuart	FL	34994	8007855165
Core & Main	590 Ferguson Drive	Orlando	FL	32805	4073837008
CREATIVE SIGN DESIGNS		TAMPA	FL		8008044809
DeAngelis Diamond Construction, Inc.	8695 College Parkway	Fort Myers	FL	33919	2396319060
DEC CONTRACTING		fort Myers	FL	33907	2393324322
DEC Contracting Group, Inc.	1560 Matthew Drive	Fort Myers	FL	33907	1239332432
EARTH BALANCE	2579 N TOLEDO BLADE	NORTH	FL	34286	9414267878
EarthBalance	2570 Commerce	North Port	FL	34289	9414267878
EMPEX WATERTOYS			FL		4805628220
Fowler Construction and Development	10491 Six Mile Cypress Parkway	Fort Myers	FL	33966	2392757000
GATES	27599 Riverview Cntr	Bonita	FL	34134	2395933777
J. Kokolakis Contracting, Inc.	202 E. Center Street	Tarpon	FL	34689	7279422211
Jon F. Swift, Inc.	2221 Eighth Street	Sarasota	FL	34237	9419516100
KAUFMANLYNN			FL		
Kelly Brothers, Inc.	15775 Pine Ridge Road	Fort Myers	FL	33908	2394827300
Link Systems LLC	5870 Hummingbird Court	Titusville	FL	32780	4074010031
Magnum Builders Of Sarasota, Inc.	4545 Northgate Court	Sarasota	FL	34234	9413515560
McGraw-Hill	3315 Central Ave	Hot Springs	AR	71913	8506563770
McLeod Land Services	7405 28th Street Court	Sarasota	FL	34243	9419221861
Natare Corporation	5905 W 74th Street	Indianapolis	IN	46278	3172223675
Nicole Martinez		Lantana	AB		5618882027
NUSON ELECTRIC			FL		
Poolsure	1707 Townhurst	Houston	TX	77043	8008587665
Pricewaterhousecoopers LLP	300 Madison Ave	New York	NY	10017	6464714000

Quality Restoration and Renovations	1907 N 40th St	Tampa	FL	33605	8135171555
R H MOORE & ASSOCIATES INC	7834 DEPOT LANE	TAMPA	FL	33637	8003302333
RDC Design Build, LLC	3990 North Powerline	Fort	FL	33309	9545663885
Recreational Design & Construction, Inc.	3990 N Powerline Road	Fort Lauderdale	FL	33309	9545663885
Stantec Consulting Services, Inc.	901 Ponce De Leon Boulevard, Suite 900	Coral Gables	FL	33134	3054452900
Take a Chance Management Services	502 Main St	Denver	CO	80203	3034406703
Tandem Construction	5391 Lakewood Ranch Boulevard North	Sarasota	FL	34240	9419541599
The Pool Company	3077 20th St. E	Tacoma	WA	98424	2532088673
Under Construction Contractors LLC, Crystal Waters	4295 13th Lane Ne	St Pete	FL	33703	7275399651
V&H Construction, Inc.	6385 Presidential CT	Fort Myers	FL	33919	2399897633
Weller Pools LLC	1821 S. Orange	Apopka	FL	32703	4078808800
Weller Pools LLC	1821 S Orange Blossom	Apopka	FL	32703	4078808800
West Construction			FL		
West Construction, Inc. & West Architecture + Design, LLC	820 North 4th Street	Lantana	FL	33462	5615882027
Wharton-Smith	750 Monroe Road	Sanford	FL	32771	4073218410
Wharton-Smith, Inc.	750 Monroe Rd	Sanford	FL	32771	4073218410
White Water west			FL		

User: Skipper, Alla

Organization: City of North Port

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Supplemental Suppliers

37 Supplemental Supplier(s)

Bid Number RFB-2018-35-0-2018/AS

Bid Name RFB NO. 2018-35 NORTH PORT AQUATIC CENTER ('identified in the Plans as': Butler Park Aquatic Center)

Company 	Contact	Phone	FAX	E-mail	Actions
AECOM		7036824902		BRIAN.SANDS@AECOM.COM	Edit / Delete
American Wave Machines		8587551497		info@surfstream.com	Edit / Delete
Anderson Poolworks				dana@andersonpoolworks.com	Edit / Delete
Anderson Poolworks		5036255628		dana@andersonpoolworks.com	Edit / Delete
Aqua Doc Pool Clinic	Marsha L Hazeltine	9414672274		pat@aquadocpoolclinic.com	Edit / Delete
Aquatic Access Inc.				info@aquaticaccess.com	Edit / Delete
Aquatic Designs Inc		3366747665		mvoight@adipools.net	Edit / Delete
Aquatic Designs Inc.				mvoigt@adipools.net	Edit / Delete
Aquatic Development Group (ADG)				sales@aquaticgroup.com	Edit / Delete
Aquatic Development Group (ADG)				sales@aquaticgroup.com	Edit / Delete
Aquatic Pools & Construction Inc.				aquaticpools@aol.com	Edit / Delete
Aquatic Unlimited		2149600198		watertopgun@aol.com	Edit / Delete
Bayshore Gardens	Randall P Hinton	9415246016		bayshoregardens@hotmail.com	Edit / Delete
Daldorado, LLC				pmartin@daldorado.com	Edit / Delete
Dreampark Int'l		6785465873		jake@dpintl.com	Edit / Delete
Family Fun Corporation		8003210440		jim@familyfunpools.com	Edit / Delete
Florida LeMark	Andres Rodriguez	7864707953		andresr@floridalemark.com	Edit / Delete
Friede & Associates Construction		6085244383		sgtruehl@friede.com	Edit / Delete
Horizons West Association Inc		9413493555		jeff@horizonswestsiestakey.com	Edit / Delete
Hucks Pool Co		8436263023		huckspool@aol.com	Edit / Delete
Husks Pool Co				huckspool@aol.com	Edit / Delete
JPS Pool		9415394826		jpspool@hotmail.com	Edit / Delete
Kast Pools		9413910105		kastpools@outlook.com	Edit / Delete
Natare Corporation		8003368828		natare@natare.com	Edit / Delete
Neuman Group/Neuman Pools inc		8009658385		info@neumangroup.com	Edit / Delete
Paddock Swimming Pool Company		3014242079		salbers@paddockpools.com	Edit / Delete
Palm Bay Club	Robert G Miller	9413231715		rmiller1715@verizon.net	Edit / Delete
RenoSys Corporation		8007837005		info@renosys.com	Edit / Delete
Ropes Courses		8889096293		greg@ropescoursesinc.com	Edit / Delete
SGM INC		4409302490		sales@sliderenu.com	Edit / Delete

SlideRenu		4409302490		sales@sliderenu.com	Edit / Delete
SureWater Technologies, Inc.		4079482078		robert@sureh20.com	Edit / Delete
VALCON INDUSTRIES LLC		8663119737		PETER@VALCON-INDUSTRIES.COM	Edit / Delete
Village Pools of Central Florida	Joey Vaughn	4075232300		jvgators05@yahoo.com	Edit / Delete
weber group inc		8122462100		carolynmclean@webergroupinc.com	Edit / Delete
WELLER POOLS LLC		8008529849		JOHN@WELLERPOOLS.COM	Edit / Delete
WESTON & SAMPSON		9785321900		GOOBERR@WSCEINC.COM	Edit / Delete

[<< Return](#)

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City of North Port
FINANCE DEPARTMENT/PURCHASING DIVISION
4870 CITY HALL BLVD, STE 337
NORTH PORT, FLORIDA 34287
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



April 10, 2017 - ADDENDUM 1

TO: PROSPECTIVE BIDDERS

RE: RFB NO. 2018-35 NORTH PORT AQUATIC CENTER

DUE DATE: MAY 1, 2018 @ 2:00 PM

City Hall, Room 302 (Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM. Bid opening will commence in Room 302 shortly thereafter)

Bidders are hereby notified that this addendum shall be made part of the above-named bid and contract documents. The following changes to the above bid are issued to modify, and/or clarify the bid and contract documents (the deletions are as ~~striketroughs~~ and additions as underlined). These items shall have the same force and effect as the original documents, and bids to be submitted on the specified date shall conform with the additions, deletions and revisions as listed herein.

ITEM #1: QUESTIONS/ANSWERS

- Q1:** What is the cost estimate/ budget has been established for the **North Port Aquatic Center** project?
A1: **Engineer's Estimate is \$10,500,000.00**
- Q2:** Can you please tell me when you expect construction to begin?
A2: **Construction Commencement – Pre-construction meeting will be held within 10 days of award and Notice to Proceed will be issued at/post the meeting. Bid Opening is May 1, 2018**
- **Anticipated Contract Award 5/22/2018**
 - **Construction Commencement (anticipated within 10 days of award- Start date determined at pre-construction meeting)**
 - **Construction Substantial Completion – April 15, 2019**
 - **Construction Completion – May 15, 2019**
- Q3:** **Would the City consider a cumulative level of experience required of the prime contractor and the pool subcontractor including the superintendents in lieu of SP-16 page 35 of specifications and on page 48 (Relevant projects/Qualifications and References? Will the City of North Port and its consultants accept the experience and references of both the prime contractor and the pool subcontractor combined as meeting the requirements outlined on Page 48, Part 1 of the Bidding documents for this project?**
- A3:** **SP-16 DELETE : MINIMUM RELEVANT PROJECTS/QUALIFICATIONS/REFERENCES (page 35) :**
- ~~Prime bidder must be fully licensed to do business in the State of Florida and be currently licensed as a Certified General Contractor in the State of Florida and provide proof of licensure with the submitted Bid Proposal. Bidders must have successfully completed, as a Prime or Subcontractor, at least three (3) projects, in the past five (5) years, of similar type, size and dollar value of the project described herein. Additionally, bidder must demonstrate the successful completion by the Superintendent of three (3) projects of similar complexity,~~

nature, size, and dollar amount of project in the past five (5) years. At least one (1) of these projects shall have been completed with the Bidder.

AND

RELEVANT PROJECTS/QUALIFICATIONS AND REFERENCES (Page 48):

Bidders must have successfully completed, ~~as a Prime or Subcontractor,~~ at least three (3) projects, in the past five (5) years, of similar type, size and dollar value of the project described herein. Additionally, bidder must demonstrate the successful completion ~~by the Superintendent~~ of three (3) projects of similar complexity, nature, size, and dollar amount of project in the past five (5) years. At least one (1) of these projects shall have been completed with the Bidder.

AND REPLACE WITH:

Bidders must have successfully completed, as a Prime and/or Pool Subcontractor, at least three (3) projects, in the past ten (10) years, of similar type and size of the project described herein. Additionally, bidder must demonstrate the successful completion by the Superintendent of one (1) project of similar complexity, in the past five (5) years.

Q4: Will the City approve Avalanche Waterslides as an Equal?

A4: No, as an equal due to the Whitewater Bowl slide configuration with the drop capsule and walk out.

Q5: I went through the documents and didn't see anything other than a project sign but assume there will need to be a complete signage/wayfinding package for this type of development. Can you let me know if this is something that is being worked on?

Our Company specializes in turnkey architectural signage solutions. We provide consultation, design, fabrication, and installation services for a full line of interior and exterior sign products, including ADA, wayfinding, electrical, DOT, street signs, graphics and much more. As the leader in architectural sign solutions in the Southeast, Creative Sign Designs is capable of successfully managing local, regional, and national projects. Besides designing, fabricating and installing both interior and exterior signage, we also have an Environmental Graphics and Wayfinding Studio that work with our clients helping to develop their sign programming and message schedules.

A5: There is no signage other than the project construction sign and the building room signage.

Firms are required to acknowledge receipt of this addendum on their proposal forms. All other terms and conditions of the original proposal and contract documents remain the same.

Alla V. Skipper

**Alla V. Skipper, CPPB
Senior Contract Administrator
Purchasing Department
4970 City Hall Blvd.
North Port, Florida 34286
Tel: 941.429.7172
Fax: 941.429.7173**

E-mail: askipper@cityofnorthport.com

**Receipt of Addendum No. 1 shall be noted within the Bid Form in the appropriate section.
End of Addendum No.1**

CITY OF NORTH PORT



NORTH PORT AQUATIC CENTER (‘Identified in the Plans as’: Butler Park Aquatic Center) **REQUEST FOR BID NO. 2018-35**



CITY OF NORTH PORT
Finance Department/Purchasing Division
4970 City Hall Boulevard
North Port, Florida 34286
Office: 941.429.7170
Fax: 941.429.7173
Email: purchasing@cityofnorthport.com



NOTICE OF AVAILABILITY OF BID SPECIFICATIONS

REQUEST FOR BID 2018-35

NORTH PORT AQUATIC CENTER

(identified in the Plans as: Butler Park Aquatic Center)

It is the intent of City of North Port to obtain the services of a licensed and qualified Certified General Contractor to provide construction services which include furnishing all the necessary materials and completing all work, labor, transportation, supervision, equipment for the construction of the North Port Aquatic Center ('inadvertently identified in the plans as Butler Park Aquatic Center, hereinafter North Port Aquatic Center) at 6205 West Price Blvd, North Port, FL.

NON-MANDATORY PRE-BID MEETING: April 16, 2018 AT 10:00 AM
4970 CITY HALL BOULEVARD, ROOM 244, NORTH PORT, FLORIDA

BID OPENING: May 1, 2018 AT 2:00 PM (EST)
4970 CITY HALL BOULEVARD, ROOM 302, NORTH PORT, FLORIDA

(Bids need to be delivered to Room 337 so they can be date and time stamped on or before 2:00 PM.
Bid opening will commence in Room 302 shortly thereafter.)

Information regarding this project (due to size) may be viewed and downloaded from City FTP site **only** at http://apps.cityofnorthport.com/ftpinfo/dnld_form.aspx (scroll to project titled RFB No. 2018-35 North Port Aquatic Center). Addenda will be posted on the City FTP site and www.demandstar.com. DemandStar's website. Links to DemandStar are also available from the City purchasing website at www.cityofnorthport.com. Verbal requests will not be honored. All questions and clarifications must be submitted in writing via e-mail to purchasing@cityofnorthport.com, referencing the project number. Questions and Clarifications deadline is **April 23, 2018 at 2:00 PM.**

If you have any questions, concerns, or problems accessing the bid package using the link, please contact, Alla V. Skipper, Senior Contract Administrator, at 941.429.7172.

The City of North Port does not discriminate on the basis of race, color, national origin, sex, age, disability, family or religious status in administration of its programs, activities or services.

PUBLISH DATES: March 30, 2018

- Herald Tribune

PUBLISH DATES: March 30, 2018

- www.cityofnorthport.com & www.demandstar.com

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ATTACHMENTS:

Go to City FTP site at http://apps.cityofnorthport.com/ftpinfo/dnld_form.aspx (go to the drop-down box, select Purchasing and scroll to Project RFB No. 2018-35)

1. Project Manual (City bidding document (75 pages), Geotechnical Report and Technical specifications)
2. Kimley Horn: Civil/Landscape Plans (24 pages)
3. Wannemacher Jensen Architects Inc: Architect Plans (29 pages)
4. Colwill Engineers: Mechanical, Electrical, Plumbing Plans (24 pages)
5. Master Consulting Engineers: Structural Plans (36 pages)
6. Counsilman/Hunsaker & Associates – Swimming Pool (36 pages)

STATEMENT OF NON-SUBMITTAL

- ☐ Insufficient time to respond to the Request for Bid.
- ☐ We do not offer this product/service.
- ☐ Our schedule would not permit us to perform.
- ☐ Unable to meet bond/insurance requirements.
- ☐ Specifications are unclear (explain below).
- ☐ OTHER (please specify below).

REMARKS: _____

COMPANY NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

TELEPHONE: _____ FAX: _____

E-MAIL: _____

SIGNATURE: _____ DATE: _____

Note: "Statement of No Bid" may be faxed or e-mailed to the Purchasing Division at purchasing@cityofnorthport.com or faxed to 941.429.7173.

SECTION I INSTRUCTIONS TO BIDDERS

THESE CONDITIONS ARE STANDARD FOR ALL BIDS FOR COMMODITIES/SERVICES ISSUED BY THE CITY OF NORTH PORT. THE CITY OF NORTH PORT MAY DELETE, SUPERSEDE OR MODIFY ANY OF THESE GENERAL PROVISIONS FOR A PARTICULAR CONTRACT BY INDICATING SUCH CHANGE IN SPECIAL PROVISIONS TO BIDDERS OR IN THE BID SHEETS. ANY AND ALL SPECIAL PROVISIONS WHICH MAY VARY FROM THE GENERAL PROVISIONS SHALL HAVE PRECEDENCE. BIDDER AGREES THAT THE PROVISIONS INCLUDED WITH THIS REQUEST FOR BID SHALL PREVAIL OVER ANY CONFLICTING PROVISIONS WITHIN ANY STANDARD FORM CONTRACT OF THE BIDDER REGARDLESS OF ANY LANGUAGE IN BIDDER'S CONTRACT TO THE CONTRARY.

DEFINITIONS: Terms used in these Instructions to Bidders are defined and have the meanings assigned to them.

Addenda: a written change to a solicitation

Bid: any offer submitted in response to this request for Bid.

Bidder: One that submits a bid in response to this Request for Bid.

Bid Documents: Includes the General Provisions; Special Provisions; Technical Specifications, the Bid Form; Non-Collusive Affidavit; Public Entity Crime Form; Certificate(s) of Insurance, if required; Payment and Performance Bonds, if required; Corporate Resolution; Bid Bond, if required; Local Business Affidavit, Scrutinized Company Affidavit and Certification and all Addendums issued prior to receipt of bids.

City: Shall refer to City of North Port, a municipal corporation of the State of Florida.

Contract: The agreement to perform the services set forth in this solicitation. The Contract will be comprised of the Bid documents signed by both parties including any addenda and other attachments specifically incorporated.

Responsible: Refers to a bidder that has the capacity and capability to perform the work required under a Request for Bid, and is otherwise eligible for award.

Responsive: Refers to a bid that contains no exceptions or deviations from the terms, conditions, and specifications set forth in the Request for Bid.

Request for Bid (RFB): Shall mean this solicitation document, including any and all addenda. A RFB contains well-defined terms, conditions, and specifications, and is awarded to the lowest priced responsive and responsible bidder.

Solicitation: The written document requesting either bids or proposals from the marketplace.

Successful Bidder: The lowest responsive, responsible Bidder to whom City (on basis of City's evaluation) makes an award.

Vendor or Contractor: A general reference to any entity responding to this solicitation or performing under any resulting Contract.

The City has established for purposes of this Request for Bid (RFB) that the words "shall," "must," or "will" are equivalent and indicate a mandatory requirement or condition, the material deviation from which shall not be waived by the City. A deviation is material if, in the City's sole discretion, the deficient response does not substantially satisfy this RFB's mandatory requirements. The words "should" or "may"

are equivalent in this RFB and indicate very desirable conditions, or requirements that are permissive in nature.

1. INSTRUCTIONS TO BIDDERS

- A. QUALIFICATIONS OF BIDDER:** It is intent to the City to award this Contract to the lowest responsible bidder, qualified by experience and solvency, with proven reliability and the ability to provide the services or items required under this Contract within a reasonable time frame acceptable to the City. Bidder may be required to supply information in writing at the request and discretion of the City prior to award of bids, in order to verify above requirements.
- B. EXAMINATION OF BID DOCUMENTS/SITE:** Prior to submission of a bid form, bidders shall carefully examine the General Provisions, Special Provisions, Technical Specifications, and all other related bid documents, including all modifications thereof, incorporated in the bid package, plus fully informing themselves as to all existing conditions and limitations that affect the work to be performed under this contract.

Discrepancies, omissions, or questions about the intent of the documents should be submitted to the Purchasing Division in written form as a request for interpretation no later than five (5) days prior to bid opening (or shall be verbally addressed at the pre-bid conference, if applicable).

It shall be the responsibility of the bidder, prior to submitting their response, to either visit www.demandstar.com to view the solicitation and download all issued addenda or contact the City of North Port Purchasing Department to determine if addenda were issued.

Examination of Site: Prior to submitting a bid form, each bidder shall examine the site and all conditions thereon. All bid forms shall be presumed to include all such existing conditions as may affect any work to be done on this project. Failure to familiarize himself with such conditions will in no way relieve the successful bidder from the necessity of furnishing any materials or performing any work that may be required to complete the work in accordance with the drawings and Specifications.

- C. CLARIFICATION AND ADDITIONAL INFORMATION:** Discrepancies, omissions, or questions about the intent of the documents will be submitted to the City of North Port Purchasing Manager, or his/her designee in written form as a request for interpretation no later than five (5) business days prior to the bid opening (or may be verbally addressed at the pre-bid meeting, if applicable).

Interpretations made will be in the form of an addendum to the documents, which will be forwarded to all bidders. Receipt by each bidder must be acknowledged on the bid form, indicating the addendum number and date of issue, therein becoming part of the Contract. No oral explanations shall be binding. The City will attempt to notify all prospective bidders of addenda issued to the bid documents; however, it shall be the responsibility of the bidder, prior to submitting their bid, to contact the Purchasing Manager, or his/her designee, to determine if addenda were issued, acknowledging and incorporating it into their bid.

- D. MODIFICATION OR WITHDRAWAL OF BIDS:** Bid modifications will be accepted from a bidder only if received in writing, properly signed by an officer of the bidder, and received prior to the opening of bids. Bid modifications must be identified as such and will be opened with the bidder's bid form.

Bids may be withdrawn by request of the bidder prior to the time fixed for opening. Error or negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

- E. **NO BID:** A respondent who is on the bid notification list and decides not to submit a response is requested to complete the Statement of Non-Submittal Form and return it to the City.
- F. **CONFLICTS WITHIN SOLICITATION:** Where there appears to be a conflict between the General Provisions, Special Provisions, the Technical Specifications, the Bid Form, or any addendum issued, the order of precedence shall be: the last addendum issued, the Bid Form, the Technical Specifications, the Special Provisions, and then the General Provisions. It is incumbent upon the vendor to identify such conflicts to the designated purchasing representative prior to the bid or proposal response date.
- G. **PROMPT PAYMENT:** It is the policy of the City that payment for all purchases by the City shall be made in a timely manner and that interest payments will be made on late payments in accordance with Part VII, Chapter 218, Florida Statutes, known as the Local Government Prompt Payment Act. The bidder may offer cash discounts for prompt payments; however, such discounts will not be considered in determining the lowest price during bid evaluation.

2. PREPARATION AND SUBMISSION OF BID FORM

Bid Form: Bids shall be made on forms supplied by the City, or as otherwise specified. Each bid must state the name of the bidder, the bidder's full business address and state the type of business entity, followed by the original signature and designation of the officer or other person authorized to bind the corporation. Any erasures or other corrections in the bid form must be explained or noted over the signature of the bidder. Bid forms containing any conditions, omissions, unexplained erasures, alterations, or irregularities of any kind may be rejected by the City.

Bid Bond: Each bid must be accompanied by a bidder's bond or Cashier's check with their bid in the amount of NOT LESS THAN 5% of their total amount of the bid. This security shall ensure that the Bidder does not revoke the bid after bid opening or fails to execute any necessary additional documents. Cashier's checks will be returned to all bidders after award of bid.

Source of Supply and Subcontractors: Bidders are to complete the attached Source of Supply and Subcontractors form. This form must be completed and included with the bid form. If bidder does not have a source of supply or subcontractor, insert "to be determined". When source or subcontractor is determined, selection will be subject to City approval.

Bid Opening: All bids received by the date and time so specified shall be opened and **the name and the total bid price of each bidder read aloud** within designated room at City Hall, at the bid opening. The opening and reading shall be in the presence of the City Clerk and the Purchasing Manager or their designees. Bidders and the general public are not required to be present, but are invited and encouraged to attend.

Late Bids: Bids received after the date and time of bid opening will not be considered and will not be opened. It will be the bidder's responsibility to make arrangements for the return of the bid package at their expense.

- 3. **CITY RIGHTS:** The City of North Port reserves the right to accept or reject any and/or all bids in whole or in part, to waive irregularities and technicalities, and to request resubmission with or without cause and/or to accept the bid that, in its judgment, will be in the best interest of the City. Also, the City reserves the right to accept all or any part of the bid and to increase or decrease quantities to meet additional or reduced requirement of the City. In the event the city receives only one response, the bid may be either accepted or rejected by the City depending on available competition and the timely needs of the City.

4. **AWARD OF BID:** The award shall be let to the lowest responsive, responsible bidder, unless other criteria are specified in the request for bids who fulfills all criteria and specifications with consideration to favorable references, qualifications and local preference and whose evaluation by the City indicates that the award will be in the best interest of the City.

Errors: For the purpose of the initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of the bidding schedule as submitted by bidders:

Obviously misplaced decimal points will be corrected.

In case of discrepancy between unit price and extended price, the unit price will govern. Apparent errors in extension will be corrected.

Apparent errors in addition of lump sum and extended prices will be corrected.

For the purpose of bid evaluation, the City will proceed on the assumption that the bidder intends his/her bid be evaluated on the basis of the unit prices, extensions, and totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the tabulation of bids.

5. **BID TABULATIONS:** Pursuant to Florida Statute §119.071(1)(b), all bid tabulations shall be posted in the City Hall, 4970 City Hall Boulevard, North Port, Florida and on DemandStar's website at www.demandstar.com within thirty (30) days after bid opening or at such time as the agency provides notice of a decision or intended decision, whichever is earlier.
6. **WARRANTY:** All warranties express and implied, shall be made available to the City for goods and services covered by this solicitation. All goods furnished shall be fully guaranteed by the vendor against factory and workmanship defects. At no expense to the City, the vendor shall correct any and all apparent and latent defects that may occur within the manufacturer's standard warranty period. The special provisions of the solicitation may supersede the manufacturer's standard warranty. Vendor shall provide a one (1) year warranty for parts and labor to each property owner for the work it performs.
7. **DESCRIPTIVE INFORMATION:** Unless otherwise specifically provided in the Technical specifications, all equipment, materials and articles incorporated in the work covered by this Contract are to be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the Technical specifications, reference to any equipment, material, article or patented process, by trade name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. If the bidder wishes to make a substitution to the specifications, the bidder shall furnish the City the name of the manufacturer, the model number and other identifying data and information necessary to aid in the City in evaluating the substitution. Such substitution shall be subject to City approval. Substitutions shall be approved only if determined by the City to be equivalent to the specifications. A bid containing substitution is subject to disqualification if the City does not approve the substitution.
8. **TAXES/FREIGHT:** The bid shall include any freight, handling, delivery, surcharges or other incidental charges. Unless otherwise specified in the solicitation, prices quoted shall be F.O.B. Destination. The City is exempt from the payment of Federal and State taxes, including sales tax. The bid offer shall not include sales tax to be collected from the City. The City's sales tax exemption is not available to vendor for items vendor purchases, regardless of whether these items will be transferred to the City.

In the event the project is declared a sales tax recovery project by the City, the following procedure shall apply:

- (a) The City representative shall make a recommendation to the Division of Procurement Services regarding the materials to be purchased;
- (b) When those materials are purchased by the City, all purchase orders shall be issued directly from Purchasing;
- (c) The City shall take title to those materials directly from the manufacturer/supplier and shall bear the risk of loss or damage to the materials which are delivered directly from the manufacturer/ supplier;
- (d) The City shall be invoiced directly for the materials from the manufacturer/supplier and shall pay the invoices directly to the manufacturer/supplier, presenting its sales tax exemption certificate at the time of payment.

The cost of any materials purchased through the sales tax recovery program shall be deducted from the Contract amount and the vendor shall no longer be responsible for providing those materials. A written change order shall be executed.

- 9. CONTINUATION OF WORK:** Any work that commences prior to and will extend beyond the expiration date of the current Contract period shall, unless terminated by mutual written agreement between the City and the vendor, continue until completion without change to the then current prices, terms and conditions.

10. TERMINATION OF CONTRACT:

Funding in Subsequent Fiscal Years: It is expressly understood by the City and the vendor that funding for any successive fiscal years of the Contract is contingent upon appropriation of monies by the City Commissioners. In the event that funds are not available or appropriated, the City reserves the right to terminate the Contract. The City will be responsible for payment of any outstanding invoices and work completed by the vendor prior to such termination.

Termination With or Without Cause: The City shall have the right to unilaterally cancel, terminate or suspend this Contract, in whole or in part, by providing the Contractor thirty (30) days written notice by certified mail.

The City reserves the right to terminate this Contract, in part or in whole, in the event the vendor fails to perform in accordance with the terms and conditions stated herein. The vendor will be notified by letter of the City's intent to terminate. In the event of termination for default, the City may procure the required goods and/or services from any source and use any method deemed in its best interest. All re-procurement cost shall be borne by the vendor.

Termination by Vendor: Vendor shall have the right to terminate services only in the event of the City failing to pay Vendor's properly documented and submitted invoice within ninety (90) calendar days of the approval by the City's Administrative Agent, or if the project is suspended by the City for a period greater than ninety (90) calendar days.

- 11. PROPRIETARY OR CONFIDENTIAL INFORMATION:** Bidders are hereby notified that all information submitted as part of, or in support of bid submittals will be available for public inspection after opening of bids in compliance with Chapter 119 of the Florida Statutes, the Public Record Act. The bidder should not submit any information in response to this solicitation which the bidder considers proprietary or confidential. The submission of any information to the City in connection with this solicitation shall be deemed conclusively to be a waiver of any protection from release of the submitted information unless such information is exempt from disclosure under the Public Records

Act, and such information is marked as exempt. Failure to mark a trade secret as exempt waives the exemption.

- 12. RULES, REGULATIONS AND LICENSES:** The vendor shall comply with all federal, state, and local laws and regulations applicable to provision of the goods and/or services specified in this solicitation.

It shall be the responsibility of the Contractor to assure compliance with OSHA, EPA and/or other local, federal, or State of Florida rules, regulations or other requirements, as each may apply.

When applicable and as required by law, the bidder will provide a material safety data sheet with each delivery of a toxic substance.

- 13. CODE OF ETHICS:** With respect to this bid, if any bidder violates or is a party to a violation of the Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such bidder may be disqualified from furnishing the goods or services for which the bid is submitted and shall be further disqualified from submitting any future bids for goods or services for the City.

- 14. COLLUSION:** By offering a submission to this RFB, the bidder certifies that the bidder has not divulged to, discussed or compared his/her bid with other bidders and has not colluded with any other bidder or parties to this bid whatsoever. Also, bidder certifies, and in the case of a joint bid each party thereto certifies as to his/her own organization, that in connection with this bid: any prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and or cost data, with any other bidder or with any competitor; any prices and/or data quoted for this bid have not been knowingly disclosed by the bidder and will not knowingly be closed by the bidder prior to the scheduled opening directly or indirectly to any other bidder or to any competitor; no attempt has been made or will be made by the bidder to induce any other person or firm to person or persons interested in this bid, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this bid or in the Contract to be entered into; and no person or agency has been employed or retained to solicit or secure this Contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees of the bidder

- 15. PUBLIC ENTITY CRIMES:** In accordance with Florida Statutes Sec. 287.133(2)(a), "A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a Contract to provide any goods/services to public entity, may not submit a bid on a Contract with a public entity for construction or repair of public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a Contractor, supplier, subcontractor, or consultant under a Contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Sections 287.017, for Category Two, for a period of 36 months from the date of being placed on the convicted vendor list." By submitting a bid, vendor certifies that vendor is not currently prohibited from transacting business with the City due to the above statute. The vendor shall comply with the terms of this statute both before and during the term of this Contract.

- 16. DRUG FREE WORKPLACE PREFERENCE:** The City has adopted a policy in observation of the Drug Free Workplace Act of 1988. Therefore, it is unlawful to manufacture, distribute, dispense, possess, or use any controlled substance in the City workplace.

The City requests that the attached Drug Free Workplace Affidavit accompany the bid response. This form has been adopted by the City in accordance with the Drug Free Workplace Act. The City will not disqualify any bidder who does not sign the affidavit. The Drug Free Workplace Affidavit is primarily

used as a tie breaker when two or more separate entities have submitted bids at the same price, terms and conditions, with preference given to the bidder who has signed the affidavit.

17. EQUAL EMPLOYMENT OPPORTUNITY: The City of North Port, Florida, in accordance with the provisions of Title VII of the Civil Rights Act of 1964 (78 Stat. 252) and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all bidders that it will ensure that in any Contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit replies in response to this advertisement and will not be discriminated against on the ground of race, color or national origin in consideration for an award.

18. NON-DISCRIMINATION: The City of North Port do not discriminate on the basis of race, color, national origin, sex, age, disability, family or religious status in administration of its programs, activities or services. Pursuant to F.S §287.134(2)(a), an entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a Contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity.

19. DECLARATION OF EXEMPTION FROM PUBLIC RECORD: In accordance with Florida Statutes 119.0701, Contractor shall comply with all public records laws, and shall specifically:

19.1. Keep and maintain public records required by the CITY to perform the service.

- a. The timeframes and classifications for records retention requirements must be in accordance with the General Records Schedule GS1-SL for State and Local Government Agencies.

(See <http://dos.dos.state.fl.us/library-archives/records-management/general-records-schedules/>).

- b. Public records means and includes those items specified in Florida Statutes 119.011(12), as amended from time to time, and currently defined as: All documents, papers, letters, maps, books, tapes, photographs, films, sound recordings, data processing software, or other material, regardless of the physical form, characteristics, or means of transmission, made or received pursuant to law or ordinance or in connection with the transaction of official business with the City. Contractor's records under this Agreement include but are not limited to, supplier/subcontractor invoices and contracts, project documents, meeting notes, emails and all other documentation generated during this Agreement.

19.2. Upon request from the City's custodian of public records, provide the City, at no cost, with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for by law. All records kept electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

19.3. Ensure that project records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and, if the Contractor does not transfer the records to City following completion of the contract, for the time period specified in General Records Schedule GS1-SL for State and Local Government Agencies.

- 19.4. Upon completion of the contract, transfer, at no cost, to the City all public records in Contractor's possession or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of the contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon the completion of the contract, the Contractor shall meet all applicable requirements for retaining public records.
- 19.5. IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT CUSTODIAN OF PUBLIC RECORDS, 4970 CITY HALL BOULEVARD, NORTH PORT, FLORIDA 34286, 941.429.7063 OR HOTLINE 941.429.7270; EMAIL: padkins@cityofnorthport.com.**
- 19.6. Failure of the CONTRACTOR to comply with these requirements shall be a material breach of this Agreement. Further, Contractor may be subject to penalties under Florida Statutes 119.10.
- 20. FORCE MAJEURE:** The parties will exercise every reasonable effort to meet their respective obligations hereunder, but shall not be liable for delays resulting from force majeure or other causes beyond their reasonable control, including, but not limited to, compliance with any Government law or regulation, acts of nature, acts or omissions of the other party, Government acts or omissions, fires, strikes, national disasters, wars, riots, transportation problems and/or any other cause whatsoever beyond the reasonable control of the parties. Any such cause will extend the performance of the delayed obligation to the extent of the delay so incurred.
- 21. GOVERNING LAWS:** The interpretation, effect, and validity of any Contract resulting from this RFB shall be governed by the laws and regulations of the State of Florida. Exclusive venue of any court action shall be in Sarasota County, Florida.
- 22. SUBCONTRACTING:** Unless otherwise specified in this solicitation, the vendor shall not subcontract any portion of the work without the prior written consent of the City. The ability to subcontract may be further limited by the Special Provisions. Subcontracting without the prior consent of the City may result in termination of the Contract for default.
- 23. MODIFICATION OF CONTRACT:** Any Contract resulting from this solicitation may be modified by mutual consent of duly authorized parties, in writing through the issuance of a modification to the Contract and/or change order as appropriate. This presumes the modification itself is in compliance with all applicable City procedures.
- 24. SUCCESSORS AND ASSIGNS:** The vendor shall not assign any interest in any Contract resulting from this solicitation and shall not transfer any interest in same (whether by assignment or novation) without prior written consent of the City, except that claims for the money due or to become due to the vendor from the City under any Contract may be assigned to a financial institution or to a trustee in bankruptcy without such approval from the City. Notice of such transfer or assignment due to bankruptcy shall be promptly given to the City.

- 25. CONTRACTING WITH CITY EMPLOYEES OR BOARD MEMBERS:** Any City employee, Board member or member of his or her immediate family seeking to Contract with the City shall seek a conflict of interest opinion from the purchasing manager or their designated representative prior to submittal of a response or application of any type to Contract with the City. The affected employee or Board member shall disclose his or her assigned function within the City and interest or the interest of his or her immediate family in the proposed Contract and the nature of the intended Contract.

Florida Statute §112.313(12) Standards Of Conduct For Public Officers, Employees Of Agencies, And Local Government Attorneys controls contracting with City employees or board members, and provides as follows:

(12) EXEMPTION. The requirements of subsections (3) and (7) as they pertain to persons serving on advisory boards may be waived in a particular instance by the body which appointed the person to the advisory board, upon a full disclosure of the transaction or relationship to the appointing body prior to the waiver and an affirmative vote in favor of waiver by two-thirds vote of that body. In instances in which appointment to the advisory board is made by an individual, waiver may be effected, after public hearing, by a determination by the appointing person and full disclosure of the transaction or relationship by the appointee to the appointing person. In addition, no person shall be held in violation of subsection (3) or subsection (7) if:

- (b) The business is awarded under a system of sealed, competitive bidding to the lowest or best bidder and:
1. The official or the official's spouse or child has in no way participated in the determination of the bid specifications or the determination of the lowest or best bidder;
 2. The official or the official's spouse or child has in no way used or attempted to use the official's influence to persuade the agency or any personnel thereof to enter such a contract other than by the mere submission of the bid; and
 3. The official, prior to or at the time of the submission of the bid, has filed a statement with the Commission on Ethics, if the official is a state officer or employee, or with the supervisor of elections of the county in which the agency has its principal office, if the official is an officer or employee of a political subdivision, disclosing the official's interest, or the interest of the official's spouse or child, and the nature of the intended business.

- 26. TRUTH-IN-NEGOTIATIONS CERTIFICATE:** If applicable, execution and signature by the vendor of the Bid Form shall act as the execution of a truth-in-negotiation certificate certifying that the wage rates and costs used to determine the compensation provided for in this Contract are accurate, complete, and current as of the date of the Contract.

For professional service Contracts, the original Contract price and any additions thereto will be adjusted to exclude any significant sums by which the City determines the Contract price was increased due to inaccurate, incomplete, or noncurrent wage rates and other factual unit costs. The City shall exercise its rights under this "Certificate" within one (1) year following payment.

- 27. GRANT FUNDING:** In the event any part of the Contract is to be funded by federal, state, or other local agency monies, the vendor hereby agrees to comply with all requirements of the funding entity applicable to the use of the monies, including full application of requirements involving the use of minority firms, women's business enterprises, and labor surplus area firms. Vendors are advised that

payments under the Contract may be withheld pending completion and submission of all required forms and documents required of the vendor pursuant to the grant funding requirements. A copy of the requirements shall be supplied to the vendor by the City upon request.

- 28. PERFORMANCE/PAYMENT BOND:** The successful bidder shall provide the required performance and payment bond or other acceptable security to the City within **ten (10) business days of being awarded the bid. Failure by the successful bidder to provide the bond within ten (10) business days shall be considered a default under Sec. 2-404 of the City of North Port Administrative Code.** Such default shall only be curable at the option of the City. In addition, the Contractor shall be responsible and bear all costs associated to record Performance and Payment Bond with Sarasota County Clerk's Office. Receipt of said recording and certified copy of the bond shall be furnished to the Purchasing Department at the time of the pre-construction meeting. Such default shall only be curable at the option of the City.

In addition, the Contractor shall be responsible and bear all costs associated to record Performance and Payment Bond with Sarasota County Clerk's Office. Receipt of said recording and certified copy of the bond shall be furnished to the Purchasing Department at the time of the pre-construction meeting. Such default shall only be curable at the option of the City.

Upon such default, the City may immediately award the bid to the next lowest responsive and responsible bidder, and recover from the original successful bidder the difference in cost between the original winning bid and the next lowest responsive and responsible bidder.

PERFORMANCE/PAYMENT BOND REQUIREMENTS:

The Contractor shall provide a Performance Bond and a Payment Bond, in the form prescribed in Section 3, Contract Documents, each in the amount of 100% of the Contract amount, the costs of which are to be paid by the Contractor. The bonds will be acceptable to the City only if the following minimum conditions are met:

- a. is licensed to do business in the State of Florida;
- b. holds a certificate of authority authorizing it to write surety bonds in this state;
- c. has twice the minimum surplus and capital required by the Florida Insurance Code at the time the invitation to bid is issued;
- d. is otherwise in compliance with the provisions of the Florida Insurance Code; and
- e. holds a currently valid certificate of authority issued by the United States Department of Treasury under 31 U.S.C. §§ 9304-9308.
- f. The Surety Company must have a current rating of at least Excellent (A or A-) as reported in the most current Best Key Rating Guide, published by A.M. Best Company, Inc., of 75 Fulton Street, New York, New York 10038, with an underwriting limitation **of at least two times the dollar amount of the contract.**

If the Surety Company for any Bond furnished by the Contractor files for bankruptcy, has a receiver appointed, is declared bankrupt, becomes insolvent, has an assignment made for the benefit of creditors, has its right to do business terminated in the State of Florida, or ceases to meet the requirements imposed by the Contract Documents, the Contractor shall, within five (5) calendar days thereafter, substitute another Bond and Surety Company, both of which shall be subject to the City's approval.

By execution of these bonds, the Surety Company acknowledges that it has read the surety qualifications and surety obligations imposed by the Contract documents and hereby satisfies those conditions.

- 29. STATE REGISTRATION REQUIREMENTS:** Any corporation submitting a bid in response to this RFB shall either be registered or have applied for registration with the Florida Department of State in accordance with the provisions of Chapter 607, Florida Statutes, unless they are exempt. A copy of the registration/application may be required prior to award of a Contract. Any partnership submitting a bid in response to this RFB shall have complied with the applicable provisions of Chapter 620, Florida Statutes.
- 30. NOTICE TO PROCEED/DELIVERY:** After award of bid, a Notice to Proceed shall be issued bearing the terms of delivery. Upon receipt of Notice to Proceed, successful bidder shall acknowledge receipt of same by either fax or mail and shall commence prosecution of the order so that the agreed upon delivery date will be satisfied.
- 31. PERFORMANCE EVALUATION:** At the end of the Contract, the receiving department may evaluate the successful bidder's performance. This evaluation will become public record.
- 32. PURCHASING AGREEMENTS WITH OTHER GOVERNMENTAL AGENCIES:** All bidders submitting a response to this RFB agree that such response also constitutes a bid in accordance with the terms of the RFB to all political subdivisions of Sarasota County and the State of Florida, under the same conditions, for the same prices as this bid, unless otherwise stipulated by the bidder.
- 33. NONEXCLUSIVE CONTRACT:** Award of this Contract shall not require the City to use the Vendor for all work of this type, which may develop during the Contract term. This Contract is non-exclusive. The city reserves the right to concurrently Contract with other entities for similar work if it deems such action to be in the best interests of the City.
- 34. AUDIT:** City shall have the right to audit vendor's records that relate to this Contract. Records shall be maintained for a period of three (3) years from the date of final payment.
- 35. UNAUTHORIZED ALIEN CLAUSE:** The City of North Port will not intentionally award publicly-funded Contracts to any Contractor who knowingly employs unauthorized alien workers, constituting a violation of the employment provisions contained in 8 U.S.C. Section 1324a(e) [Section 274A(e) of the Immigration and Nationality Act ("INA")]. The City shall consider employment by any Contractor of unauthorized aliens a violation of Section 274A(e) of the INA. Such violation by the Contractor of the employment provisions contained in Section 274A(e) of the INA shall be grounds for termination of this Agreement by the City.
- 36. E- VERIFY:** The Contractor shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Contractor during the term of the Contract and shall expressly require any subcontractors performing work or providing services pursuant to the Contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the Contract term.

It is the awarded Bidder's responsibility to ensure that all its employees and subcontractors comply with the employment regulations required by the US Department of Homeland Security. The City shall have no responsibility to check or verify the legal immigration status of any employee of the awarded Bidder.

- 37. EMPLOYEE BACKGROUND CHECK:** If an owner, except a stockholder in a publicly traded corporation, or an employee of the Contractor has been convicted of any offenses requiring registration as a sexual offender or sexual predator, regardless of the location of conviction, the Contractor shall ensure that the offender's or predator's work on the project is consistent with the terms of his probation and registry requirements.
- 38. PAYMENT:** Two (2) original requests for payment must be submitted to the City of North Port on a form approved by the City. In lieu of the hard copies of the pay request submittal, scanned signed digital files of the requests for payments may be submitted as an attachment to an e-mail. Each pay request must be accompanied by written consent of the surety, when applicable, and an updated work schedule to reflect progress of work. Payment shall be subject to the approval and direction of the surety in accordance with F.S. §255.05(11). Price shall be net and all invoices payable according to the Florida Local Government Prompt Payment Act (F.S. ch. 218). Upon certification and approval by the City or its duly authorized agent, progress payments may be made to the Contractor upon his/her application for all services or work completed or materials furnished in accordance with the Contract. Prior to fifty percent (50%) completion, the Contractor will be paid monthly the total value of the work completed and accepted during the preceding month, less ten percent (10%) retainage. After fifty percent (50%) completion of the construction services purchased pursuant to the Contract, the City must reduce to five percent (5%) the amount of retainage withheld from each subsequent progress payment made to the Contractor upon request of the Contractor. For purposes of this subsection, the term "fifty percent (50%) completion" is the point at which the City has expended fifty percent (50%) of the total cost of the construction services purchased as identified in the Contract together with all costs associated with existing change orders and other additions or modifications to the construction services provided for in the Contract. The City shall inform the Contractor's Surety of any reduction in retainage. The Contractor must update each new pay request in accordance with any changes made to the previous submittal. The City or its duly authorized administrative agent, shall approve final payment for all work, materials and services furnished under this Contract.
- Retainage may be reduced upon issuance of the Certificate of Substantial Completion by the City if, in the sole opinion of the City, sufficient progress on the schedule has been accomplished, the surety does not object, and the City has retained adequate coverage for the project through the achievement of Final Completion.
- 39. MBE:** Contractors awarded construction contracts who intend to subcontract material or service requirements of the project are encouraged to subcontract to certified minority business/women business enterprises firms or show good faith effort.
- 40. DBE Contract Assurance (IF APPLICABLE):** The contractor, sub-recipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.
- 41. SWORN STATEMENT, COMPLIANCE WITH FLORIDA TRENCH ACT:** Bidder shall be solely responsible for complying with the Florida Trench Safety Act (553.60-553.64 Florida Statutes) and Occupational Safety and Health Administration excavation safety standards, 29 CFR 1926.650 (subpart P) as amended. All costs associated with complying with these requirements shall be included in the separate line items of the bid and shall be as detailed in the Sworn Statement of Compliance with

the Florida Trench Safety Act. Bidder shall submit the Statement of Compliance with the Florida Trench Safety Act form provided herein with his bid or with each work assignment.

- 42. INSURANCE REQUIREMENTS:** The successful Bidder shall be required to supply, at their cost, insurance coverage in form and amount as required by the City, as outlined in the bid specifications.
- 43. CONTACT PROHIBITION:** All prospective Bidders are hereby instructed **NOT** to contact any member of the City of North Port Commission, the City Manager, or City of North Port staff member other than the Authorized Contact Persons identified in this Solicitation regarding this solicitation package, Bidder's submittal package, City's Intent to Award, or City's Intent to Reject (if applicable) at any time prior to the FORMAL AWARD for this project. Any such contact shall be cause for rejection of your submittal.
- 44. SCRUTINIZED COMPANIES:** For contracts of \$1,000,000.00 or more, the Bidder shall certify that it is not on the Scrutinized Companies with Activities in Sudan list or the Scrutinized Companies with Activities in Iran Petroleum Energy Sector list as defined in Florida Statutes §215.473, as required by §287.135, Florida Statutes. The City shall supply the certification form. Providing a false certification is punishable by civil penalty equal to twice the contract amount plus reasonable attorney's fees and costs, in addition to the Bidder being ineligible to bid on any contract for three years after the date it was determined that a false certification was made.
- By submitting a bid, proposal or response, the company, principals, or owners certify that they are not listed on the Scrutinized Companies with Activities in Sudan List or listed on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or is engaged in business operations in Cuba or Syria.
- 45. EMPLOYEE BACKGROUND CHECK:** If an owner, except a stockholder in a publicly traded corporation, or an employee of the Contractor has been convicted of any offenses requiring registration as a sexual offender or sexual predator, regardless of the location of conviction, the Contractor shall ensure that the offender's or predator's work on the project is consistent with the terms of his probation and registry requirements.
- 46. LOCAL PREFERENCE:** Bidder may claim the Local Preference if Bidder qualifies under the definition below and in accordance with Ordinance 2009-10, as may be amended by the City of North Port.

A. Local Business Definition:

Preference shall be given to a "local business" in the purchase of commodities and services procured pursuant to this Section. Bidders desiring to receive preference as a local business will be required to affirmatively state and provide documentation as set forth in the solicitation in support of their status as a local business. Any bidder who fails to submit sufficient documentation with their bid shall not be granted local preference consideration for the purpose of that specific contract award.

"Local business" means a bidder that maintains a physical business address located within the limits of Sarasota County, Charlotte County or Desoto County for a period of six (6) months or more before the bid submission date from which the bidder operates or performs business and where at least fifty percent (50%) of the bidder's employees are residents of the City. Post office boxes may not be used to establish a physical business address.

“North Port local business” means a local business that has its primary physical business address located within the limits of the City for a period of six (6) months or more before bid submission date, from which the bidder operates or performs business and where at least fifty percent (50%) of the bidder’s employees are residents of the City. Post office boxes may not be used to establish a physical business address.

If requested by the City, the bidder will be required to provide documentation substantiating the information given in this affidavit. City reserves the right to request supporting documentation as evidence to substantiate the information given in this affidavit. Failure to do so will result in the bidder’s submission being deemed non-responsive.

Any bidder that misrepresents its status as a local business or North Port local business shall be barred from receiving any City contracts for a period of three (3) years.

B. Local Price Match Option:

Each formal competitive bid solicitation shall clearly identify the criteria for award. When a responsive and responsible bidder who is not a local business (hereafter, non-local business bidder) submits the lowest bid price (hereafter, low bid), all responsive and responsible local business bidders shall have five (5) business days to submit an offer to match the low bid, provided the original bid submitted by the local business bidder is within ten percent (10%) of the low bid if the amount of the low bid is no more than one million dollars (\$1,000,000). If the amount of the low bid is more than one million dollars (\$1,000,000) but no more than 2 million dollars (\$2,000,000), local business bidders within five percent (5%) shall have the opportunity to match the low bid. If the amount of the low bid is more than two million dollars (\$2,000,000) but no more than 3 million dollars (\$3,000,000), local business bidders within three percent (3%) shall have the opportunity to match the low bid. If the amount of the low bid is more than three million dollars (\$3,000,000), local business bidders within two and one-half percent (2.5%) shall have the opportunity to match the low bid. The original lowest responsive and responsible North Port local business bidder who matches the low bid shall receive the award. If no eligible North Port local business bidder can match the low bid, the award shall be made to the original lowest responsive and responsible local business bidder who matches the low bid. If no eligible local business bidder can match the low bid, the award shall be made to the lowest responsive and responsible bidder, regardless of local business status.

If there is a tie between a local business and a non-local business, the local business shall receive the award. If there is a tie between two North Port local businesses or two local businesses, the business with the higher percentage of employees who reside within the City shall receive the award.

END OF SECTION I

GENERAL PROVISIONS

1. SCOPE OF WORK

1.1. Intent of Contract: Bid forms shall set forth firm bid unit prices for furnishing all necessary materials and completing all work, including but not limited to labor, transportation, supervision, electricity, water, equipment, startup, testing, training and all other work needed for a complete and functional system, as described in the Technical Specifications and/or shown on the Contract Drawings attached herewith. The City reserves the right to establish the exact limits of work in the field and to add or delete from the Project, as it deems necessary.

1.2. Definitions:

1.2.1. The successful bidder for this Contract will be referred to as the Contractor; Department Director or his/her representative, acting personally or through an assistant duly authorized for such act by the City will be referred to as City. For the purposes of this Contract, the word "Project" shall mean the services limits of Contractor.

1.2.2. The Contract documents consist of the Request for Bids, Instructions to Bidders, Bid Forms, Technical Specifications and Conditions, Construction Drawings, General Provisions, Special Provisions, Insurance Requirements, and all other related documents, including all modifications thereof incorporated in the documents before their execution. These form the Contract.

1.2.3. Written notice shall be deemed to have been duly served three days after date of postmark, and upon receipt, if delivered to the individual or member of the firm or an officer of the corporation for whom it is intended.

1.2.4. Subcontractor(s), as employed herein, includes only those having a direct Contract with the Contractor and it includes one who furnishes material worked to a special design according to the plans and specifications of this work, but does not include one who merely furnishes material not so worked.

1.2.5. The term "work" of the Contractor includes labor or materials or both, equipment, transportation, or other facilities necessary to complete the Contract.

1.2.6. All time limits stated in the Contract documents are of essence to the Contract

1.3. Time of Completion: The Contractor shall complete the work within the time set forth in the Contract. The Contractor shall complete each portion of the work within such time as set forth in the Contract for such portion. The time of completion of the Contract shall be expressed in calendar days.

All work for this project shall be performed during regular business hours. A regular workday shall be considered to be a maximum of ten (10) hours duration. The cost for inspection time for work performed on weekends, holidays, or in excess of ten (10) hours may be billed to the Contractor at the prevailing wage plus overhead costs for those persons involved.

A working day is any day within the period between the start of the Contract time and the date provided in the Contract for completion or upon field acceptance by the City of all work provided for in the Contract, or as stipulated in the Technical Specifications, or whichever comes first, other than: Saturday, Sunday, any day designated as a holiday by the City, any day the Contractor is prevented from working during the first five (5) hours of the work day, with at least sixty percent (60%) of the normal work force, due to inclement weather.

Request for planned overtime by the Contractor must be submitted in writing to the City, twenty-four (24) hours in advance, and may not proceed without the City's approval.

- 1.4. Quality of Work:** The Contractor agrees to do the work covered under this Contract to the best of his/her ability and conforming to this Contract and specifications and of a quality acceptable to the trades. The Contractor further agrees to follow proper and appropriate instructions by the City.

2. PROSECUTION AND PROGRESS

- 2.1. Subletting or Assigning of Contracts:** The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or his right, Title, or interest therein, without written consent of the City Manager or his Designee
- 2.2. Preconstruction Meeting:** After the Contract has been awarded, the City will schedule a preconstruction meeting to be held before any work is begun to review the construction aspects of the Project. The meeting will be between the City, the Contractor and various utility companies that will be affected by the construction.
- 2.3. Performance and Payment Bond:** The awarded Contractor shall furnish a certified recorded copy from Sarasota County Clerk's Office of the Performance and Payment Bond in the amount of 100% of the total project price within ten (10) calendar days after notification of award to the Purchasing Department. The undersigned shall be responsible and bear all costs associated to record Performance and Payment Bond with Sarasota County Clerk's Office. Receipt of said recording and a certified copy of the Bond shall be furnished to the Purchasing Department at the time of the pre-construction meeting.
- 2.4. Submission of Work Schedule/Order of Completion:** At the preconstruction meeting, the successful bidder shall have on hand a working schedule for the Project, showing in detail the order in which the Contractor proposes to perform the work. He/she shall indicate the dates on which major equipment will be delivered and various major items of work will start and the estimated completion dates of the major items. Construction Schedule the Contractor's proposed operations for the various items of work, which would affect or be affected by utility adjustments.
- 2.5. Submission of Schedule of Values:** A Schedule of Values to reflect value of equipment, materials and work performed per unit price, with totals shall be submitted at preconstruction meeting. Both parties are to agree on proposed schedule of values prior to any work being performed.
- 2.6. Provisions for Convenience of Public:** The Contractor shall schedule his/her operations so as minimize any inconvenience to adjacent businesses for residences. Where necessary, the City may require the Contractor to construct first the work in any areas along the Project where restrictions caused by construction operations would represent a more serious handicap, before beginning construction in the less affected areas.

3. CONTROL OF THE WORK AND MATERIALS

3.1. Control of Work:

- 3.1.1. Plans and Contract Documents:** The Contractor will be furnished a CD and two (2) signed and sealed building permit field copies of the Plans, Technical Specifications, General and Special Provisions as required for the Project. Additional signed & sealed copies, if needed to obtain the permits or otherwise perform the Work associated with

this Contract, will be submitted upon written request. Other copies that may be needed by the Contractor shall be produced by the Contractor as his own expense.

- 3.1.2. Detail Drawings and Instructions:** The City may furnish, with reasonable promptness, additional instructions by means of drawings or otherwise, necessary for the proper execution of the work. All such drawings and instructions shall be consistent with the Contract documents, true developments thereof, and reasonable inferable there from.
- 3.1.3. Order of Precedence:** These documents are integral parts of the Contract, and a requirement occurring on one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In cases of discrepancy, the governing order of documents shall be as follows:

Permits from Agencies as required by law

Change Orders/Amendments

Contract Documents, including Technical Specifications

Construction Plans

3.1.3.1.1. Dimensions given in figures govern scaled dimensions.

3.1.3.1.2. Detail drawings govern over general drawings.

3.1.3.1.3. Addenda/Change order drawings govern over Contract documents.

- 3.1.4. Conformity of Work with Plans:** All work performed, and all materials furnished shall be in reasonably close conformity with lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown on the Plans or indicated in the Technical Specifications or Special Provisions.
- 3.1.5. Authority of the City:** All work shall be done under the supervision of the City or the City's representative and performed to its satisfaction. It is agreed by the parties hereto that the City shall decide all questions and disputes which may arise relative to the interpretation of the plans, construction, prosecution, and fulfillment of the Contract, and as to the character, quality, amount, and value of any work done, and material furnished, under or by reason of the Contract.
- 3.1.6. City's Status:** The City and/or the City's Representative shall examine and inspect the work to assure compliance with the requirements of these Contract Documents. The City and/or the City's Representative shall determine the quality and acceptability of materials and workmanship relative to the requirements of the Plans and Technical Specifications.

The City Manager or his Designee has the authority to:

Stop the work whenever such stoppage may be necessary to insure the proper execution of the Contract.

Reject all work that does not conform to the Contract.

Resolve questions that arise in the execution of the work.

The City's Representative has the authority to:

Reject all work that does not conform to the Contract.

Resolve questions that arise in the execution of the work.

- 3.1.7. Suspension of Work:** The City may at any time suspend work by giving ten (10) calendar days' notice to the Contractor in writing. The City shall reimburse the Contractor for expenses incurred by the Contractor in connection with work under the Contract as a result of such suspension, unless such suspension was caused by actions of the Contractor. However, if the work or any part thereof shall be stopped by a notice in writing aforesaid, and if the City does not give written notice to the Contractor to resume work within thirty (30) calendar days of the date fixed in the written notice to suspend, then the Contractor will be entitled to the estimates and payment for all work done, unless such suspension was caused by actions of the Contractor.
- 3.1.8. The City's Right to do Work:** If the Contractor should neglect to prosecute the work properly or fail to perform in accordance with the provisions of this Contract, the City, after three days written notice, may without prejudice to any other remedy it may have, make good any deficiencies and deduct from the payment due the Contractor.
- 3.1.9. The City's Right to Terminate Contract:** If the Contractor refuses or fails to complete the work within the time specified for this Contract, or any extension thereof, the City may terminate the Contractor's right to proceed. In such event, the City may take over the work and prosecute the same to completion by the Contractor or otherwise and the Contractor will be liable for any excess cost occasioned by the City. The City may take possession of and utilized in completing the work such materials and equipment as may be on the site of the work and necessary therefore.

If the Contractor should be adjudged a bankrupt, or should make a general assignment for the benefit of his/her creditors, or if a receiver should be appointed due to insolvency, or if he/she should refuse or fail, except in cases which time extension is provided to supply enough workmen, or if he/she should fail to make payment to subcontractors for labor and/or material, or disregard laws, ordinances or the instructions of the City, or be guilty of a violation of a provision of the Contract, then the City may, without prejudice to any other right or remedy and after giving seven (7) calendar days' notice, terminate employment of the Contractor and possess materials, tools, and appliances thereon and finish work by methods it may deem expedient. Expenses incurred by the City and the damage incurred through the Contractor's default.

In any circumstance, the City shall have the right to unilaterally cancel, terminate or suspend this Contract, in whole or in part, by providing the Contractor thirty (30) calendar days written notice by certified mail.

In the event of termination, the Contractor shall be entitled to compensation for services rendered and costs incurred through the effective date of termination. All finished or unfinished documents, material, or work shall become the property of the City and shall be delivered to the City without reservation.

- 3.1.10. City May Stop the Work:** If the Work is defective, or the Contractor fails to supply sufficient skilled supervisory personnel or workmen or suitable materials or equipment or the work area is deemed unsafe, the City may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the City to stop the Work shall not give rise to any duty on the part of the City to exercise this right for the benefit of the Contractor or any other party. The City

will not award any increase in Contract Price or Contract Time if the Work is stopped due to the circumstances described herein.

- 3.1.11. City's Decision:** The City shall, within a reasonable time after their presentation, make decisions in writing on claims by the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the Contract Documents.
- 3.1.12. Authority and Duties of City's Inspectors:** The City's Inspectors shall be authorized to inspect all work done and all materials furnished. They shall be authorized to call to the attention of the Contractor any failure of the work or materials to conform to the Technical Specifications and Contract. The presence of the Inspector shall in no way lessen the responsibility of the Contractor.
- 3.1.13. Inspection of Work:** The City and its representative shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection. If the Specifications/Conditions, the City's instruction, laws, ordinances or any public authority require any work to be specially tested or approved, the Contractor shall give to the City timely notice of its readiness for inspection and, if the inspection is by an authority other than the City, the date fixed for such inspection. Inspections by the City shall be promptly made and, where practicable, at the source of supply. If any work should be covered up without approval or consent of the City, it must, if required by the City, be uncovered for examination at the Contractor's expense. Re-examination of questioned work may be ordered, and the work must be uncovered by the Contractor.
- 3.1.14. Contractor's Supervision and Employees:** The Contractor shall supervise, inspect, and direct the work completely and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequence and procedures necessary for the orderly progress of the work, and to maintain all safety precautions and programs incidental thereto. The Contractor shall at all times enforce strict discipline and good order among his/her employees, and shall not employ any unfit person or anyone unskilled in the work assigned to him/her. The Contractor shall be responsible to see that the completed work complies fully with the Contract Documents.

As the work progresses, the Contractor shall keep on the job at all times an English-speaking Superintendent or designee, technically qualified, who is an employee of the Contractor and who shall not be replaced without written notice and approval of the City. The Superintendent will be the Contractor's representative on the job and shall have authority to act on behalf of the Contractor. The Superintendent or his/her qualified designee shall be present at the job site and direct the work of subcontractors, as well as employees of the Contractor. This supervisor will be equipped with a communication device enabling him/her to contact suppliers, subcontractors or his/her office who in turn can convey necessary communications to others. All communications given to the Superintendent shall be as binding as if given to the Contractor. The Contractor shall issue all communications to the City or his/her representative.

The Contractor's Superintendent shall be present on the job site at all times while work is in progress, and shall be available by phone for emergencies twenty-four hours per day, seven days per week. Failure to observe this requirement shall be considered

suspension of the work by the Contractor until such time as such Superintendent is again present on the job.

If the Contractor, in the course of the work, finds any discrepancy between the drawing and the physical conditions of the site, or any errors or omissions in drawing, or in the construction layout points and instructions, he/she shall immediately inform the City, in writing, and the City shall promptly verify same. Any work done after such discovery will be done at the Contractor's risk.

Neither party shall employ or hire any employee of the other party without the concurrence of each party.

3.1.15. Contractor's Understanding: It is understood and agreed that the Contractor has, by careful examination, satisfied himself/herself as to the nature and locations of the work, the conformation of the ground, the character, quality, and quantity of materials to be encountered, the character of equipment and facilities needed prior to and during prosecution of the work under this Contract. No verbal agreement or conversation with any officer, agent, or employee of the City, either before or after execution of this Contract, shall affect or modify the terms or obligations herein contained.

3.1.16. Permits and Regulations: Permits and licenses necessary for the prosecution of the work shall be secured and paid for by the City, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the specifications and drawings are at variance therewith, he shall promptly notify the City in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to the City, he/she shall bear all costs arising there from.

3.1.17. Protection of Work and Property: The Contractor shall continuously maintain protection of all his/her work from damage and shall protect the City's property from injury or loss arising in connection with this Contract. He/she shall adequately protect adjacent property as provided by law and the Contract Documents. He/she shall provide and maintain all passageways, guard fences, lights, and other facilities for protection required by public authority or local conditions. In an emergency affecting the safety of life or of the work, or of adjoining property, the Contractor, without special instruction or authorization from the City, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury, and he/she shall so act, without appeal, if so instructed or authorized. Any compensation claimed by the Contractor on account of emergency work shall be determined by agreement between the Contractor and the City.

The Contractor shall not occupy private land outside of any easements or rights of way unless a written authorization has been signed by the property owner. It shall be the Contractor's responsibility to provide these agreements prior to construction, if required. Prior to the use of private lands, the Contractor shall submit a copy of the agreement(s) to the City. In the event the Contractor uses private property for any purpose without first having obtained the necessary approvals from the property owner and provided the necessary agreements to the City, the City will direct the Contractor in writing to immediately cease using such property.

Prior to application for final payment, the Contractor shall provide documentation from the owner of each piece of private property for which an agreement for use was provided, or for which the City has issued written notification to the Contractor, that each owner is satisfied with the manner in which the Contractor has restored the property. Final payment or reduction in retainage shall not be paid until such documentation is received by the City.

- 3.1.18. Changes in the Work:** The City, without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the work, the Contract sum being adjusted accordingly. Such work shall be executed under the conditions of the original Contract. The change and amount of compensation must be agreed upon in writing in a document of equal dignity herewith prior to any deviation from the terms of this Contract.

In giving instructions, the City shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work. Except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the City; and no claim for an addition to the Contract sum shall be valid, unless ordered. Value of any such extra work or change shall be determined in one or more of the following ways:

By estimate and acceptance in a lump sum.

By unit prices named in the Contract or subsequently agreed upon.

By cost and percentage or by cost and a fixed fee.

If none of the previous methods are agreed upon, the Contractor, provided he/she receives an order as above, shall proceed with the work. In such case and also under case, he/she shall keep amendment in such form as the City may direct, a correct amount of the net cost of labor and materials, together with vouchers. The City shall certify to the amount, including reasonable allowance for overhead and profit, due to the Contractor. Pending final determination of value, no payment on changes shall be made. When requiring a change in the scope of services the Contractor shall notify the City by written notice that a change order is requested within five (5) days of any occurrence.

- 3.1.19. Deductions for Uncorrected Work:** If the City deems it inexpedient to correct work injured or done not in accordance with the Contract, an equitable deduction from the Contract price shall be made thereof.

- 3.1.20. Delays and Extension of Time:** If the Contractor should be delayed at any time in the progress of work by any act of neglect of the City or of its employees or by any other Contractor employed by the City, or by changes ordered in the work, or by such causes beyond the Contractor's control, or by delay authorized by the City, or by any cause which the City shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the City may decide. However, no time delay shall be allowed if judged by the City to be caused by the Contractor's negligence.

No such extension shall be made for delay occurring more than seven (7) calendar days before claim therefore is made in writing to the City. In the case of a continuing cause of delay only one (1) claim is necessary. This article does not exclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

- 3.1.21. Correction of Work Before Final Payment:** All work, materials, whether incorporated in the work or not, all processes of manufacturer, and all methods of construction shall be at all times and places subject to the inspection of the City who shall be the final judge of quality and suitability of the work, materials, processes of manufacture, and methods of construction for the purposes for which they are used. Should they fail to meet City's approval; they shall be forthwith reconstructed, made good, replaced, and/or corrected, as the case may be, by the Contractor at his/her own expense. Rejected material shall be immediately removed from the site. If, in the opinion of any portion of the work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgment of the City to be equitable.
- 3.1.22. Contractor Right to Stop Work or Cancel Contract:** If the work should be stopped under an order of any court or other public authority for a period of three (3) months through no act or fault of the Contractor or of anyone employed by him, or if the City fails to pay the Contractor within thirty (30) calendar days of maturity and presentation of any sum certified by the City, then the Contractor may, upon seven (7) calendar days written notice to the City, stop work and terminate this Contract.
- 3.1.23. Removal of Equipment:** In the case of annulment of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the City, shall promptly remove any part or all of his equipment and supplies from property of the City and/or site of work, failing which the City has the right to remove such equipment and supplies at the Contractor's expense.
- 3.1.24. Use of Completed Portions:** The City has the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work of such portions may not have expired, but taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the Contractor shall be compensated as the City may determine and the City approves.
- 3.1.25. Payments Withheld:** The City may withhold payment to the Contractor from loss on account of:
- a. Defective Work not remedied
 - b. Failure of the Contractor to make payment properly to Subcontractors or for material/labor
 - c. A reasonable doubt that the Contract can be completed for the balance then unpaid.
 - d. Damage to another Contractor
- When the above grounds are removed, payment shall be made for amounts withheld because of them.
- 3.1.26. Damages:** Any claim for damage arising under this Contract shall be made in writing to the party liable within a reasonable time of the first observance of such damage and not later than the time of final payment, except as expressly stipulated otherwise in the case of faulty work, and shall be adjusted by agreement.

- 3.1.27. Assignment:** Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him/her hereunder without the previous written consent of the City.
- 3.1.28. Right of Various Interests:** Before work being done by the City's forces or by other Contractor's forces, contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the City before such commencement, to secure the completion of the various portions of the work in general harmony.
- 3.1.29. Separate Contracts:** The City reserves the right to let other Contracts in connection with this work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of the work, and shall properly connect and coordinate his/her work with theirs. If any part of the Contractor's work depends on proper execution or results upon the work of any other Contractor, the Contractor shall inspect and promptly report to the City any defects in such work that render it unsuitable for such proper execution and results. His/her failure to so inspect and report shall constitute an acceptance of the other Contractors, work as fit and proper for the reception of his work, except as to defects, which may develop on the other Contractor's, work after execution of his work.
- 3.1.30. Subcontractors:** The Contractor shall provide a list of Subcontractors with his/her proposal for approval. The Contractor agrees that he/she is as fully responsible to the City for the acts and omissions of his/her Subcontractors and of persons either directly or indirectly employed by them as he/she is for the acts and omissions of persons directly employed by him/her. Nothing contained in the Contract documents shall create any Contractual relationship between any Subcontractor and the City.
- Substitutions of subcontractors must be submitted in writing and shall be subject to the approval by the City. To insure proper execution of his/her subsequent work, the Contractor shall measure work already in place and shall at once report to the City any discrepancy between the executed work and the drawings.
- 3.1.31. Horizontal and Vertical Control:** Unless noted otherwise in the Contract documents, the Contractor shall be responsible for the layout of all Contract work. The Contractor shall employ or retain any/all professional services that are required by the Contract to complete the work. The Contractor shall carefully preserve benchmarks, reference points and stakes, and, in case of willful or careless destruction, be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.
- 3.1.32. Lands for Work:** The City shall provide the lands upon which the work under this Contract is to be done, except that the Contractors shall provide land required for the erection of temporary construction facilities and storage of material, together with the right of access to same.
- 3.1.33. Cleaning Up:** The Contractor shall, at such times as may be required by the City, remove from the City's property and from all public and private property, at his/her own expense, all temporary structures, used materials and equipment, rubbish and waste materials resulting from his/her operations. All damaged areas will be restored by the Contractor to their original conditions and approved by the City. By submission of a bid, the Contractor assumes full responsibility for the associated expenses. There shall not

be an increase in time or price associated with such removal, and payment to Contractor may be withheld until such work is completed.

- 3.1.34. Guarantee:** The Contractor shall warrant all equipment furnished and work performed by him/her for a period of one (1) year from the date of written acceptance of the work, final completion by the City or as may be otherwise specified. Any faulty work or equipment will be fully corrected at no cost to the City and restored work will be warranted for one year from the date of acceptance, or as may be otherwise specified. This will not release additional warranties required by other sections or provided by individual suppliers.

The making and acceptance of final payment shall not waive any claim for faulty work appearing after final payment or for failure to adhere strictly to the Contract documents. If any part of the project is guaranteed for a longer period, such longer period shall prevail. Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from use of inferior materials, equipment or workmanship for one (1) year from the date of completion or written acceptance by the City, whichever is later.

- 3.1.35. Responsibility Regarding Existing Utilities and Structures:** The existence and location of underground utilities indicated on the plans are not guaranteed and shall be investigated and verified in the field by the Contractor before submitting a bid. Excavation in the vicinity of existing structures and utilities shall be done by hand. The Contractor shall be responsible for any damage to, and for maintenance and protection of, existing utilities and structures from any damage resulting from said excavation. The Contractor is to include within his line item bid prices the costs to protect, support, relocate, or move (whether shown or not shown on the proposed project set of plans) all underground utilities, which may be in conflict with the construction of the proposed project.

- 3.1.36. Accidents:** The Contractor shall provide equipment and medical facilities as necessary to supply first aid to anyone who is injured in connection with the work. The Contractor must promptly report in writing to the City accidents arising out of, or in conjunction with the performance of the work, whether in, or adjacent to, the site, which causes death, personal injury, or property damages, giving full details and statements of witnesses. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the City. If a claim is made by anyone against the Contractor or Subcontractor on account of an accident, the Contractor shall promptly report the facts in writing to the City, giving full details of the claim.

- 3.1.37. Stage Plans:** Stage plans of structural alterations, cofferdams, dredging, furnished or approved by the City, shall be adhered to unless objected to in writing by the Contractor, but the submission or approval of stage plans by the City shall not relieve the Contractor of full responsibility for the work.

- 3.1.38. Measurement of Quantities:** The quantities of work performed will be computed by the City on the basis of measurement taken by the City or its assistants, and these measurements shall be final and binding. All work computed under the Contract shall be measured by the City according to the United States Standard Measurement and Weights. The City does not assume any responsibility that the final quantities will

remain in accord with estimated quantities, nor shall the Contractor claim misunderstanding or deception because of such estimate of quantities.

The estimated quantities of work to be done and material to be provided may be increased, decreased, or omitted, as provided herein. Any increase in quantities shall be approved by the City prior to any work.

3.1.39. Reference to Other Specifications: Where reference is made to specifications such as ASTM, AWWA or AASHTO, the latest edition shall be used.

3.1.40. Sanitary Facilities: The Contractor shall provide and maintain, in a sanitary condition, facilities for his/her employees as are required by local and state boards of health.

3.1.41. Quality of Equipment and Materials: To establish standards of quality, the City may, in the specifications, refer to products by name and/or catalog number. This procedure is not to be construed as eliminating from competition other products of equal quality by other manufacturers where fully suitable in design.

The Contractor shall furnish a complete list of proposed desired substitutions prior to signing of the Contract together with such engineering and catalog data as the City may require.

The Contractor shall abide by the City's judgment when proposed substitute items of equipment are judged unacceptable and shall furnish the specified item of equipment in such case. All proposals for substitutions shall be submitted in writing by the General Contractor. The City will approve or disapprove proposed substitutions in writing within a reasonable time.

3.1.42. Codes and Laws: The successful bidder shall comply with all Federal, State, Local Laws and Ordinances that affect the Contract in any way.

3.1.43. Traffic Control: The Contractor shall comply with the "Manual on Uniform Traffic Control and Devices" and maintain safe conditions at all times.

3.1.44. Exploration and Reports: If reference is made to identification of reports of explorations and tests of subsurface conditions at the site that have been used in preparing the Contract documents, it should be understood that these reports are not part of the Contract documents. The Contractor shall have full responsibility with respect to subsurface conditions at the site. Technical data, made available only at the Contractor's request, may not be sufficient for construction purposes. Additional investigations may be necessary for the purposes of carrying out the construction project. If the Contractor desires additional subsurface investigation, it will be done at his/her expense, prior to bidding. Limited Subsurface reports for this project are available through the Utility Department.

If the Contractor has elected not to make subsurface investigation prior to bidding, he/she shall not be entitled to any extra compensation or Contract change orders due to conditions encountered.

3.1.45. Existing Structures: Drawing of physical conditions in or relating to existing surface and subsurface structures which are at or contiguous to the site that have been utilized by the consultant and/or the City in preparation of the Contract documents. The Contractor may rely upon the accuracy of the technical data contained in such drawing but not for the completeness thereof for the purpose of preparing or submitting a

bid. Except as previously indicated, the Contractor shall have full responsibility with respect to physical conditions in or relating to such structures.

- 3.1.46. Report of Differing Conditions:** If the Contractor believes that any technical data on which he/she relies is inaccurate, or if any physical conditions uncovered or revealed at the site differ materially from that indicated, reflected, or referred to in the Contract documents, the Contractor shall promptly, after becoming aware and before performing any work in connection therewith (except in emergency situations), notify the City in writing about the inaccuracy of difference. The City will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise the City in writing (with a copy to the Contractor) of the City's findings and conclusion.
- 3.1.47. Not Shown or Indicated:** If an underground facility is uncovered or revealed at or contiguous to the site, which was not shown or indicated and of which the Contractor could not reasonably have been expected to be aware, the Contractor shall promptly, before performing any work (except in emergencies), identify the owner of such underground facility and give written notice thereof to that owner and to the City. The Contractor will review the underground facility to determine the extent to which the documents should be modified to reflect and substantiate the consequences of the existence of the underground facility. With City approval, the Contract documents will be amended or supplemented to the extent necessary. During such time, the Contractor shall be responsible for the safety and protection of such underground facility. The Contractor shall be allowed an increase or an extension of time, or both, to the extent that they are attributable.
- 3.1.48. Progress Meeting:** Progress meetings will be conducted bi-weekly or as required if requested by Contractor or the City.

SPECIAL PROVISIONS

SP-01 INTENT: The City of North Port will receive sealed bids to secure the services of a professional, licensed, and qualified Contractor(s) who are capable of providing all labor, material and equipment to construct the project.

The Contractor shall pro-actively prosecute the work through the use of their own resources; along with that of qualified sub-contractors. The Contractor shall maintain complete control of the work by adequate planning and scheduling of resources.

SP-02 EQUIPMENT: The Contractor shall only use equipment, machines, or combination of machines that are in good and safe working condition and appropriate for the intended use on the project. The equipment shall produce results that meet or exceed the Technical Specifications stated herein. Special attention is directed to pavers capable of achieving desired application rates, specified cross slope and necessary joint matching through the use of the latest electronic technology available.

Equipment incapable of providing this will not be acceptable for use on this Project. The Contractor shall utilize compaction equipment, which will produce the required density in accordance with the Technical Specifications. The Contractor shall not use equipment which is unsafe or in need of repair. Work completed with equipment, which is not properly functioning, shall be deemed unacceptable.

SP-03 PRE-CONSTRUCTION CONFERENCE: A Pre-Construction Conference will be held, at which time the Contractor shall submit the following for the City's approval or acceptance: A telephone list specifying the name, address, phone number and e-mail of all subcontractors or suppliers to be used on this project. If the Contractor proposes to subcontract the survey work, the Contractor shall include the registration number of the surveyor. The telephone list shall also include emergency telephone numbers. The Contractor shall include a 24-hour emergency telephone number(s) for the City's use, which the Contractor shall update as necessary throughout the project. The Contractor shall request, in writing, any changes in subcontractors or suppliers. No change in subcontractors or suppliers shall be made without written consent from the City.

- SP-03.2.** In addition to the telephone and facsimile numbers, the Contractor shall provide an e-mail address where emails can be sent. The e-mail address must be monitored at least daily and capable of transferring electronic files.
- SP-03.3.** The source of materials for the borrow material. The Contractor shall not change these sources without written consent from the City.
- SP-03.4.** The Contractor shall submit to the City a list of equipment the Contractor proposes to utilize on this project.
- SP-03.5.** The Contractor shall submit for City approval a paper copy and electronic copy of a Construction Schedule prepared using City approved software, and a Schedule of Progress Payment Requests.
- SP-03.6.** The Contractor shall also submit all other materials or mix designs, which will be used by the Contractor for this Contract.

No work shall start until all submittals have been accepted by the City and/or City's Representative. Once approved, no changes will be allowed without the written approval of the City and/or the City's Representative.

The Contractor shall also provide on a monthly basis an update to the Construction Schedule reflecting changes made as a result of such reasons as weather, breakdowns, and unanticipated delays, as a means of better monitoring the project.

SP-04 DEWATERING DURING CONSTRUCTION: The Contractor shall furnish (at no additional cost) a specialty certified dewatering contracting firm to design and perform site and excavation de-watering during the construction of the project. Dewatering shall be directed to the water quality pond on the Butler Park site and not the adjacent creek. See Bid Proposal form.

SP-05 FIRE ALARM AND FIRE SPRINKLER SYSTEMS: The Contractor shall furnish as a part of his bid a turnkey (design and installed by a certified firm) fire alarm and fire sprinkler system per the City of North Port requirements and delineated in the technical specifications. The submittal of this design will be required in order to get a building permit. See Bid Proposal Form

SP-06 COOPERATION WITH UTILITIES: The Contractor shall notify all utility owner(s) affected by the construction prior to beginning work. Any expense of utility repair or other damage due to Contractor's operations shall be borne by the Contractor. Protection of utilities shall be the responsibility of the Contractor, who shall provide adequate protection to maintain proper service.

NOTE: The Contractor is to include within his bid prices, the costs to protect, and/or support, all underground utilities, which may be in conflict with the construction of this proposed project.

Attention is called to the Florida Underground Facility Damage Prevention and Safety Act defined in Florida Statute 240. This act provides for a "One Call Toll Free" telephone number to be used by all parties doing excavation, demolition or other underground construction.

SP-07 CONTRACT TIME/LIQUIDATED DAMAGES: The work shall be completed **BY MAY 15, 2019** on the Notice to Proceed. The contract time shall include the preparation, submittal, review and approval of submittals, delivery of materials, and construction, assembly, adjustment and placement into service for beneficial use of all facilities covered under this Contract.

The City of North Port shall issue a Notice of Substantial Completion when it has determined the work identified in the contract has been substantially completed **NO LATER THAN APRIL 15, 2019**; record drawings have been submitted and approved by the City and that the facility is operating satisfactorily. The contract time also includes up to fourteen (14) calendar days for the review of submittals, excluding pay requests, by the City of North Port. The City of North Port shall provide the Contractor with a punch list within two (2) calendar days after the Notice of Substantial Completion is issued. The punch list will identify the remaining items that must be addressed to the satisfaction of the City of North Port by the Contractor to meet his/her obligations under the contract. The Contractor shall complete the items on the punch list to the satisfaction of the City of North Port within the remainder of the thirty (30) calendar days from Substantial Completion and prior to submittal of final payment. Any cost incurred by the City (i.e. inspection time) after the thirty (30) calendar day period shall be charged to the Contractor.

The City and the Contractor hereby agree that time is of the essence on this Contract and the City will suffer damages if the work is not substantially completed within the contract time, plus any extensions thereof allowed by Change Order. It is further recognized and agreed by the City and the Contractor that the determination of the exact value of the damages the City would suffer due to a delay in the Substantial Completion of the work would be a difficult, time consuming and costly process. It is therefore hereby agreed by the City and the Contractor that it is in their mutual interest to establish a figure of **ONE THOUSAND DOLLARS (\$1,000)** as Liquidated Damages (but not as a penalty) to be paid by the Contractor to the City for each calendar day that Substantial Completion is delayed beyond the Contract Time. It is mutually agreed by the City and the Contractor that neither shall make any claim to increase or reduce

the amount to be paid under Liquidated Damages as the result of any calculation of actual damages suffered by the City as the result of delay in the Substantial Completion of the work.

SP-08 DAMAGES: Areas adjacent to the construction that are damaged shall be repaired at the Contractor's expense. Restoration of adjoining areas shall be equal to or better than original condition and to the satisfaction of the City. Protection of personal property, utilities, structures, mailboxes, sprinkler systems, conduits, trees, and shrubs shall be the responsibility of the Contractor, who shall provide adequate protection to maintain proper service. Mailboxes shall be kept in service to the satisfaction of the US Postal Service and the City, until they are permanently restored to their proper location upon the completion of the work.

SP-09 TESTING/INSPECTION: If the Contract Documents, laws, ordinances, rules, regulations or order of any public authority having jurisdiction require any work to be specifically inspected, tested or approved by someone other than the Contractor, the Contractor will give the City timely notice of readiness therefore and coordinate directly with the testing entity for scheduling of tests and inspections. The Contractor will furnish the City with the required certificates of inspection, testing or approval. All such tests will be in accordance with the methods prescribed by the American Society for Testing and Materials or such other applicable organizations as may be required by law or the Contract Documents. If any such work required to be inspected, tested or approved is covered without written approval of the City, it shall, if requested Quality Control by the City, be uncovered for observation at the Contractor's expense. The Contractor shall pay for the initial cost of all such inspections, tests and approvals. Any charges for re-tests due to failure of work to meet requirements, waiting time or remobilization of testing entity shall be borne by the Contractor and credited against pay requests prior to submittal to the City. All testing required by the specifications will be the responsibility of the Contractor.

Testing shall be as specified in the Technical Provisions. Contractor shall submit a Quality Control Plan for review and approval by the City. The Contractor shall coordinate the testing with the Verification Testing firm contracted by the City for this project.

SP-10 CONTINUOUS PROSECUTION OF WORK: The Contractor shall continuously prosecute the work in accordance with the Contract Documents. Upon written direction from the City, the Contractor shall remove any personnel for the duration of the Contract, who fails to comply with the Contract Documents.

Correction of safety concerns will be given priority and shall be corrected as soon as practicable, but not later than 24 hours after discovery by the City and notification to the Contractor. Failure to comply with these Provision and/or Technical Specification shall result in the Contractor being considered in default and subject to suspension of this contract.

SP-11 SAFETY/ACCESS: The Contractor shall at all times take every available precaution to safeguard the Public and the Work Force. The Contractor within the Work Zone. All contractors and subcontractors performing work on City Property and projects shall have a written Health and Safety plan.

These plans are required by OSHA as well as other regulating agencies.

The Contractor shall at all times take every available precaution to safeguard the Public. The Contractor's personnel shall fully comply with the approved Maintenance of Traffic (MOT); the MOT shall be provided for Woodhaven Drive and Greenwood Avenue and other local road systems that will be rehabilitated.

Contractor shall communicate with the Inspector and act courteously with the Public. All personnel working within the City's right-of-way shall at all times wear City approved safety vests, including personnel who may only briefly be out of their vehicle (i.e., supervisors, truck drivers). The Contractor

shall not remove any traffic controls, including off-duty officers and flaggers without permission of the City Inspector until the roadway is completely ready for traffic; therefore, the Contractor shall have personnel on-site until all temporary striping is completed. No open excavations are allowed in the project. Any pipe installation shall be backfilled properly the same day of work on such pipe area to allow safe passing of pedestrians and vehicles. The Contractor shall immediately remove any personnel who fail to conform to this requirement.

SP-12 PRIVATE PROPERTY: The Contractor shall not occupy private land outside of any easements or rights of way unless a written authorization has been signed by the property owner. It shall be the Contractor's responsibility to provide these agreements prior to construction, if required. Prior to the use of private lands, the Contractor shall submit a copy of the agreement(s) to the City. In the event that the Contractor uses private property for any purpose without first having obtained the necessary approvals from the property owner or provided the necessary agreement to the City, the City will direct the Contractor in writing to immediately cease using such property.

Prior to application for final payment, the Contractor shall provide documentation from the owner of each piece of private property for which an agreement for use was provided, or for which the City has issued written notification to the Contractor, that each owner is satisfied with the manner in which the Contractor has restored the property. Final payment or reduction in retainage shall not be paid until such documentation is received by the City.

SP-13 CHANGES IN THE WORK: The City, without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the work, the Contract sum being adjusted accordingly. Such work shall be executed under the conditions of the original contract. The change and amount of compensation must be agreed upon in writing in a document of equal dignity herewith prior to any deviation from the terms of this Contract. In giving instructions, the City shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work. Except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the City; and no claim for an addition to the Contract sum shall be valid, unless ordered. Value of any such extra work or change shall be determined in one or more of the following ways:

1. By estimate and acceptance in a lump sum.
2. By unit prices named in the contract or subsequently agreed upon.
3. By cost and percentage or by cost and a fixed fee.
4. By Incidental Field Change Adjustment (IFCA).

If none of the previous methods are agreed upon, the Contractor, provided he receives an order as above, shall proceed with the work. In such case and also under case, he shall keep amendment in such form as the City may direct, a correct amount of the net cost of labor and materials, together with vouchers. The City shall certify to the amount, including reasonable allowance for overhead and profit, due to the Contractor. Pending final determination of value, no payment on changes shall be made.

SP-14 CONTRACTOR'S UNDERSTANDING: It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and locations of the work, the conformation of the ground, the character, quality, and quantity of materials to be encountered, the character of equipment and facilities needed prior to and during prosecution of the work under this Contract. No verbal agreement or conversation with any officer, agent, or employee of the City, either before or after execution of this Contract, shall affect or modify the terms or obligations herein contained.

SP-15 MONTHLY ESTIMATES: As the construction work progresses, each month the Contractor will be paid the total value of the work completed and accepted during the preceding month, less ten percent (10%) retainage. In accordance with Section 218.735, Florida Statutes and for those construction contracts in excess of \$200,000, the City, after fifty percent (50%) of the contracted construction work is completed, shall reduce the amount of the retainage withheld to five percent (5%) on all subsequent monthly estimates. Also, after such time the Contractor may request and submit as part of his monthly estimate a release of up to one-half of the retainage being withheld by the City, unless the City has grounds for withholding the payment of retainage pursuant to Section 255.05, Florida Statutes.

The City's computations shall be the basis for monthly estimates and final payment.

The City will furnish the Contractor's Superintendent with a list of quantities and pay items summarizing the work completed during the preceding month. This comprises the monthly estimate. As identified in Division 1 of the technical specifications, the schedule of values for payment applications will be submitted by the Contractor to the City for approval.

The City's summary of pay items and submittal of the monthly estimate for subsequent payment to the Contractor shall serve as the basis for and become part of the invoice for such payment.

The invoice shall be in strict conformance with the form prescribed by the City and submitted at the same time as the monthly estimate.

The Contractor shall include with each Pay Request a revised Construction Schedule.

COMPLETION OF PROJECT: All release of liens have been submitted and are satisfactory to the City, certifying that all payrolls, material bills, and other indebtedness incurred by the Contractor in connection with this project have been paid in full.

SP-16 MINIMUM RELEVANT PROJECTS/QUALIFICATIONS/REFERENCES:

Prime bidder must be fully licensed to do business in the State of Florida and be currently licensed as a Certified General Contractor in the State of Florida and provide proof of licensure with the submitted Bid Proposal. Bidders must have successfully completed, as a Prime or Subcontractor, at least three (3) projects, in the past five (5) years, of similar type, size and dollar value of the project described herein. Additionally, bidder must demonstrate the successful completion by the Superintendent of three (3) projects of similar complexity, nature, size, and dollar amount of project in the past five (5) years. At least one (1) of these projects shall have been completed with the Bidder.

SP-17 E-VERIFY: The Contractor shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Contractor during the term of the Contract and shall expressly require any subcontractors performing work or providing services pursuant to the Contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the Contract term.

It is the awarded Bidder's responsibility to ensure that all its employees and subcontractors comply with the employment regulations required by the US Department of Homeland Security. The City shall have no responsibility to check or verify the legal immigration status of any employee of the awarded Bidder.

SP-18 UNAUTHORIZED ALIEN WORKERS: The City will not intentionally award publicly-funded contracts to any Contractor who knowingly employs unauthorized alien workers, constituting a violation of the

employment provisions contained in U.S.C. Section 1324a(e) [Section 274A(e) of the Immigration and Nationality Act (“INA”)]. The City shall consider employment by any Contractor of unauthorized aliens a violation of Section 274A(e) of the INA. Such violation by the Contractor of the employment provisions contained in Section 274A(e) of the INA shall be grounds for termination of this Agreement by the City.

SP-19 EMPLOYEE BACKGROUND CHECK: If an owner, except a stockholder in a publicly traded corporation, or an employee of the Contractor has been convicted of any offenses requiring registration as a sexual offender or sexual predator, regardless of the location of conviction, the Contractor shall ensure that the offender’s or predator’s work on the project is consistent with the terms of his probation and registry requirements.

SP-20 RELEASE OF LIENS: The Contractor is required to pay all money due subcontractors and material dealers promptly. The Contractor shall submit releases of liens, satisfactory to the City, certifying that all payrolls, material bills, and other indebtedness incurred by the Contractor in connection with this project have been paid in full. Documentation supporting the partial or full release of liens shall be provide with each payment request except the first request.

SP-21 PERMITS: SWFWMD, DEPARTMENT OF HEALTH, and BUILDING PERMITS are permits required to complete this project which have been or will be obtained by the City. The City will pay for all permit fees determined by the DOH, SWFWMD, and Neighborhood Development Services / Building Division. The City will pay the Utility capacity fees and Impact fees. The City will pay any miscellaneous fees assessed by any utility company or government agency. Permits and licenses necessary for the prosecution of the work shall be secured by the Contractor. Contractor will need to provide a copy of a valid Florida General Contractor’s License

The Contractor will be responsible for obtaining all permits necessary to complete the work described on the Plans and in the Specifications. All work performed will be in accordance to the permit special conditions and restrictions.

For the work of this Contract, the City has obtained no permits for this project.

The City will pay for all permit fees determined by the Building Department and the City of North Port Public Works Department. For this project, Right of Way (ROW) permit(s) will be required. The City will make payment directly to the Neighborhood Development Services Department for any miscellaneous fees assessed for the necessary permits and related inspections. Additional or re-inspection fees shall be paid for by the Contractor. Pressure testing the system shall be paid for by the Contractor. Permits and licenses necessary for the prosecution of the work shall be secured by the Contractor.

SP-22 SUMMARY OF PAY ITEMS: The Bid Form, Summary of Pay items lists “The design and construction/installation of Stretch 25Y Competition Pool Geo-Thermal System” as an Add Alternative II. It has been determined this item will be included in the Base Bid.

SP-23 CRITERIA FOR AWARD: The award of this bid shall be to the overall lowest responsive, responsible bidder who meets or exceeds the minimum requirements of these specifications. Other consideration(s) of award may be local preference, qualifications, and references. Any unfavorable references may be cause to deem bidder non-responsive.

The City reserves the right to reject the bid proposal of any bidder who has previously failed to perform properly, or on time, contracts of similar nature; or who is not in a position to satisfactorily perform the contract. If, after bid opening, the lowest bidder is deemed non-responsible by the City, the bidder shall follow protest of this bid in accordance with chapter 2, Article VIII Section 2-409 of the City of North Port

Code of Ordinances. Failure to file a protest in accordance with above shall constitute a waiver of the right to protest.

END OF SPECIAL PROVISIONS

INSURANCE REQUIREMENTS

Contractor and subcontractors shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, insurance against claims for injury to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors.

The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract. The City in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees, or subcontractors. Contractor is free to purchase such additional insurance as may be determined necessary.

LIMITS OF INSURANCE - Contractor shall provide coverage with limits of liability not less than those stated below. An excess liability policy or umbrella liability policy may be used to meet the minimum liability requirements provided that the coverage is written on a "following form" basis.

1. Commercial General Liability – Occurrence Form (CG 00 01)

Policy shall include bodily injury, property damage, broad form contractual liability and Explosion, Collapse and Underground (XCU) coverage. The general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

The Contractor shall procure and maintain, and require all subcontractors to procure and maintain a comprehensive general liability policy, including, but not limited to

Requirements:

- General Aggregate \$2,000,000
 - Each Occurrence \$1,000,000
 - products and completed ops \$1,000,000
 - damage to rented premises \$100,000
 - fire damage \$100,000
- a) The policy shall be endorsed to include the following additional insured language: "City of North Port and its officers, employees, agents and volunteers" shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor.
- b) Contractor's subcontractors shall be subject to the same minimum requirements identified above.
- c) Policy shall be endorsed for a waiver of subrogation against the City of North Port.

2. Automobile Liability

Bodily injury and property damage for any owned, hired, and non-owned vehicles used in the performance of this Contract. Automobile liability must be written on a standard ISO form (CA 00 01) covering any auto (Code 1), or if Contractor has no owned autos, hired (Code 8) and non-owned (Code 9) autos.

- Combined Single Limit (CSL) (Ea Accident) \$1,000,000
- Bodily Injury (per person) \$1,000,000
- Bodily Injury (per accident) \$1,000,000
- Property Damage (per accident) \$1,000,000

- a. The policy shall be endorsed to include the following additional insured language: "City of North Port and its officers, employees, agents and volunteers" shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor, including automobiles owned, leased, hired or borrowed by the Contractor".
- b. Contractor's sub-contractors shall be subject to the same minimum requirements identified in this section.
- c. Policy shall contain a waiver of subrogation against the City of North Port.

3. Worker's Compensation and Employers' Liability (PER CHAPTER 440. FLORIDA STATUTES)

The Contractor shall procure and maintain Worker's Compensation insurance for all his employees to be engaged in work on the project under this Contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation insurance for all of the latter's employees to be engaged in such work unless such employees are covered by protection afforded by the Contractor's Workers Compensation insurance. For additional information contact the Department of Financial Services, Workers' Compensation Division at 850.413.1601 or on the web at www.fldfs.com. In case any class of employees engaged in hazardous work on the project under this Contract is not protected under the Worker's Compensation Statute, the Contractor shall provide, and shall cause each subcontractor to provide, Employer's Liability Insurance for the protection of such of his employees not otherwise protected under such provisions. The minimum liability limits of such insurance shall not be less than herein specified or in that amount specified by law for that type of damage claim.

Proof of such insurance shall be filed by the Contractor with the City within ten (10) days after the execution of this Contract.

**Workers' Compensation
Employers' Liability**

- Each Accident, each employee, bodily injury or disease \$1,000,000
- a. Policy shall contain a waiver of subrogation against the City of North Port.
 - b. Contractor's sub-contractors shall be subject to the same minimum requirements identified in this section.
 - c. If the contractor has no employees, the contractor must submit to the City the Workers Compensation Exemption from the State of Florida.

4. Builder's Risk Insurance (Course of Construction) or Installation Floater – If Required.

Insurance utilizing an "All Risk" (Special Perils) coverage form with limits equal to the completed value of the project and no coinsurance penalty provisions.

5. Contractors' Pollution Legal Liability (if project involves environmental hazards) – If Required.

- Each Occurrence or Claim \$1,000,000
- Policy Aggregate \$2,000,000

GENERAL REQUIREMENTS:

A. The City of North Port is to be named additional insured on **Comprehensive Commercial General Liability Policy and Auto Policy**. All certificates of insurance must be on file with and approved by the City before commencement of any work activities under this Contract.

Any and all deductibles to the above referenced policies are to be the responsibility of the Contractor. The Contractor's insurance is considered primary for any loss regardless of any insurance maintained by the City. The Contractor is responsible for all insurance policy premiums, deductibles, or SIR (self-insured retentions) or any loss or portion of any loss that is not covered by any available insurance policy.

All insurance policies must be issued by companies of recognized responsibility licensed to do business in Florida and must contain a provision that prohibits cancellation unless the City is provided notice as stated within the policy. It is the Contractor's responsibility to provide notice to the City.

B. WAIVER OF SUBROGATION: All required insurance policies, with the exception of Workers Compensation, are to be endorsed with a waiver of subrogation. The insurance companies, by proper endorsement or thru other means, agrees to waive all rights of subrogation against the City, its officers, officials, employees and volunteers, and the City's insurance carriers, for losses paid under the terms of these policies that arises from the contractual relationship or work performed by the Contractor for the City. It is the Contractor's responsibility to notify their insurance company of the Waiver of Subrogation and request written authorization or the proper endorsement. Additionally, the Contractor, its officers, officials, agents, employees, volunteers, and any Subcontractors, agrees to waive all rights of subrogation against the City and its insurance carriers for any losses paid, sustained or incurred, but not covered by insurance, that arise from the contractual relationship or work performed. This waiver also applies to any deductibles or self-insured retentions the Contractor or its agents may be responsible for.

C. POLICY FORM:

1. All policies, required by this Contract, **with the exception of Workers Compensation**, or unless specific approval is given by Risk Management through the City's Purchasing Office, are to be **written on an occurrence basis**, shall name the City of North Port, its Commissioners, officers, agents, employees and volunteers as additional insured as their interest may appear under this Contract. Insurer(s), with the exception of Professional Liability and Workers Compensation, shall agree to waive all rights of subrogation against the City of North Port, its Commissioners, officers, agents, employees, or volunteers.
2. Insurance requirements itemized in this Contract, and required of the Contractor, shall be provided by or on behalf of all subcontractors to cover their operations performed under this Contract. The Contractor shall be held responsible for any modifications, deviations, or omissions in these insurance requirements as they apply to subcontractors.
3. Each insurance policy required by this Contract shall:
 - a. Apply separately to each insured against whom claim is made and suit is brought, except with respect to limits of the insurer's liability.
 - b. Be endorsed to state that coverage shall not be suspended, voided or cancelled by either party except after notice is delivered in accordance with the policy provisions. The Contractor is to notify the City Purchasing Office by written notice via certified mail, return receipt requested.
4. The City shall retain the right to review, at any time, coverage, form, and amount of insurance.

5. The procuring of required policies of insurance shall not be construed to limit Contractor's liability nor to fulfill the indemnification provisions and requirements of this Contract. The extent of Contractor's liability for indemnity of the City shall not be limited by insurance coverage or lack thereof, or unreasonably delayed for any reason, including but not limited to, insurance coverage disputes between the Contractor and its carrier.
6. The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely responsible for the payment of all deductibles and retentions to which such policies are subject, whether or not the City is an insured under the policy.
7. Claims Made Policies will be accepted for professional and hazardous materials and such other risks as are authorized by the City's Purchasing Office. All Claims Made Policies contributing to the satisfaction of the insurance requirements herein shall have an extended reporting period option or automatic coverage of not less than two (2) years. If provided as an option, the Contractor agrees to purchase the extended reporting period on cancellation or termination unless a new policy is affected with a retroactive date, including at least the last policy year.
8. Certificates of Insurance Evidencing Claims Made or Occurrences form coverage and conditions to this Contract, as well as the contract number and description of work, are to be furnished to the City's Purchasing Office (4970 City Hall Boulevard, Suite 337, North Port, FL 34286) prior to commencement of work AND a minimum of thirty (30) calendar days prior to expiration of the insurance contract when applicable. All insurance certificates shall be received by the City's Purchasing Office before the Contractor will be allowed to commence or continue work. The Certificate of Insurance issued by the underwriting department of the insurance carrier shall certify compliance with the insurance requirements provided herein.

Bidders should carefully review their existing insurances and consider their ability to meet these requirements prior to submission. The requirements should be forwarded to their agent, broker, and insurance providers for review

END OF INSURANCE REQUIREMENTS

BIDDER CHECKLIST

REQUIRED FORM

This checklist is provided to assist each Bidder in the preparation of their bid response. Included in this checklist are important requirements, which is the responsibility of each Bidder to submit with their response in order to make their response fully compliant. This checklist is only a guideline it is the responsibility of each Bidder to read and comply with the Invitation to Bid in its entirety.

- ☐ 1. Carefully read and become familiar with the Instructions to Bidders, General Provisions, Special Conditions and Technical Provisions, Permits, Inspections Reports, Surveys and Insurance Requirements.
- ☐ 2. Fill out and sign **Bid Form (acknowledge addenda, bond information, subcontractors and suppliers, if applicable)**.
- ☐ 3. Fill out **Summary of Pay Items (Cost must be filled in every block)**.
- ☐ 4. Fill out and sign the **Statement of Organization** and have it properly notarized.
- ☐ 5. Provide **State of Florida Registration** (<http://www.sunbiz.org/search.html>)
- ☐ 6. Fill out and sign the **Non-Collusive Affidavit** and have it properly notarized.
- ☐ 7. Fill out and sign the **Conflict of Interest Form**
- ☐ 8. Fill out the **Reference Form**
- ☐ 9. Fill out and Sign the **Vendor Drug Free Workplace Form**.
- ☐ 10. Fill out and sign the **"Local Business Affidavit"** or **"North Port Local Business Affidavit"**, if applicable.
- ☐ 11. Fill out and sign **Public Entity Crime Information**
- ☐ 12. Fill out and sign **No Lobbying Affidavit**
- ☐ 13. Provide **USB drive** (pdf of submittal)
- ☐ 14. Fill out and sign the **SWORN STATEMENT: THE FLORIDA TRENCH SAFETY ACT**
- ☐ 15. Provide **any additional documentation requested** within the Bid and Technical Specifications Document.
- ☐ 16. **Submit ONE (1) Original AND ONE (1) Copy of submittal.**
- ☐ 17. **CREDIT CARDS** Does your company accept Credit Card Payments? (Credit card payments will be processed upon the City's inspection and acceptance of goods/services and receipt of invoice for payment. The City will not pay fees for credit card transactions). ☐ YES ☐ NO
- ☐ 18. Clearly mark the sealed bid with the **BID NUMBER AND BID NAME** on the outside of the package.

City of North Port /Purchasing Division
Alla V. Skipper, CPPB, Senior Contract Administrator
4970 City Hall, Suite 337
North Port, Florida 34286
RFB NO. 2018-35, North Port Aquatic Center

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

This page must be completed and submitted

**BID FORM
REQUIRED FORM**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

E-MAIL ADDRESS: _____

CONTRACTOR LICENSE #: _____

FEID #: _____

To the City Commission of the City of North Port pursuant to and in compliance with your notice inviting sealed bids (Invitation to Bid), Instructions to Bidders, General Provisions, Special Provisions, Technical Specifications & Conditions, Insurance, Bid Form, Plans, Geotechnical Report Documents and any the other documents relating thereto, the undersigned bidder, having familiarized himself/herself with the terms of the Contract documents, local conditions affecting the performance of the Contract, and the cost of the work at the place where the work is to be done, hereby proposes and agrees to perform within the time stipulated in the Contract, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, material, tools, expendable equipment, and all utility and transportation services and design of certain items necessary to perform the Contract and complete in a workmanlike manner, all of the work required in connection with the construction of said work all in strict conformity with the plans and specifications and other Contract documents for the prices hereinafter set forth.

The undersigned as bidder, declares that the only persons or parties interested in this proposal as principals are those named herein; that this submittal is made without collusion with any person, firm, or corporation; and he/she proposes and agrees, if the proposal is accepted, that he/she will execute a Contract with the City in the form set forth in the Contract documents and that he/she will accept in full payment thereof the following prices, to wit:

TOTAL BID PRICE (WITHOUT ADD ALTERNATE)

_____ \$ _____
(TYPE/PRINT) (NUMERIC)

Through the signing of this Bid Form, Bidder attests his/her bid is guaranteed for a period of not less than **NINETY (90) DAYS** from the date of the official bid opening.

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

This page must be completed and submitted

SUMMARY OF PAY ITEMS (REQUIRED FORM)

This page must be completed and submitted

Item	Description and Price in Words	PRICE (Numeric)
1	The construction of all miscellaneous work per the plans and specifications, including but not limited to: General Conditions, Site Preparation, Demolition, Grading, Utilities, Paving, Shade Structures, Site Furnishings, Fencing, Electrical Service Modifications, and Landscaping and Irrigation (and any other Base Bid items not covered below), to construct complete and in place the North Port Aquatic Center in North Port, Florida for the Lump Sum of _____ dollars and ____ cents.	\$ _____
2	The construction of the Pool Bathhouse Building, including foundations, mechanical and electrical work, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____
3	The construction of the Pool Filtration and Restroom Building, including foundations, mechanical and electrical work, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____
4	The construction of the Stretch 25Y Competition Pool, including all concrete work, mechanical and electrical, bulkhead, finishes, and equipment, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____
5	The construction of the Lazy River Pool, Slide Tower, Two Body Flumes, and Spray Features, including all concrete work, mechanical and electrical, finishes, and equipment, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____
6	The construction of the Zero Beach Entry Children's Pool, including all concrete work, mechanical and electrical, finishes, and equipment, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____
7	The design and dewatering of the construction project by a specialty certified dewatering contractor complete and in place, as defined in the Technical Specifications for the Lump Sum of _____ dollars and ____ cents.	\$ _____
8	The design and construction/installation of a fire alarm and fire sprinkler system by a licensed engineer and certified specialty contractor, as defined in the Technical Specifications, and as required by the City of North Port, complete and in place for the Lump Sum of _____ dollars and ____ cents.	\$ _____

9	The design and construction/installation of Stretch 25Y Competition Pool Geo-Thermal System. Consisting of 5 – Symbiont PH-215-TT-RV heat/cool units, 2 – 6” deep aquifer wells (including the well permits), 1 – 15hp submersible well pump and VFD, 1 – 5hp pool water booster pump with VFD, well water piping from wells to equipment, pool and well water manifold piping at the units, a concrete equipment pad, electrical power wiring from the FPL transformer (to be located next to the filter room), controls and control wiring, start-up and balance, training of the system, complete and in place, for the Lump Sum of _____ dollars and ____ cents.	\$ _____
BASE BID	TOTAL BASE BID (ITEMS 1 THROUGH 9 ABOVE), complete and in place for the total Lump Sum of _____ dollars and ____ cents.	\$ _____

ADD ALTERNATE (AA) BID ITEMS

Item	Description and Price in Words	Price in Figures
AA (#1)	The Bowl Slide, complete and in place, for the Lump Sum of _____ dollars and ____ cents.	\$ _____

A. SUBCONTRACTORS: Prior to the award of this RFB, the successful bidder hereby agrees to provide the City of North Port with a list of all subcontractors, specialty contractors, and suppliers, including category of work, contact name, address, contact person and telephone number.:

B. SPECIALTY CONTRACTOR/SUPPLIERS: List the following as a required part of the Bid Form.

Swimming Pool Contractor: _____

Waterslide Supplier: _____

Dewatering Contractor: _____

Play Equipment Supplier: _____

Geo Thermal Contractor/Supplier: _____

Fire Alarm Contractor: _____

Fire Sprinkler Contractor: _____

This page must be completed and submitted

- C. **CONTRACT TIME:** The Undersigned further agrees to commence said work upon receipt of the Notice to Proceed issued by the City and to complete **BY MAY 15, 2019** after date of the Notice to Proceed.
- D. **LIQUIDATED DAMAGES FOR SUBSTANTIAL COMPLETION:** The Undersigned agrees that, from the compensation otherwise to be paid, the Owner may retain the sum of **One Thousand Dollars (\$1,000.00)** for each calendar day that the entire Work remains incomplete after thirty (30) calendar days following the date of the Certificate of Substantial Completion **BY APRIL 15, 2019** issued by the Architect/Engineer, which sum is agreed upon as the proper measure of liquidated damages which the Owner will sustain per diem by the failure of the Undersigned to complete the work at the time stipulated in the Contract. This sum is not to be construed in any sense a penalty.
- E. **FINAL COMPLETION / FINAL ACCEPTANCE:** The Undersigned agrees to complete all the Work within thirty (30) calendar days after the date of the Certificate of Substantial Completion issued by the Architect/Engineer **NO LATER THAN MAY 15, 2019.**

Submitted by:

SEAL: (If bid is by a Corporation)

Contractor

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

This page must be completed and submitted

REQUIRED FORM

The undersigned acknowledges receipt of the following addenda, and the cost, if any, of such revisions has been included in the bid price.

Addendum No.		Dated		Addendum No.		Dated	
Addendum No.		Dated		Addendum No.		Dated	
Addendum No.		Dated		Addendum No.		Dated	
Addendum No.		Dated		Addendum No.		Dated	

BID BOND AND PERFORMANCE/PAYMENT BOND

BID BOND: ACCOMPANYING THIS PROPOSAL IS _____

(insert: “cash”, “bidder’s bond”, or “certified check”, as the case may be) in an amount equal to at least 5% of the total amount of the bid, payable to the City of North Port. Cashier’s checks will be returned to all bidders after award of bid.

The undersigned deposits the above-named security as a proposal guarantee and agrees that it shall be forfeited to the City as liquidated damages in case this proposal is accepted by the City and the undersigned fails to execute a contract with the City as specified in the contract documents accompanied by the required labor and material and faithful performance bonds with sureties satisfactory to the City, and accompanied by the required certificates of insurance coverage. Should the City be required to engage the services of an attorney in connection with the enforcement of this bid, bidder promises to pay City’s reasonable attorneys’ fees incurred with or without suit.

The undersigned agrees, if awarded this bid, to furnish a **Performance and Payment Bond** in the amount of 100% of the total project price within ten (10) calendar days after notification of award to the Purchasing Department. The undersigned shall be responsible and bear all costs associated to record Performance and Payment Bond with Sarasota County Clerk’s Office. Receipt of said recording and a certified copy of the Bond shall be furnished to the Purchasing Division at the time of the pre-construction meeting.

All contract documents (i.e.; performance and payment bond, cashier’s check, bid bond) shall be in the name of “City of North Port”.

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

RELEVANT PROJECTS/QUALIFICATIONS AND REFERENCES

REFERENCES: Bidders must have successfully completed, as a Prime or Subcontractor, at least three (3) projects, in the past five (5) years, of similar type, size and dollar value of the project described herein. Additionally, bidder must demonstrate the successful completion by the Superintendent of three (3) projects of similar complexity, nature, size, and dollar amount of project in the past five (5) years. At least one (1) of these projects shall have been completed with the Bidder.

The City reserves the right to contact references. (Attach additional sheets, if required.)

1. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (as a Prime or Subcontractor)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

2. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (as a Prime or Subcontractor)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

3. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (as a Prime or Subcontractor)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

4. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (by the Superintendent)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

5. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (by the Superintendent)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

6. RELEVANT PROJECTS: REFERENCES / QUALIFICATIONS / EXPERIENCE (by the Superintendent)

Owner Name: _____

Project Name _____

Project Scope _____

Project Address _____

Owner Representative/Contact Person/Title: _____

Representative/Contact Telephone# _____ Cell/Mobile # _____

Representative/Contact Person E-mail _____

Contract Cost \$ _____ Final Cost at Completion of the Project \$ _____

Construction Schedule: Planned _____ (calendar days) Actual _____ (calendar days)

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

This page must be completed and submitted

EQUIPMENT LIST

Equipment is located at: _____

The following is a listing of your equipment, inclusive of manufacturer, year and condition. Condition shall be listed in accordance with the following scale: **1-Excellent; 2-Good; 3-Fair; 4-Poor.** **(Attach additional sheets, if required.)**

Description	Manufacturer	Year	Condition	Leased/Owned (If leased, date of expiration)

SOURCE OF SUPPLY AND SUBCONTRACTOR FORM

The following sources of supply and subcontractors shall be used for the **2018-35 NORTH PORT AQUATIC CENTER.** Subcontractor selection will be subject to City approval. **(Attach additional sheets, if required.)**

SUBCONTRACTOR(S)

(PLEASE INCLUDE ADDRESS/TELEPHONE NUMBER & E-MAIL)

1. _____
2. _____
3. _____
4. _____

SUPPLIER(S)

1. _____
2. _____
3. _____
4. _____

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ Title: _____

This page must be completed and submitted

CONFLICT OF INTEREST FORM

F.S. §112.313 places limitations on public officers (including advisory board members) and employees' ability to contract with the City either directly or indirectly. Therefore, please indicate if the following applies:

PART I.

- ☐ I am an employee, public officer or advisory board member of the City
_____ (List Position Or Board)
- ☐ I am the spouse or child of an employee, public officer or advisory board member of the City
Name: _____
- ☐ An employee, public officer or advisory board member of the City, or their spouse or child, is an officer, partner, director, or proprietor of Respondent or has a material interest in Respondent. "Material interest" means direct or indirect ownership of more than 5 percent of the total assets or capital stock of any business entity. For the purposes of [§112.313], indirect ownership does not include ownership by a spouse or minor child.
Name: _____
- ☐ Respondent employs or contracts with an employee, public officer or advisory board member of the City
Name: _____
- ☐ None of The Above

PART II:

Are you going to request an advisory board member waiver?

- ☐ I will request an advisory board member waiver under §112.313(12)
- ☐ I will NOT request an advisory board member waiver under §112.313(12)
- ☐ N/A

The City shall review any relationships which may be prohibited under the Florida Ethics Code and will disqualify any bidders whose conflicts are not waived or exempt.

Date: _____

Signed (Person authorized to bind the company): _____

Name (printed): _____ **Title:** _____

This page must be completed and submitted

AFFIDAVIT
Claiming Status as a LOCAL BUSINESS

****CONTRACTOR MUST MEET ALL 4 REQUIREMENTS BELOW TO CLAIM LOCAL BUSINESS STATUS****

State of _____ }
County of _____ } SS.

Before me, the undersigned authority, personally appeared:

who, being first duly sworn, deposes and says that:

1. I am the _____ (Owner, Partner, Officer, Representative or Agent) of _____, the Bidder that has submitted the attached proposal;

AND

2. I am fully informed respecting the operation and employees of the Bidder;

AND

3. I affirm that the Bidder has maintained a physical business address located within the limits of Sarasota County, Charlotte County or Desoto County for a period of six (6) months or more before submitting this bid, from which the Bidder operates or performs business. The qualifying local address is _____

AND

4. I affirm that at least fifty percent (50%) of the Bidder's employees are residents of the City of North Port. If requested by the City, the bidder will be required to provide documentation substantiating the information given in this affidavit. City of North Port reserves the right to request supporting documentation as evidence to substantiate the information given in this affidavit. Failure to do so will result in the bidder's submission being deemed non-responsive.

Any bidder that misrepresents its status as a local business or North Port local business shall be barred from receiving any City contracts for a period of three (3) years.

State of _____
County of _____

Sworn to and subscribed before me this _____ day of _____, 20____, by _____
_____ who ☐ is personally known to me or ☐ has produced his driver's license as identification.

NOTARY SEAL:

Notary Public - State of Florida

Print Name: _____

Commission No: _____

This page to be returned ONLY if Contractor is claiming a Local Business Status.

AFFIDAVIT
Claiming Status as a North Port Local Business

****CONTRACTOR MUST MEET ALL 4 REQUIREMENTS BELOW TO CLAIM NORTH PORT BUSINESS STATUS****

State of _____ }
County of _____ } SS.

Before me, the undersigned authority, personally appeared:

who, being first duly sworn, deposes and says that:

1. I am the _____ (Owner, Partner, Officer, Representative or Agent) of _____, the Bidder that has submitted the attached bid;

AND

2. I am fully informed respecting the operation and employees of the Bidder;

AND

3. I affirm that the Bidder has maintained its primary physical business address within the limits of the City of North Port for a period of six (6) months or more before submitting this bid, from which the Bidder operates or performs business. The qualifying local address is

AND

4. I affirm that at least fifty percent (50%) of the Bidder's employees are residents of the City of North Port.

If requested by the City, the bidder will be required to provide documentation substantiating the information given in this affidavit. City of North Port reserves the right to request supporting documentation as evidence to substantiate the information given in this affidavit. Failure to do so will result in the bidder's submission being deemed non-responsive.

Any bidder that misrepresents its status as a local business or North Port local business shall be barred from receiving any City contracts for a period of three (3) years.

State of _____
County of _____

Sworn to and subscribed before me this _____ day of _____, 20____, by _____
_____ who ☐ is personally known to me or ☐ has produced his driver's license as identification.

NOTARY SEAL:

Notary Public - State of Florida

Print Name: _____

Commission No: _____

This page to be returned ONLY if Contractor is claiming a North Port Local Business Status.

PUBLIC ENTITY CRIME INFORMATION

As provided by F.S. §287.133, a person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a Contractor, supplier, Subcontractor, or Consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

I, _____, being an authorized representative of the
Respondent _____,

Located at: _____

City: _____ State: _____ Zip Code: _____, have read
and understand the contents above. I further certify that Respondent is not disqualified from replying to
this solicitation because of F.S. §287.133.

Signature: _____ Date: _____

Telephone #: _____ Fax #: _____

Federal ID #: _____

State of _____
County of _____

Sworn to and subscribed before me this _____ day of _____, 20____, by _____
_____ who ☐ is personally known to me or ☐ has produced his driver's license as identification.

NOTARY SEAL:

Notary Public - State of Florida

Print Name: _____

Commission No: _____

This page must be completed and submitted

NON-COLLUSIVE AFFIDAVIT

State of _____ }
County of _____ } SS.

Before me, the undersigned authority, personally appeared:

who, being first duly sworn, deposes and says that:

1. He/She is the _____ (Owner, Partner, Officer, Representative or Agent) of _____, the Respondent that has submitted the attached reply;
2. He/She is fully informed respecting the preparation and contents of the attached reply and of all pertinent circumstances respecting such reply;
3. Such reply is genuine and is not a collusive or sham reply;
4. Neither the said Respondent nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Respondent, firm, or person to submit a collusive or sham reply in connection with the work for which the attached reply has been submitted; or have in any manner, directly or indirectly sought by agreement or collusion, or communication or conference with any Respondent, firm, or person to fix the price or prices in the attached reply or of any other Respondent, or to fix any overhead, profit, or cost elements of the reply price or the reply price of any other Respondent, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the reply work.

Signed, sealed and delivered this _____ day of _____, 20____.

By: _____

(Printed Name)

(Title)

State of _____
County of _____

Sworn to and subscribed before me this _____ day of _____, 20____, by _____
_____ who ☐ is personally known to me or ☐ has produced his driver's license as identification.

NOTARY SEAL:

Notary Public - State of Florida

Print Name: _____

Commission No: _____

COMPANY NAME: _____

SIGNATURE: _____

This page must be completed and submitted

DRUG FREE WORKPLACE FORM

The undersigned Respondent in accordance with Florida Statute §287.087 hereby certifies that _____ does:

(Company Name)

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that Respondent complies fully with the above requirements.

Check one:

- ☐ As the person authorized to sign this statement, I certify that this firm complies fully with above requirements.
- ☐ As the person authorized to sign this statement, this firm **does not** comply fully with the above requirements.

Signature

Print Name

Date

This page must be completed and submitted

ALL BID PAGES MUST BE EXECUTED BY A CORPORATE/BINDING AUTHORITY & NOTARIZED WHERE APPLICABLE

SWORN STATEMENT: THE FLORIDA TRENCH SAFETY ACT

(Complete if applicable)

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC BY AN OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This Sworn Statement is submitted with Bid No. _____ for the construction of _____
2. This Sworn Statement is submitted by _____ whose business address is _____ and (if applicable) its Federal Employer Identification Number (FEIN) is _____.
3. My name is _____ (PRINTED OR TYPED NAME OF INDIVIDUAL SIGNING) and hold the position of _____ with the above entity.
4. The Trench Safety Standards that will be in effect during the construction of this Project are Florida Statute Section 553.60-55.64, Trench Safety Act, and OSHA Standard.
5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless the City and ENGINEER, and any of their agents or employees from any claims arising from the failure to comply with said standard.
6. The undersigned has appropriated \$ _____ per linear foot of trench to be excavated over 5' deep for compliance with the applicable standards and intends to comply by instituting the following procedures: _____
7. The undersigned has appropriated \$ _____ per square foot for compliance with shoring safety requirements and intends to comply by instituting the following procedures: _____
8. The undersigned, in submitting this Bid, represents that he or she has reviewed and considered all available geotechnical information and made such other investigations and tests as he or she may deem necessary to adequately design the trench safety system(s) he or she will utilize on this Project.

Authorized Signature/Title

Sworn to and subscribed before me

this _____
(date)

Notary Public Signature

(Notary Seal)

My Commission Expires: _____

LOBBYING CERTIFICATION

"The undersigned hereby certifies, to the best of his or her knowledge and belief, that":

STATE OF _____

COUNTY OF _____

This _____ day _____ of 20____, being first duly sworn, deposes and says that he or she is the authorized representative of _____ (Name of the contractor, firm or individual), and that the vendor and any of its agents agree to have no contact or communication with, or discuss any matter related in any way to any active City of North Port solicitation, with any City of North Port elected officials, officers, their appointees or their agents or any other staff or outside individuals working with the city in respect to this request other than the designated Procurement Official Contact and to abide by the restrictions outlined in the General Provisions of the Solicitation. Technical questions directed to the project manager, is prohibited. These persons shall not be lobbied, either individually or collectively, regarding any questions for bid, proposal, qualification and/or any other solicitations released by the city. To do so is grounds for immediate disqualification from the selection process. The selection process is not considered final until such a time as the Commission has made a final and conclusive determination.

- (a) No City appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence either directly or indirectly an officer or employee of the City, City Commission in connection with the awarding of any City Contract.
- (b) If any funds other than City appropriated funds have been paid or will be paid to any person for influencing or attempting to influence a member of City Commission or an officer or employee of the City in connection with this contract, the undersigned shall complete and submit Standard Form-L "Disclosure Form to Report Lobbying", in accordance with its instructions.

Signed, sealed and delivered this _____ day of _____, 20____.

By: _____

(Printed Name)

(Title)

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me this _____ day of _____, 20____, by _____ who ☐ is personally known to me or ☐ has produced his/her driver's license as identification.

Notary Public - State of _____

Print Name: _____

Commission No: _____

THIS PAGE MUST BE SUBMITTED WITH BID

“SAMPLE”
CONTRACT (SUBJECT TO CHANGE)

This Contract (“Contract”) is made this _____ day of _____, 20____, by and between the **CITY OF NORTH PORT**, a municipal corporation of the State of Florida, hereinafter referred to as the “City” and XXXXXXXX, a Florida limited liability company, ADDRESS, CITY, Florida ZIP CODE, hereinafter referred to as the “Contractor”.

WITNESSETH

That the parties to this Contract, in consideration of their mutual agreements and promises hereinafter contained, bind themselves, their partners, successors, assigns and legal representatives to all covenants, agreements and obligations contained in the agreements and bid documents executed between the parties, and do hereby further agree as follows:

1. RESPONSIBILITIES OF THE CONTRACTOR:

- A. Responsibility for and Supervision:** The Contractor shall supervise and direct the work to the best of his/her ability, give it all the attention necessary for such proper supervision and direction and not employ for work on the project any person without sufficient skill to perform the job for which the person was employed.

The Contractor assumes full responsibility for acts, negligence, or omissions of all his/her employees on the project, for those subcontractors and their employees, and for those of all other persons doing work under a contract with him/her. All contracts between the Contractor and any such subcontractor as the Contractor shall hire, shall conform to the provisions of the Contract and bid documents and shall incorporate in them the relevant portions of this Contract.

- B. Furnishing of Labor and Materials:** The Contractor shall provide and pay for all labor, materials, and equipment, including tools, construction equipment and machinery, and all transportation and all other facilities and services necessary for the proper completion of the work in strict conformity with the provisions herein contained, and with the Request For Bid No. 2018-35, including the plans and specifications, addendums and with the proposal submitted by the Contractor and on file with the City. The foregoing Request For Bid (RFB), specifications, and proposal submitted by the Contractor, are hereby specifically made a part of this Contract and are incorporated herein.

The Contractor represents and warrants to the City that all equipment and materials used in the work, and made a part of the structures thereon, or placed permanently in connection therewith, will be new unless otherwise specified in the Contract and bid documents, of good quality, free of defects, and in conformity with the Contract and bid documents. It is understood between the parties thereto that all equipment and materials not in conformity are defective.

- C. Incorporation of Bid Documents:** The **Request For Bid No. 2018-35**, including the plans, specifications, and addendums, and Contractor’s response to RFB, are specifically made a part of this Contract and are incorporated herein. In the event of a conflict between or among the documents or any ambiguity or missing specifications or instruction, the following priority is established:

1. First, this Contract (Contract No. 2018-35) Approved by Commission, and any attachments
2. Second, Request for Bid, including any and all attachments and addenda
3. Third, Contractor's response to this solicitation.
4. Fourth, specific direction from the City Manager

D. Public Records Law: In accordance with Florida Statutes 119.0701, Contractor shall comply with all public records laws, and shall specifically:

1. Keep and maintain public records required by the City to perform the service.
 - a. The timeframes and classifications for records retention requirements must be in accordance with the General Records Schedule GS1-SL for State and Local Government Agencies.

(See <http://dos.dos.state.fl.us/library-archives/records-management/general-records-schedules/>).
 - b. "Public records" means and includes those items specified in Florida Statutes 119.011(12), as amended from time to time, and currently defined as: All documents, papers, letters, maps, books, tapes, photographs, films, sound recordings, data processing software, or other material, regardless of the physical form, characteristics, or means of transmission, made or received pursuant to law or ordinance or in connection with the transaction of official business with the City. Contractor's records under this Agreement include but are not limited to, supplier/subcontractor invoices and contracts, project documents, meeting notes, e-mails and all other documentation generated during this Agreement.
2. Upon request from the City's custodian of public records, provide the City, at no cost, with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for by law. All records kept electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.
3. Ensure that project records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and, if the Contractor does not transfer the records to City following completion of the contract, for the time period specified in General Records Schedule GS1-SL for State and Local Government Agencies.
4. Upon completion of the contract, transfer, at no cost, to the City all public records in Contractor's possession or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of the contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon the completion of the contract, the Contractor shall meet all applicable requirements for retaining public records.

5. IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT CUSTODIAN OF PUBLIC RECORDS, 4970 CITY HALL BOULEVARD, NORTH PORT, FLORIDA 34286, 941.429.7063 OR HOTLINE 941.429.7270; E-MAIL: padkins@cityofnorthport.com.

6. Failure of the CONTRACTOR to comply with these requirements shall be a material breach of this Agreement. Further, Contractor may be subject to penalties under Florida Statutes 119.10.

2. CONTRACT PRICE:

In consideration of the foregoing services, work, labor and materials to be furnished by the contractor as per said plans, specifications and addendums, the City agrees to pay and the Contractor \$XXX

The **CONTRACT PRICE** is XXXXXX-XXX (\$XXXX).

3. PAYMENT:

Two (2) original requests for payment must be submitted to the City of North Port on a form approved by the City. Each pay request must be accompanied by an updated work schedule to reflect progress of work. Payment shall be accompanied by either written approval and direction of the surety, or receipt of updated affidavits of payment by subcontractors and/or suppliers, in accordance with F.S. §255.05(11). Price shall be net and all invoices payable according to the Florida Local Government Prompt Payment Act (F.S. ch. 218). Upon certification and approval by the City or its duly authorized agent, progress payments may be made to the Contractor upon its application for all services or work completed or materials furnished in accordance with the Contract. Prior to fifty percent (50%) completion, the Contractor will be paid monthly the total value of the work completed and accepted during the preceding month, less ten percent (10%) retainage. After fifty percent (50%) completion of the construction services purchased pursuant to the Contract, the City must reduce to five percent (5%) the amount of retainage withheld from each subsequent progress payment made to the Contractor upon request of the Contractor. For purposes of this subsection, the term "fifty percent (50%) completion" is the point at which the City has expended fifty percent (50%) of the total cost of the construction services purchased as identified in the Contract together with all costs associated with existing change orders and other additions or modifications to the construction services provided for in the Contract. The City shall inform the Contractor's Surety of any reduction in retainage. Contractor must update each new pay request in accordance with any changes made to the previous submittal. The City or its duly authorized administrative agent, shall approve final payment for all work, materials or services furnished under this Contract retainage may be reduced upon issuance of the Certificate of Substantial Completion by the City if, in the sole opinion of the City, sufficient progress on the schedule has been accomplished, all required affidavits have been provided, and the City has retained adequate coverage for the project through the achievement of Final Completion.

4. CONTRACT TIME:

The Contractor specifically agrees that it will commence operations within a mutually agreed upon time following notification by the City to commence work and that all work to be performed under the provisions of this Contract shall be completed in not more than _____calendar days by **MAY 15, 2015** from the notice to proceed; subject only to delays caused through no fault of the Contractor or acts of God. The work will be substantially completed within _____calendar days **BY APRIL 15, 2015**; with final completion within **30 calendar days** after attaining Substantial Completion. Time is of the essence in the performance of this Contract.

5. LIQUIDATED DAMAGES:

The work shall be completed within the Contract time specified. The Contract time shall include the preparation, submittal, review and approval of submittals, delivery of materials, and construction, assembly, adjustment and placement into service for beneficial use of all facilities covered under this Contract.

The City shall issue a Notice of Substantial Completion when it has determined that the work identified in the Contract has been substantially completed; record drawings have been submitted and approved by the City and that the facility is operating satisfactorily. The Contract time also includes up to fourteen (14) calendar days for the review of submittals, excluding pay requests, by the City. The City shall provide the Contractor a punch list within two (2) calendar days after the Notice of Substantial Completion is issued. The punch list will identify the remaining items that must be addressed to the satisfaction of the City by the Contractor to meet his/her obligations under the Contract. The Contractor shall complete the items on the punch list to the satisfaction of the City within twenty-eight (28) additional calendar days of the issuance of the Final Punch List or Notice of Substantial Completion, whichever is later, and prior to submittal of the application for reduction of retainage or final payment. Any cost incurred by the City (i.e. inspection time) after the twenty-eight (28) calendar day period shall be charged to the Contractor.

The City and the Contractor hereby agree that time is of the essence on this Contract and the City will suffer damages if the work is not substantially completed within the Contract time (**BY APRIL 15, 2015**), plus any extensions thereof allowed by Change Order. It is further recognized and agreed by the City and the Contractor that the determination of the exact value of the damages the City would suffer due to a delay in the Substantial Completion of the work would be a difficult, time consuming and costly process. It is therefore hereby agreed by the City and the Contractor that it is in their mutual interest to establish a figure of **(\$1,000.00)** as Liquidated Damages (but not as a penalty) to be paid by the Contractor to the City for each calendar day that Substantial Completion is delayed beyond the Contract Time.

It is mutually agreed by the City and the Contractor that neither shall make any claim to increase or reduce the amount to be paid under Liquidated Damages as the result of any calculation of actual damages suffered by the City as the result of delay in the Substantial Completion of the work.

6. BOND REQUIREMENTS:

A. Bond Requirements: The successful bidder shall provide the required performance and payment bond or other acceptable security to the City within **ten (10) business days of being awarded the bid. Failure by the successful bidder to provide the bond within ten (10)**

business days shall be considered a default under Sec. 2-404 of the City of North Port Administrative Code. Upon such default the City may immediately award the bid to the next lowest responsive and responsible bidder, and recover from the original successful bidder the difference in cost between the original winning bid and the next lowest responsive and responsible bidder. Such default shall only be curable at the option of the City.

In addition, the Contractor shall be responsible and bear all costs associated to record the Performance and Payment Bond with Sarasota County Clerk's Office. The Contractor shall furnish the receipt of said recording and certified copy of the bond to the Purchasing Department at the time of the pre-construction meeting. Such default shall only be curable at the option of the City.

B. Performance and Payment Bond: The Contractor shall provide a Performance and Payment Bond, in the form prescribed in Florida Statutes Section 255.05 in the amount of one hundred percent (100%) of the Contract amount, the costs of which are to be paid by the Contractor. The bond will be acceptable to the City only if the Surety Company:

- 1) Is licensed to do business in the State of Florida;
- 2) Holds a certificate of authority authorizing it to write surety bonds in this state;
- 3) Has twice the minimum surplus and capital required by the Florida Insurance Code at the time the invitation to bid is issued;
- 4) Is otherwise in compliance with the provisions of the Florida Insurance Code;
- 5) Holds a currently valid certificate of authority issued by the United States Department of Treasury under 31 U.S.C. §§ 9304-9308;
- 6) A current rating of at least Excellent (A or A-) as reported in the most current Best Key Rating Guide, published by A.M. Best Company, Inc., of 75 Fulton Street, New York, New York 10038; and
- 7) With an underwriting limitation of at least two times the dollar amount of the contract.

If the Surety Company for any bond furnished by the Contractor files for bankruptcy, has a receiver appointed, is declared bankrupt, becomes insolvent, has an assignment made for the benefit of creditors, has its right to do business terminated in the State of Florida, or ceases to meet the requirements imposed by the Contract Documents, the Contractor shall, within five (5) calendar days thereafter, substitute another Bond and Surety Company, both of which shall be subject to the City's approval.

By execution of this bond, the Surety Company acknowledges that it has read the surety qualifications and surety obligations imposed by the Contract documents and hereby satisfies those conditions.

By execution of this bond, the Surety Company acknowledges that it has read the surety qualifications and surety obligations imposed by the Contract documents and hereby satisfies those conditions.

7. INSURANCE:

Before performing any Contract work, the Contractor shall procure and maintain, during the life of this Contract, the following types of insurance coverage and shall furnish certificates representing such insurance to the City. The policies of insurance shall be primary and written on forms acceptable to the City and placed with insurance carriers approved and licensed by the Insurance

Department in the State of Florida and meet a minimum financial AM Best and Company rating of no less than "A - Excellent: FSC VII." No changes are to be made to these specifications without prior written approval by the City Manager or designee. The City Manager or designee may alter the amounts or types of insurance policies required by this Contract upon agreement with Contractor.

Contractor and subcontractors shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, insurance against claims for injury to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors.

The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract. The City in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees, or subcontractors. Contractor is free to purchase such additional insurance as may be determined necessary.

Contractor shall provide coverage with limits of liability not less than those stated below. An excess liability policy or umbrella liability policy may be used to meet the minimum liability requirements provided that the coverage is written on a "following form" basis.

Commercial General Liability – Occurrence Form (CG 00 01)

Policy shall include bodily injury, property damage, broad form contractual liability and Explosion, Collapse and Underground (XCU) coverage. The general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

Proof of such insurance shall be filed by the Contractor with the City within ten (10) days after the execution of this Contract.

Requirements:

- General Aggregate \$2,000,000
 - Each Occurrence \$1,000,000
 - products and completed ops \$1,000,000
 - damage to rented premises \$100,000
 - fire damage \$100,000
- 1) The policy shall be endorsed to include the following additional insured language: "City of North Port and its officers, employees, agents and volunteers" shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor.
 - 2) Contractor's subcontractors shall be subject to the same minimum requirements identified above.
 - 3) Policy shall be endorsed for a waiver of subrogation against the City of North Port.

Automobile Liability

Bodily injury and property damage for any owned, hired, and non-owned vehicles used in the performance of this Contract. Automobile liability must be written on a standard ISO form (CA 00 01) covering any auto (Code 1), or if Contractor has no owned autos, hired (Code 8) and non-owned (Code 9) autos.

Proof of such insurance shall be filed by the Contractor with the City within ten (10) days after the execution of this Contract.

Requirements:

- Combined Single Limit (CSL) (Ea Accident) \$1,000,000
 - Bodily Injury (per person) \$1,000,000
 - Bodily Injury (per accident) \$1,000,000
 - Property Damage (per accident) \$1,000,000
- 1) The policy shall be endorsed to include the following additional insured language: "City of North Port and its officers, employees, agents and volunteers" shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor, including automobiles owned, leased, hired or borrowed by the Contractor".
 - 2) Contractor's sub-contractors shall be subject to the same minimum requirements identified in this section.
 - 3) Policy shall contain a waiver of subrogation against the City of North Port.

Worker's Compensation and Employers' Liability (PER CHAPTER 440. FLORIDA STATUTES)

The Contractor shall procure and maintain during the life of this Contract Worker's Compensation insurance for all his employees to be engaged in work on the project under this Contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation insurance for all of the latter's employees to be engaged in such work unless such employees are covered by protection afforded by the Contractor's Workers Compensation insurance. For additional information contact the Department of Financial Services, Workers' Compensation Division at 850.413.1601 or on the web at www.fldfs.com. In case any class of employees engaged in hazardous work on the project under this Contract is not protected under the Worker's Compensation Statute, the Contractor shall provide, and shall cause each subcontractor to provide, Employer's Liability Insurance for the protection of such of his employees not otherwise protected under such provisions. The minimum liability limits of such insurance shall not be less than herein specified or in that amount specified by law for that type of damage claim.

Proof of such insurance shall be filed by the Contractor with the City within ten (10) days after the execution of this Contract.

Workers' Compensation Employers' Liability Requirements

- Each Accident, each employee, bodily injury or disease \$1,000,000
- 1) Policy shall contain a waiver of subrogation against the City of North Port.
 - 2) Contractor's sub-contractors shall be subject to the same minimum requirements identified in this section.
 - 3) If the contractor has no employees, the contractor must submit to the City the Workers Compensation Exemption from the State of Florida.

Builder's Risk Insurance (Course of Construction) or Installation Floater (If Required by the City)

Insurance utilizing an "All Risk" (Special Perils) coverage form with limits equal to the completed value of the project and no coinsurance penalty provisions.

Contractors' Pollution Legal Liability (if project involves environmental hazards) (if Required by the City)

- Each Occurrence or Claim \$1,000,000
- Policy Aggregate \$2,000,000

GENERAL REQUIREMENTS:

A. The City of North Port is to be named additional insured on **Comprehensive Commercial General Liability Policy and Auto Policy**. All certificates of insurance must be on file with and approved by the City before commencement of any work activities under this Contract.

Any and all deductibles to the above referenced policies are to be the responsibility of the Contractor. The Contractor's insurance is considered primary for any loss regardless of any insurance maintained by the City. The Contractor is responsible for all insurance policy premiums, deductibles, or SIR (self-insured retentions) or any loss or portion of any loss that is not covered by any available insurance policy.

All insurance policies must be issued by companies of recognized responsibility licensed to do business in Florida and must contain a provision that prohibits cancellation unless the City is provided notice as stated within the policy. It is the Contractor's responsibility to provide notice to the City.

B. WAIVER OF SUBROGATION: All required insurance policies, with the exception of Workers Compensation, are to be endorsed with a waiver of subrogation. The insurance companies, by proper endorsement or thru other means, agrees to waive all rights of subrogation against the City, its officers, officials, employees and volunteers, and the City's insurance carriers, for losses paid under the terms of these policies that arises from the contractual relationship or work performed by the Contractor for the City. It is the Contractor's responsibility to notify their insurance company of the Waiver of Subrogation and request written authorization or the proper endorsement. Additionally, the Contractor, its officers, officials, agents, employees, volunteers, and any Subcontractors, agrees to waive all rights of subrogation against the City and its insurance carriers for any losses paid, sustained or incurred, but not covered by insurance, that arise from the contractual relationship or work performed. This waiver also applies to any deductibles or self-insured retentions the Contractor or its agents may be responsible for.

C. POLICY FORM:

1. All policies, required by this Contract, **with the exception of Workers Compensation**, or unless specific approval is given by Risk Management through the City's Purchasing Office, are to be **written on an occurrence basis**, shall name the City of North Port, its Commissioners, officers, agents, employees and volunteers as additional insured as their interest may appear under this Contract. Insurer(s), with the exception of Professional Liability and Workers Compensation, shall agree to waive all rights of subrogation against the City of North Port, its Commissioners, officers, agents, employees, or volunteers.
2. Insurance requirements itemized in this Contract, and required of the Contractor, shall be provided by or on behalf of all subcontractors to cover their operations performed under this Contract. The Contractor shall be held responsible for any modifications, deviations, or omissions in these insurance requirements as they apply to subcontractors.
3. Each insurance policy required by this Contract shall:

- a. Apply separately to each insured against whom claim is made and suit is brought, except with respect to limits of the insurer's liability.
 - b. Be endorsed to state that coverage shall not be suspended, voided or cancelled by either party except after notice is delivered in accordance with the policy provisions. The Contractor is to notify the City Purchasing Office by written notice via certified mail, return receipt requested.
4. The City shall retain the right to review, at any time, coverage, form, and amount of insurance.
5. The procuring of required policies of insurance shall not be construed to limit Contractor's liability nor to fulfill the indemnification provisions and requirements of this Contract. The extent of Contractor's liability for indemnity of the City shall not be limited by insurance coverage or lack thereof, or unreasonably delayed for any reason, including but not limited to, insurance coverage disputes between the Contractor and its carrier.
6. The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely responsible for the payment of all deductibles and retentions to which such policies are subject, whether or not the City is an insured under the policy.
7. Claims Made Policies will be accepted for professional and hazardous materials and such other risks as are authorized by the City's Purchasing Office. All Claims Made Policies contributing to the satisfaction of the insurance requirements herein shall have an extended reporting period option or automatic coverage of not less than two (2) years. If provided as an option, the Contractor agrees to purchase the extended reporting period on cancellation or termination unless a new policy is affected with a retroactive date, including at least the last policy year.
8. Certificates of Insurance Evidencing Claims Made or Occurrences form coverage and conditions to this Contract, as well as the contract number and description of work, are to be furnished to the City's Purchasing Office (4970 City Hall Boulevard, Suite 337, North Port, FL 34286) prior to commencement of work AND a minimum of thirty (30) calendar days prior to expiration of the insurance contract when applicable. All insurance certificates shall be received by the City's Purchasing Office before the Contractor will be allowed to commence or continue work. The Certificate of Insurance issued by the underwriting department of the insurance carrier shall certify compliance with the insurance requirements provided herein.

8. INDEMNITY:

The Contractor shall indemnify and hold harmless the City, its Commissioners, officers, and employees, from and against any and all liabilities, damages, losses and costs (including attorneys' fees and court costs, whether such fees and costs are incurred in negotiations, collection of attorneys' fees or at the trial level or on appeal), which may arise out of any negligence, recklessness, or intentional wrongful misconduct of the Contractor (or Contractor's Officers, subcontractors, sub-subcontractors, materialmen, or the employees, or agents of any one of them, if any) in the performance or the failure to perform under the terms of the Contract. In the event of a claim, the City shall promptly notify the Contractor in writing by prepaid certified mail (return receipt requested), or by delivery through any nationally recognized courier service (such as Federal Express or UPS) which

provides evidence of delivery, at the address provided in Section 18. Notification may also be provided by fax transmission to the number provided in Section 18, if provided.

The City shall provide all available information and assistance that the Contractor may reasonably require regarding any claim. This agreement for indemnification shall survive termination or completion of this Contract. The insurance coverage and limits required in this Contract may or may not be adequate to protect the City and such insurance coverage shall not be deemed a limitation on the Contractor's liability under the indemnity provided in this section. In any proceedings between the parties arising out of or related to this Indemnity provision, the prevailing party shall be reimbursed all costs, expenses and reasonable attorney fees through all proceedings (at both trial and appellate levels).

9. CONTRACTOR'S AFFIDAVIT:

When all work contemplated by this Contract has been completed, and has been inspected and approved by the City, or its duly authorized agent, the Contractor shall furnish to the City, a Contractor's Affidavit in a form acceptable to the City. Signed affidavits of payment will also be required by the City from any and all subcontractors hired by the Contractor, unless payment is approved by the surety in accordance with F.S. §255.05(11). The affidavits shall state whether the subcontractor(s) has been paid in full or whether there are payments remaining. A list of all subcontractors shall be furnished to the City prior to any payments against the Contract.

10. TERMINATION AND DEFAULT:

The City Manager or designee shall have the right at any time upon thirty (30) calendar days written notice to the Contractor to terminate the services of the Contractor and, in that event, the Contractor shall cease work and shall deliver to the City all documents (including but not limited to reports, designs, specifications, and all other data) prepared or obtained by the Contractor in connection with its services. Upon delivery of the documents, the City shall pay the Contractor in full settlement of all claims by it hereunder as the work actually completed bears to the entire work under the Contract, as determined by the City, less payments already made to the Contractor, and any amounts withheld by the City to settle claims against or to pay indebtedness of the Contractor in accordance with the provisions of the Contract.

- A. Funding in Subsequent Fiscal Years: It is expressly understood by the City and the Contractor that funding for any subsequent fiscal year of the Contract is contingent upon appropriation of monies by the City Commissioners. In the event that funds are not available or appropriated, the City reserves the right to terminate the Contract. The City will be responsible for payment of any outstanding invoices and work completed by the Contractor prior to such termination.
- B. In the event that the Contractor has abandoned performance under this Contract, then the City Manager or designee may terminate this Contract upon three (3) calendar days' written notice to the Contractor indicating its intention to do so. The written notice shall state the evidence indicating the Contractor's abandonment.
- C. The Contractor shall have the right to terminate the Contract only in the event of the City failing to pay the Contractor's properly documented and submitted invoice within ninety (90) calendar days of the approval by the City's Administrative Agent, or if the project is suspended by the City for a period greater than ninety (90) calendar days.

- D. The City Manager or designee reserves the right to terminate and cancel this Contract in the event the Contractor shall be placed in either voluntary or involuntary bankruptcy, a receiver is appointed for the Contractor or an assignment is made for the benefit of creditors.
- E. In the event Contractor breaches this Contract, the City shall provide written notice of the breach and Contractor shall have ten (10) days from the date the notice is received to cure. If Contractor fails to cure within the ten (10) days, the City Manager or designee shall have the right to immediately terminate the Contract and/or refuse to make any additional payment, in whole or in part, and, if necessary, may demand the return of a portion or the entire amount previously paid to Contractor due to:
1. The quality of a portion or all of the Contractor's work not being in accordance with the requirements of this Contract;
 2. The quantity of the Contractor's work not being as represented in the Contractor's Payment Request, or otherwise;
 3. The Contractor's rate of progress being such that, in the City's opinion, substantial or final completion, or both, may be inexcusably delayed;
 4. The Contractor's failure to use Contract funds, previously paid the Contractor by the City, to pay Contractor's project related obligations including, but not limited to, subcontractors, laborers and material and equipment suppliers;
 5. Claims made, or likely to be made, against the City or its property;
 6. Loss caused by the Contractor;
 7. The Contractor's failure or refusal to perform any of the obligations to the City, after written notice and a reasonable opportunity to cure as set forth above.
 8. Violation of any local, state or federal law in the performance of this Contract shall constitute a material breach of this Contract.
 9. In the event that the City makes written demand upon the Contractor for amounts previously paid by the City as contemplated in the clause, the Contractor shall promptly comply with such demand. The City's rights hereunder survive the term of this Agreement and are not waived by final payment and/or acceptance.

In the event that the City makes written demand upon the Contractor for amounts previously paid by the City as contemplated in the clause, the Contractor shall promptly comply with such demand. The City's rights hereunder survive the term of this Contract, and are not waived by final payment and/or acceptance.

- F. Termination with or without Cause. The performance of work under the Agreement may be terminated with or without cause by the City Manager in whole or in part or whenever the City Manager determines that termination is in the City's best interest. Any such termination shall be effected by the delivery to the Contractor of a written notice of termination at least (30) days before the date of termination, specifying the extent to which performance of the work under the Agreement is terminated and the date upon which such termination becomes effective. After receipt of a notice of termination, except as otherwise directed, the Contractor shall stop work on the date of receipt of the notice of termination or other date specified in the notice; place no further orders or subcontracts for material, services, or facilities except as necessary

for completion of such portion of the work not terminated; terminate all vendors and subcontracts; and settle all outstanding liabilities and claims. The Contractor will be paid only for such work performed and materials supplied up to the termination. Under no circumstances shall the City make any payment to the Contractor for services that have not been performed or that are performed subsequent to the termination date.

11. INDEPENDENT CONTRACTOR:

The Contractor is, and shall be, in the performance of all work, services and activities under this Contract, an independent contractor, and not an employee, agent or servant of the City. All persons engaged in any of the work or services performed pursuant to this Contract shall at all times, and in all places, be subject to the Contractor's sole direction, supervision, and control. The Contractor shall exercise control over the means and manner in which it and its employees perform the work, and in all respects the Contractor's relationship and the relationship of its employees to the City shall be that of an independent contractor and not as employees or agents of the City. The Contractor does not have the power or authority to bind the City in any promise, agreement or representation other than as specifically provided for in this Contract. The Contractor shall not pledge the City's credit or make it a guarantor of payment of surety for any contract, debt, obligation, judgment, lien or any form of indebtedness. The Contractor further warrants and represents that it has no obligation or indebtedness that would impair its ability to fulfill the terms of this Contract.

12. SUBCONTRACTORS:

Contractor shall furnish to City a list of all subcontractors prior to any payments against the Contract. All subcontractors are subject to City approval.

13. LICENSES AND PERMITS/LAWS AND REGULATIONS:

The Contractor shall pay all taxes required by law in connection with the activity in accordance with this Contract including sales, use, and similar taxes, and unless mutually agreed to in writing to the contrary, shall secure all licenses and permits necessary for proper completion of the work, paying any fees therefore. Violation of any local, state or federal law in the performance of this Contract shall constitute a material breach of this contract. The Contractor shall comply with all laws and ordinances, and the rules, regulations, and orders of all public authorities relating to the performance of the work herein. If any of the Contract documents are at variance therewith, the Contractor shall notify the City promptly on the discovery of such variance.

14. AMENDMENT:

This Contract constitutes the sole and complete understanding between the parties and supersedes all agreements between them, whether oral or written with respect to the subject matter. No amendment, change or addendum to this Contract is enforceable unless agreed to in writing by both parties and incorporated into this Contract. The City Manager or designee may agree to amendments that do not increase compensation to Contractor. The City Commission shall approve all increases in compensation under this Contract.

15. EQUAL EMPLOYMENT OPPORTUNITY:

The City of North Port, Florida, in accordance with the provisions of Title VII of the Civil Rights Act of 1964 (78 Stat. 252) and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all bidders that it will ensure that in any Contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit replies in response to this advertisement and will not be discriminated against on the ground of race, color or national origin in consideration for an award.

16. NON-DISCRIMINATION:

The City of North Port does not discriminate on the basis of race, color, national origin, sex, age, disability, family or religious status in administration of its programs, activities or services. Pursuant to F.S. §287.134(2)(a), an entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a Contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity.

17. ASSIGNMENT:

The Contractor shall not assign any interest in this Contract and shall not transfer any interest in same (whether by assignment or novation) without prior written consent of the City Manager or designee, except that claims for the money due or to become due the Contractor from the City under this Contract may be assigned to a financial institution or to a trustee in bankruptcy. Notice shall be promptly given to the City.

18. NOTICES:

Any notice, demand, communication, or request required or permitted hereunder shall be sent by certified mail, return receipt requested, and shall be mailed to:

As to CITY:

**General Services Director
City of North Port
4970 City Hall Blvd.
North Port, Florida 34286
941.429.7113 Tel
941.429.7216 Fax
spfundheller@cityofnorthport.com**

As to CONTRACTOR:

Notices shall be effective when received at the addresses specified above. Changes in the respective addresses which such notice is to be directed may be made from time to time by either party by written notice to the other party. Facsimile transmission is acceptable notice effective when received, however, facsimile transmissions received after 5:00 pm or on weekends or

holidays, will be deemed received on the next business day. The original of the notice must additionally be mailed as required herein. Nothing in this Article shall be construed to restrict the transmission of routine communications between representatives of Contractor and City.

19. WAIVER:

No delay or failure to enforce any breach of this Contract by either City or Contractor shall be binding upon the waiving party unless such waiver is in writing. In the event of a written waiver, such a waiver shall not affect the waiving party's rights with respect to any other or further breach. The making or acceptance of a payment by either party with knowledge of the existence of a default or breach shall not operate or be construed to operate as a waiver of any subsequent default or breach.

20. ATTORNEY'S FEES:

In any proceedings between the parties arising out of or related to this Contract, the prevailing party shall be reimbursed all costs, expenses and reasonable attorney fees through all proceedings, at both trial and appellate levels.

21. GOVERNING LAW, VENUE AND SEVERABILITY:

The rights, obligations and remedies of the parties under this Contract shall be governed by the laws of the State of Florida and the exclusive venue for any legal or judicial proceedings in connection with the enforcement or interpretation of this Contract shall be in Sarasota County, Florida. The invalidity, illegality, or unenforceability of any provision of this Contract shall in no way affect the validity or enforceability of any other portion or provision of the contract. Any void provision shall be deemed severed from the Contract and the balance of the Contract shall be construed and enforced as if the Contract did not contain the particular portion or provision held to be void.

22. PARAGRAPH HEADINGS:

Paragraph headings are for the convenience of the parties and for the reference purposes only and shall be given no legal effect.

23. ENTIRE AGREEMENT:

This Contract (with all referenced plans, attachments, addenda and provisions incorporated by reference) embodies the entire agreement of both parties, superseding all oral or written previous and contemporary agreements between the parties relating to matters set forth in this Contract. In the event of any conflict between the provisions of this Contract and the RFB or Contractor's bid, this signed Contract (excluding the RFB and Contractor's bid) shall take precedence, followed by the provisions of the RFB, and then by the terms of the Contractor's bid.

IN WITNESS WHEREOF, the parties have hereto caused the execution of these documents, the year and date first above written.

ATTEST:

CITY OF NORTH PORT, FLORIDA

By: _____
Patsy C. Adkins, City Clerk, MMC

By: _____
Peter D. Lear, CPA, CGMA, City Manager

APPROVED AS TO FORM AND CORRECTNESS:

By: _____
Amber L. Slayton, City Attorney

WITNESS:

CONTRACTOR:

WITNESSED BY: _____

By: _____
SIGNATURE

PRINT NAME AND TITLE

Revision 28-Nov-17

Application Types		Application Form	Main Permit Type	Application Report Category	Admin Misc Plan Rev	Com or Res Plan Rev	Permit Base Fee	Std Insp	Additional Fees Based on Value, Insp & Plan Reviews by various Dept,'s										Total Permit
Type	Description								Bldg	Bldg	Educa	DPBR	CC Fee	Zng	Z-Insp	PZ&E	PW	Fire	
AGAR	ADD,Res Garages & Carports								Not Used										
AGPF	Above Ground Pool and Fence	Standard	AGPF	306	\$20.00	NA	\$20.00	2			\$0.30	\$4.00	\$5.00	20.00	20.00		50.00		\$139.30
AGPL	Above Ground Pool	Standard	AGPL	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
AGT	Above Ground Gas Tank (propane)	Standard	AGT	304	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00				< 500 lb	\$89.60
AHCO	Air Handler Change Out	Fax	AHCO	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
AMUS	Amusement, Social, & Recreation	Standard	CNC	401	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
BFLP	Back Flow Preventer	Standard	PLO	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
BLDO	Building Other	Standard	BLDO	205	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
CA	Commercial Addition	Standard	BLDO	201	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
CANP	Canopy (Car,Boat,Etc.)	Standard	CANP	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00				\$69.30
CB	Commercial Buildout	Standard	CNC	208	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
CDCO	Condensor Change Out (Ground Mount)	Fax	CDCO	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
CDCO	Condensor Change Out (Roof Mount)	Standard	CDCO	303	\$20.00	NA	\$20.00	2			\$0.30	\$4.00	\$5.00						\$49.30
CHUR	Church / Other Religious	Standard	CNC	402	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
CMCO	Complete Mechanical Change Out (Ground Mount)	Fax	CMCO	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
CMCO	Complete Mechanical Change Out (Roof Mount)	Standard	CMCO	303	\$20.00	NA	\$20.00	2			\$0.30	\$4.00	\$5.00						\$49.30
CO	Change of Occupancy								Not Used										
CR	Commercial Remodel	Standard	BLDO	201	\$20.00	NA	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
CS	Commercial Shell Building	Standard	CNC	208	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
CT	Construction Trailer	Standard	CT	201	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00	\$0.00	pz&e			\$89.60
CTA1	Centex-SFR Attached 1 Story	Standard	RNC	102	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
CTD1	Centex-SFR Detached 1 Story	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
CTD2	Centex-SFR Detached 2 Story	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
CV	Culvert / ROW Use	Standard	CV	701	\$20.00	NA	\$0.00	PW						20.00	\$160.00				\$200.00
DECK	Deck	Standard	DECK	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	20.00	\$0.00				\$69.30
DEMO	Demolition	Standard	DEMO	645	\$20.00	NA	\$200.00	5			\$3.00	\$4.00	\$5.00						\$232.00
DEM1	Demo of Single Family Houses	Standard	DEMO	645	\$20.00	NA	\$200.00	5			\$3.00	\$4.00	\$5.00						\$232.00
DEM2	Demo of Two Family Buildings								Not Used										
DEM3	Demo of Three/Four Family Buildings								Not Used										
DEM5	Demo of Five or More Family Buildings								Not Used										
DIA1	Divosta-SFR Attached 1 Story	Standard	RNC	102	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
DIA2	Divosta-SFR Attached 2 Story	Standard	RNC	102	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
DID1	Divosta-SFR Detached 1 Story	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
DRR	Door Replacement	Standard	DRR	301	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
DUP	Duplex Two Family Residence								Not Used										
DWAB	Drywall Abatement	Standard	DWAB	301	\$20.00	NA	\$360.00	8			\$5.40	\$4.00	\$5.00						\$394.40
DWCO	Duct Work Change Out	Fax	DWCO	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
EHD	Equipment Hood	Standard	EHD	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00					\$25.00	\$74.30
ELEC	Electric Work Only	Standard	ELO	302	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00						TBD
ELSH	Electric Shed (Garage,Etc.)	Fax	ELSH	302	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
ENC	Enclosure Carport / Lanai,Etc	Standard	ENC	301	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00	zng	zng				TBD
EP	Excavate in Pavement - PW								Not Used										
EPL	Erect Pole Line - PW								Not Used										
EPS	Excavate in Parkway or Sidewalk - PW								Not Used										
ESCO	Electric Service Change Out / Temp Power	Fax	ESCO	302	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
FA	Fire Alarm	Standard	FA	505	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00					\$200.00	\$249.30
FAC	Factory	Standard	CNC	203	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
FREP	Fire Repair	Standard	FREP	505	\$20.00	NA	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00				pw	fire	TBD
FRS	Fire Room Supression	Standard	FRS	505	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00					\$150.00	\$199.30
FS	Fire Sprinkler	Standard	FS	505	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00					\$250.00	\$299.30
FUGS	Fire Underground Service	Standard	FUGS	505	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00					\$150.00	\$199.30
GARG	Garages (Det/Atched or Carport)	Standard	GARG	106	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00	\$20.00	zng				TBD
GAS	Gas	Standard	GAS	304	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00					\$89.60
GDRR	Garage Door Replacement	Standard	GDRR	301	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
GENE	Generator Electric	Standard	GENE	302	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30

Revision 28-Nov-17

Application Types		Application Form	Main Permit Type	Application Report Category	Admin Misc Plan Rev	Com or Res Plan Rev	Permit Base Fee	Std Insp	Additional Fees Based on Value, Insp & Plan Reviews by various Dept,'s										Total Permit
Type	Description								Bldg	Bldg	Educa	DBPR	CC Fee	Zng	Z-Insp	PZ&E	PW	Fire	
GENG	Generator Gas	Standard	GENG	305	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00					\$89.60
GH	Guest House	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
GTRP	Grease Trap	Standard	GTRP	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
HOSP	Hospital & Institutional	Standard	CNC	403	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
HOT	Hotel / Motel	Standard	CNC	202	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
HSF	Hood Suppression Fire	Standard	HSF	505	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00					\$125.00	\$174.30
HSRP	House Repipe	Fax	HSRP	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
HTET	HTE TEST APPLICATION	NA	HTET																
IAHC	Internet Air Handler/Furn Changeout	C2G	IAHC	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ICSC	Internet Complete System Change Out w/Manual J	C2G	ICSC	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ICUC	Internet Condenser Unit Change Out w/ARI Report	C2G	ICUC	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
IDWC	Internet Ductwork Change Out	C2G	IDWC	303	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
IHRP	Internet Whole House Repipe	C2G	IHRP	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
IND	Industrial	Standard	CNC	203	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
IRR	Irrigation	Fax	IRR	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ISEC	Internet Security System Install	C2G	ISEC	302	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
IWHR	Internet Water Heater Replacement	C2G	IWHR	308	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
JB	Jack & Bore - PW								Not Used										
LC	LandClearing Commercial (PZ&E REVIEW & FEES)	Land Clearing	ZN	701	\$20.00	NA	\$0.00	0					\$5.00	160.00		pz&e	50.00		TBD
LCR	LandClearing Residential	Land Clearing	ZN	701	\$20.00	NA	\$0.00	0					\$5.00	160.00			50.00		\$235.00
MD	Modular Single Family Residence	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
MDFB	Modular Fut/Bldr - Largo Pres	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
MECH	Mechanical Work Only	Standard	MEO	303	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00						TBD
MF3	Multi Family Residence 3 Units & Up	Standard	RNC	104	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
MHD	Mobile Home Demo (Removal)	Standard	DEMO	645	\$20.00	NA	\$200.00	1		insp	\$3.00	\$4.00	\$5.00		\$0.00				\$232.00
MHN	Mobile Home New Setup	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
MHPL	Model Home Parking Lot								Not Used										
MISC	Miscellaneous	Standard	BLDO	106	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
MST	Modular Sales Trailer	Standard	BLDO	201	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng				TBD
MUL5	Multi Family Residence 5 & More Units								Not Used										
NCO	New Change of Occupancy	CO	NCO	501	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00		\$0.00			\$50.00	\$99.30
NFC	No Fee Commercial Permit								Not Used										
NFR	No Fee Residential Permit								Not Used										
NONR	Nonresidential & Nonhousekeeping								Not Used										
NSF	Non Structural Fence	Standard	NSF	405	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00	\$20.00			\$50.00		\$119.30
NSS	Non Structural Shed < 192 sf	Standard	NSS	406	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30
NSSF	Non Structural Shed < 192 sf and Fence	Standard	NSSF	406	\$20.00	NA	\$20.00	0			\$0.30	\$4.00	\$5.00	\$20.00	\$20.00		\$50.00		\$139.30
NSSW	Non Structural Slab Work	Standard	NSSW	306	\$20.00	NA	\$40.00	0			\$0.60	\$4.00	\$5.00	\$20.00			\$50.00		\$139.60
OFF	Office	Standard	CNC	204	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
OTHR	Other Non Residential Buildings								Not Used										
OTR	Other - PW								Not Used										
PC	Pool Cage / Scr Cage Exceeding Limits of Deck	Standard	PC	306	\$20.00	NA	\$20.00	2			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00		\$50.00		\$119.30
PCCR	Pool Cage Composite Roof	Standard	PCCR	306	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00	\$0.00				\$89.60
PCED	Pool Cage Existing Deck	Standard	PCED	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30
PDZM	Pond/Zoning Miscellaneous	Standard	ZN	701	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00				\$69.30
PED	Pedestal (Comcast/Tele)	Standard	PED	302	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00				\$69.30
PKGR	Parking Garage/Bldgs. & Open Decked								Not Used										
PLHE	Pool Heater Electric	Standard	PLHE	302	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30
PLHG	Pool Heater Gas	Standard	PLHG	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30
PLHS	Pool Heater Solar	Fax	PLHS	304	\$20.00	NA	\$25.00	1			\$0.38	\$4.00	\$5.00						\$54.38
PLUM	Plumbing Work Only	Standard	PLO	304	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00						TBD
PSSA	Property Standards Site Abatement	Standard	PSSA	301	\$20.00	NA	\$40.00	1			\$0.60	\$4.00							\$64.60
PTC	Pole - Tarp Carport	Standard	PTC	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00				\$69.30
RC	Residential Construction								Not Used										
RCO	Reissued Change of Occupancy	CO	RCO	501	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00		\$0.00			\$50.00	\$99.30

Revision 28-Nov-17

Application Types		Application Form	Main Permit Type	Application Report Category	Admin Misc Plan Rev	Com or Res Plan Rev	Permit Base Fee	Std Insp	Additional Fees Based on Value, Insp & Plan Reviews by various Dept,'s										Total Permit
Type	Description								Bldg	Bldg	Educa	DBPR	CC Fee	Zng	Z-Insp	PZ&E	PW	Fire	
RES	Restaurant	Standard	CNC	208	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
RESA	Residential Additions	Standard	BLDO	106	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
ROHO	Roof Over Home Owner (Shingles)	Roofing	ROHO	305	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ROLC	Roof Over Licensed Contractor (Shingles)	Roofing	ROLC	305	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ROOF	Roofing under 1 square	Roofing	ROOR	305	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
ROW	Right Of Way Use Permit	Standard	ROW	701	\$10.00	NA	\$0.00								\$40.00				\$50.00
RR	Residential Remodel	Standard	BLDO	106	\$20.00	NA	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00						TBD
RRCO	Residential Reissued Certificate of Occupancy	Standard	RRCO	501	\$20.00	NA	\$40.00	TBD		insp	1.50%	TBD	\$5.00						TBD
RRHO	Remove & Replace Home Owner (Roof)	Roofing	RRHO	305	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
RRLC	Remove & Replace Licensed Contractor (Roof)	Roofing	RRLC	305	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
SCED	Screen Cage Existing Deck	Standard	SCED	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00					\$69.30
SCR	Screen or Glass RM / w/AI or Comp Roof	Standard	SCR	306	\$20.00	NA	\$20.00	TBD		insp	1.50%	TBD	\$5.00	zng	zng				TBD
SECS	Security System								Not Used										
SEW	Sewer Work Only	Standard	PLO	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
SEWC	Sewer Connect	Fax	SEWC	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
SFA	Single Family Attached (Villa)								Not Used										
SFR	Single Family Residence Detached	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
SFA2	Single Family (Res) Attached 2 story	Standard	RNC	102	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
SFRA	Single Family Residence Attached	Standard	RNC	102	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
SFR2	Single Family (Res) Detached 2 Story	Standard	RNC	101	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw		TBD
SF3	Single Family Attached 3 Units & Up	Standard	RNC	104	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng		pw	fire	TBD
SF4	Single Family Attached 5 or More Units								Not Used										
SHU	Shutters	Standard	SHU	301	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
SHUE	Shutters W / Electric	Standard	SHUE	301	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
SIGN	Signs	Standard	SIGN	306	\$20.00	NA	\$20.00	TBD		insp	\$0.30	TBD	\$5.00	zng	zng		pw		TBD
SKY	Skylight	Standard	SKY	301	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
SKYE	Skylight W / Electric	Standard	SKYE	301	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
SLAB	Slab (Structural Only)	Standard	SLAB	306	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00		\$50.00		\$119.30
SR	Service Station Renovation	Standard	BLDO	201	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
STA	Station / Convenience Store	Standard	CNC	207	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
STF	Structural Fence	Standard	STF	405	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00	\$0.00		\$50.00		\$139.60
STO	Storage Facility	Standard	CNC	208	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
STOR	Stores & Customer Services	Standard	CNC	208	NA	sq ft	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng	pz&e	pw	fire	TBD
STRU	Structures Other Than Buildings	Standard	BLDO	106	\$20.00	NA	\$20.00	TBD	valu	insp	1.50%	TBD	\$5.00	zng	zng				TBD
STS	Septic to Sewer	Fax	SEWC	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
STSN	Structural Shed New	Standard	STSN	406	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00		\$50.00		\$119.30
SWDK	Seawall and / or Docks	Standard	SWDK	106	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00		\$50.00		\$119.30
SWIM	Swimming (Pool,Spa,Etc.)	Standard	SWIM	106	\$20.00	\$125.00	\$200.00	5			\$3.00	\$5.00	\$5.00	\$20.00	\$0.00		\$50.00		\$428.00
TNK	Tank (gasoline,diesel,etc.)	Standard	TNK	304	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00				\$100.00	\$189.60
TNT	Tent	Standard	BLDO	201	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00	\$20.00	\$0.00				\$69.30
UGT	Underground Gas Tank (propane)	Standard	UGT	304	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00	\$20.00					\$89.60
USBA	Unsafe Building Abatement	Standard	USBA	301	\$20.00	NA	\$80.00	TBD			\$1.20	\$4.00							\$105.20
WATC	Water Connect	Fax	WATC	304	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
WHE	Water Heater Electric	Fax	WHE	308	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
WHG	Water Heater Gas	Fax	WHG	308	\$20.00	NA	\$20.00	1			\$0.30	\$4.00	\$5.00						\$49.30
WHS	Water Heater Solar	Fax	WHS	308	\$20.00	NA	\$25.00	1			\$0.38	\$4.00	\$5.00						\$54.38
WIN1	Window Replacement	Standard	WIN1	301	\$20.00	NA	\$40.00	2			\$0.60	\$4.00	\$5.00						\$69.60
WIN2	Window 3 & Up								Not Used										
ZN	Zoning Only	Standard	ZN	701	NA	NA	\$40.00	TBD			\$0.60	\$4.00	\$5.00	\$20.00					TBD

PART II

SUBSURFACE INVESTIGATION

**SUBSURFACE SOIL EXPLORATION,
ANALYSIS AND RECOMMENDATIONS
FOR PROPOSED POOL AND
SUPPORT STRUCTURES @ BUTLER PARK,
6205 PRICE BOULEVARD,
NORTH PORT,
SARASOTA COUNTY, FLORIDA**



Ardaman & Associates, Inc.

OFFICES

FLORIDA

Orlando, 8008 S. Orange Avenue, Orlando, Florida 32809, Phone (407) 855-3860

Bartow, 1525 Centennial Drive, Bartow, Florida 33830, Phone (863) 533-0858

Cocoa, 1300 N. Cocoa Boulevard, Cocoa, Florida 32922, Phone (321) 632-2503

Fort Myers, 9970 Bavaria Road, Fort Myers, Florida 33913, Phone (239) 768-6600

Miami, 2608 W. 84th Street, Hialeah, Florida, 33016, Phone (305) 825-2683

Port St. Lucie, 460 NW Concourse Place, Unit #1, Port St. Lucie, Florida 34986-2248, Phone (772) 878-0072

Sarasota, 78 Sarasota Center Boulevard, Sarasota, Florida 34240, Phone (941) 922-3526

Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (850) 576-6131

Tampa, 3925 Coconut Palm Drive, Suite 115, Tampa, Florida 33619, Phone (813) 620-3389

West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (561) 687-8200

LOUISIANA

Alexandria, 3609 MacLee Drive, Alexandria, Louisiana 71302, Phone (318) 443-2888

Baton Rouge, 316 Highlandia Drive, Baton Rouge, Louisiana 70810, Phone (225) 752-4790

Monroe, 1122 Hayes Street, Monroe, Louisiana 71292, Phone (318) 387-4103

New Orleans, 1305 Distributors Row, Suite 1, Jefferson, Louisiana 70123, Phone (504) 835-2593

Shreveport, 7222 Greenwood Road, Shreveport, Louisiana 71119, Phone (318) 636-3723

MEMBERS:

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American Concrete Institute

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Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

September 23, 2011
File No. 11-7173

TO: Kimley-Horn & Associates, Inc.
2201 West Royal Lane, Suite 275
Irving, TX 75063-3206

Attention: Mark Hatchel

SUBJECT: Subsurface Soil Exploration, Analysis and Recommendations for Proposed Pool
and Support Structures @ Butler Park, 6205 Price Boulevard, North Port, Sarasota
County, Florida

Gentlemen:

As requested, our firm has completed a subsurface soil exploration program at the above-referenced site. The purpose of this program was to determine the suitability of the existing soils for the proposed construction and to make foundation and soil preparation recommendations.

This report documents our findings and conclusions. It has been prepared for the exclusive use of Kimley-Horn & Associates, Inc. for specific application to the subject project, in accordance with generally-accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

SCOPE

The scope of our services has included the following items:

1. Conducting five (5) Standard Penetration Test borings to determine the nature and condition of the subsurface soils.
2. Reviewing each soil sample obtained in our field testing program by a geotechnical engineer in the laboratory for further investigation, classification and assignment of laboratory tests.
3. Analyzing the existing soil conditions with respect to the proposed construction.

4. Preparing this report to document the results of our field testing program, engineering analysis and recommendations.

FIELD EXPLORATION PROGRAM

Our field exploration program consisted of conducting five (5) Standard Penetration Test borings at the locations shown on the attached sketch. These borings were performed to determine the nature and condition of the subsurface soils to a maximum depth of 25 feet below the existing ground surface. Test boring depths, location and number were determined by Ardaman & Associates, Inc. Test borings were located in the field utilizing available landmarks and a 100-foot tape. Test boring locations should be considered accurate only to the degree implied by the method used. Should more accurate locations be required, a registered land surveyor should be retained. The equipment and procedures used in the borings are described in greater detail in the appendix of this report.

GENERAL SUBSURFACE CONDITIONS

The general subsurface conditions encountered during the field exploration program are shown on the soil boring logs, included in the appendix of this report. Soil stratification is based on examination of recovered soil samples and interpretation of field boring logs. The stratification lines represent the approximate boundaries between the soil types, while the actual transitions may be gradual.

A generalization of the subsurface soil conditions encountered in the borings is described below:

DEPTH		TO	SOIL DESCRIPTION
FROM	(ft)		
0'	-	9'	Medium dense to dense gray-brown silty fine sand
9	-	12'	Medium dense fine sand and gray clayey silty fine sand
12'	-	24'	Loose silty fine sand with silt and shell

On the date of our field exploration program, the water table was encountered at depths ranging between 4.4 and 4.6 feet below existing grade. The water table level is anticipated to fluctuate due to seasonal rainfall variations and other factors.



LABORATORY TESTING PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our office and, thereafter, examined by a geotechnical engineer to obtain more accurate descriptions of the existing soil strata. Laboratory testing consisting of percent fines was determined on selected samples to aid in soil classification or to further define the engineering properties of the soils. The results of these tests are included on the boring logs at the respective location of sample. The soil descriptions shown on the soil boring logs are based on a visual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2488-84) and standard practice.

ANALYSIS AND RECOMMENDATIONS

It is our understanding that the proposed construction will consist of a pool and support structures. The support structures are assumed to consist of single story masonry structures constructed near existing grade. The pool deck is also assumed to be constructed at or near existing grade.

Soils Analysis

The soils encountered at the subject site are well-suited to support the proposed pool and support structures on conventionally designed shallow foundations.

Foundation Design

Foundations for the proposed structures may be designed for an allowable soil contact pressure of 2,000 psf. We recommend that all wall foundations be no less than eighteen inches wide and column foundations be no less than twenty-four inches wide. All foundations should be designed for an equal dead load distribution in accordance with standard building code requirements. A soil cover of eighteen inches, as measured from the bottom of the foundation system to outside adjacent finished grade, should be provided.

Pool Dewatering

The pool area should be dewatered prior to any excavation utilizing a system of well points. The well points and pumping system should be designed to lower the ground water level to at least 2 feet below the bottom of the pool. The pumping system should be operated continuously until pool construction is completed. Dewatering should continue until sufficient water is added to the completed pool to prevent flotation of the shell.



Soil Preparation Recommendations

The following soil preparation recommendations are made as a guide to the design professionals, parts of which should be incorporated into the project's general specifications.

1. The pool and structure areas (plus a margin of 5.0 feet outside building perimeter lines) should be cleared and grubbed of all surface vegetation and organic debris.
- 2.. Fill if required should consist of clean fine sands not containing more than 10% passing the #200 sieve can be placed in level lifts not exceeding 12 inches loose and compacted with the above-described equipment. Each layer should be compacted to a minimum of 95% of Modified Proctor maximum density.
3. Fill necessary to raise the grade from the top of the foundation elevation to finished floor slab subgrade elevation should also consist of clean fine sands compacted to 95% of Modified Proctor maximum density. If fill is placed inside partially completed walls, extreme care should be exercised to avoid damage to these walls.
4. A soils engineer or his representative from Ardaman & Associates, Inc., Sarasota Office, should inspect and test the compacted excavated elevation and each layer of fill to verify compliance with the above-suggested recommendations. In addition, a representative should inspect and test the foundation contact soils immediately prior to concrete placement. The bottom of the foundations should be compacted with a jumping jack compactor prior to the placement of the reinforcing steel.

GENERAL COMMENTS

The analysis and recommendations submitted in this report are based upon the data obtained from six (6) Standard Penetration Test borings performed at the locations indicated on the attached sketch. This report does not reflect any variations which may occur between the borings. While the borings are representative of the subsurface conditions at their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The nature and extent of variations may not become evident until during the course of a ground improvement program, if such a program is undertaken. If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations. The boring logs and related information are based upon the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate, and the




description represents our interpretation of the subsurface conditions at the designated boring location on the particular date drilled.

The groundwater elevations shown on the boring logs represent groundwater surfaces encountered on the dates shown. Fluctuations in water table levels should be anticipated throughout the year.

It has been a pleasure to be of assistance to you with this project. Please contact us when we may be of further service to you, or should you have any questions concerning this report.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.
Certificate of Authorization No. 5950



Gary H. Schmidt, P.E.
Vice President
Fl. Lic. No. 12305

GHS:ly



SOIL BORING, SAMPLING AND TESTING METHODS

Standard Penetration Test

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density and, for cohesive soils, an approximate unconfined compressive strength (Q_u):

Cohesionless Soils:	<u>N-Value</u>	<u>Description</u>	
	0 to 4	Very loose	
	4 to 10	Loose	
	10 to 30	Medium dense	
	30 to 50	Dense	
	Above 50	Very dense	
Cohesive Soils:	<u>N-Value</u>	<u>Description</u>	<u>Q_u (ton/ft²)</u>
	0 to 2	Very soft	Below 0.25
	2 to 4	Soft	0.25 to 0.50
	4 to 8	Medium stiff	0.50 to 1.0
	8 to 15	Stiff	1.0 to 2.0
	15 to 30	Very stiff	2.0 to 4.0
	Above 30	Hard	Above 4.0

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from each sampling interval and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. After thorough examination and testing of the obtained samples in the laboratory, the samples are discarded unless prior arrangements have been made. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

Auger Borings

Auger borings are used when a relatively large, continuous sampling of soil strata close to ground surface is desired. A 4-inch diameter, continuous flight, helical auger with a cutting head at its end is screwed into the ground in 5-foot sections. It is powered by the rotating action of the Kelly bar of a rotary drill rig. The sample is recovered by withdrawing the auger out of the ground without rotating it. The soil sample so obtained is classified and representative samples put in bags or jars and brought back to the laboratory for further classification and testing.

Hand Auger Borings

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5 to 9 feet) depth or when access is not available to power drilling equipment. A 3-inch diameter, hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved to the surface at approximately 6-inch intervals and its contents emptied for inspection. The soil sample so obtained is classified and representative samples put in bags or jars and transported to the laboratory for further classification and testing.

Laboratory Test Methods

Soil samples returned to our laboratory are examined by a geotechnical engineer or geotechnician to obtain more accurate descriptions of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to further define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as described in this report. The soil descriptions shown on the logs are based upon a visual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2488-84) and standard practice. Following is a list of abbreviations which may be used on the boring logs.

- 200 - Percent Fines (percent passing the No. 200 sieve); ASTM D-1140
- DD - Dry Density of Undisturbed Sample; ASTM D-2937
- Gs - Specific Gravity of Soil; ASTM D-854
- k - Hydraulic Conductivity (Coefficient of Permeability)
- LL - Liquid Limit; ASTM D-423
- OC - Organic Content; ASTM D-2977
- pH - pH of Soil; ASTM D-2976
- PI - Plasticity Index (LL-PL); ASTM D-424
- PL - Plastic Limit; ASTM D-424
- Qp - Unconfined Compressive Strength by Pocket Penetrometer;
- Qu - Unconfined Compressive Strength; ASTM D-2166 (soil), D-2938 (rock)
- SL - Shrinkage Limit; ASTM D-427
- USCS - Unified Soil Classification System; ASTM D-2487
- w - Water (Moisture) Content; ASTM D-2216

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

PROJECT: Butler Park Pool

LOCATION: 6205 Price Blvd.

North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DATE DRILLED: 9/7/11 START:

FINISH:

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: N.D. TIME:

DATE: 9/7/11

DRILL MAKE & MODEL: CME-45

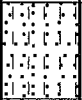




BIT: 2-3/8" tricone

DRILLING RODS:

AW

DRILLING METHOD: rotary with SPT

WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0	3-6-8	14	1		SP-SM	brown fine sand with silt (trace shell)					
	10-12-16	28	2		SP	pale brown fine sand					
4	11-12-11	23	3		SM	dark grayish brown silty fine sand		13			
	8-12-22	34	4		SM	dark gray silty fine sand (trace roots)					
	28-17-17	34	5		SP-SM	brown fine sand with silt					
8	13-16-16	32									
	12-17-20	37									
12						end of boring					
16											
20											
24											
28											

PAGE 1 OF 1

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Geotechnical, Environmental and
Materials Consultants

REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.:

B1

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

DATE DRILLED: 9/7/11 START:

FINISH:

PROJECT: Butler Park Pool

GROUND SURFACE ELEVATION:

LOCATION: 6205 Price Blvd.

WATER TABLE DEPTH: 4.7 TIME: DATE: 9/7/11








North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone DRILLING RODS: AW

DRILLING METHOD: rotary with SPT WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0	7-8-9	17	1		SP-SM	brown fine sand with silt (trace shell)					
	10-12-18	30	2		SP-SM	pale brown fine sand with silt					
4	15-19-21	40	3		SP-SM	gray fine sand with silt					
	18-19-20	39	4								
			5		SP-SM	dark gray fine sand with silt (trace roots)					
	11-12-16	28									
8	13-15-16	31	6		SC	gray clayey fine sand (trace roots)		13			
	15-19-22	41	7		SC	gray & brown clayey fine sand (trace roots)					
						end of boring					
12											
16											
20											
24											
28											

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REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.: B2

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

PROJECT: Butler Park Pool

LOCATION: 6205 Price Blvd.

North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DATE DRILLED: 9/7/11 START:

FINISH:

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: 4.6

TIME:















DATE: 9/7/11

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone

DRILLING RODS: AW

DRILLING METHOD: rotary with SPT (auto-hammer below 10')

WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0	4-9-13	22	1		SP-SM	brown fine sand with silt (trace shell)					
	13-14-18	32									
	18-28-24	44									
4	20-16-22	38	2		SP-SM	dark gray fine sand with silt		11			
	19-17-10	27	3		SP	gray fine sand					
8	9-10-10	20	4		SP	brown fine sand (trace shell)					
	9-10-12	22	5		SP-SM	brown fine sand with silt (trace roots)					
			6		SP	pale brown fine sand		2.5			
12					SP	gray fine sand					
	3-2-3	6	7								
16					SP	dark gray fine sand		3.7			
	4-5-13	22	8								
20					SP	gray fine sand					
	4-4-5	9	9								
24						end of boring					
28											

PAGE 1 OF 1

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REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.:

B3

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

PROJECT: Butler Park Pool

LOCATION: 6205 Price Blvd.

North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DATE DRILLED: 9/7/11 START:

FINISH:

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: N.D. TIME:

DATE: 9/7/11










DRILL MAKE & MODEL: CME-45

BIT: 4" auger point

DRILLING RODS:

DRILLING METHOD: auger

WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0			1		SP-SM	brown fine sand with silt (trace shell)					
4			2		SP-SM	grayish brown fine sand with silt					
			3		SP-SM	dark grayish brown fine sand with silt		9.7			
8			4		SP-SM	gray fine sand with silt					
12			5		SP-SM						
16			6		SP-SM	dark brownish gray fine sand with silt		8.3			
20			7		SP-SM	brownish gray fine sand with silt					
24			8		SC	gray clayey fine sand with phosphate		13			
			9					17			
28						end of boring					

PAGE 1 OF 1

Ardaman & Associates, Inc.

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REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.: B4

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

PROJECT: Butler Park Pool

LOCATION: 6205 Price Blvd.

North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DATE DRILLED: 9/6/11 START:

FINISH:

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: N.D. TIME:

DATE: 9/6/11

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone

DRILLING RODS: AW

DRILLING METHOD: rotary with SPT (auto-hammer below 10')

WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0	5-9-16	25	1		SP-SM	dark grayish brown fine sand with silt (trace shell)					
	18-18-18	36	2		SP-SM	brown fine sand with silt (trace shell)					
4	20-19-20	39	3		SP-SM	brown & gray fine sand with silt (trace shell)					
	17-14-15	29	4		SP	brownish gray fine sand					
	9-7-7	14	5		SP-SM	dark brown fine sand with silt					
8	5-6-7	13	6		SM	gray silty fine sand (trace roots)					
	8-9-13	22	7		SM-SC	gray clayey silty fine sand		15			
12											
	4-3-1	5	8		SP-SM	dark gray fine sand with shell					
16											
					SP-SM	dark gray fine sand with silt		8.9			
20	2-2-5	9	9								
					SP-SM	gray fine sand with silt					
24	3-5-6	14	10								
						end of boring					
28											

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Geotechnical, Environmental and
Materials Consultants

REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.:

B5

BORING LOCATION: see Figure 1

CLIENT: Kimley-Horn & Associates

PROJECT: Butler Park Pool

LOCATION: 6205 Price Blvd.

North Port, Sarasota County, Florida

DRILL CREW: DP/MO

LOGGED BY: DP

DATE DRILLED: 9/6/11 START:

FINISH:

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: 4.4 TIME: DATE: 9/6/11

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone DRILLING RODS: AW

DRILLING METHOD: rotary with SPT WEATHER CONDITIONS:

DEPTH (feet)	BLOW COUNTS PER 6-INCHES	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX
0	8-13-17	30	1		SP-SM	brown fine sand with silt (trace shell)					
	24-13-14	27	2		SP-SM	dark grayish brown fine sand with silt (trace shell)					
4	14-14-10	24									
	6-7-11	18	3		SP-SM	dark gray fine sand with silt (trace roots)					
	12-11-10	21	4		SP	gray fine sand					
8	8-7-6	13	5		SM-SC	brownish gray clayey silty fine sand		13			
	10-12-13	25	6								
12						end of boring					
16											
20											
24											
28											

PAGE 1 OF 1

 Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

REVIEWED BY: Jerry H. Kuehn, P.E.

FILE NO: 11-7173

BORING NO.: B6

CREEK CONSERVATION LINE

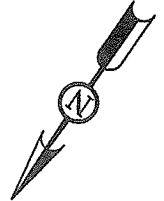
EDGE OF VEGETATION
(TYP.)

PLAYGROUND AREA

200' DRAINAGE EASEMENT LINE

DRAINAGE INLET
GRATE=18.64'

DRAINAGE INLET
GRATE=18.64'



SCALE: 1"=100'

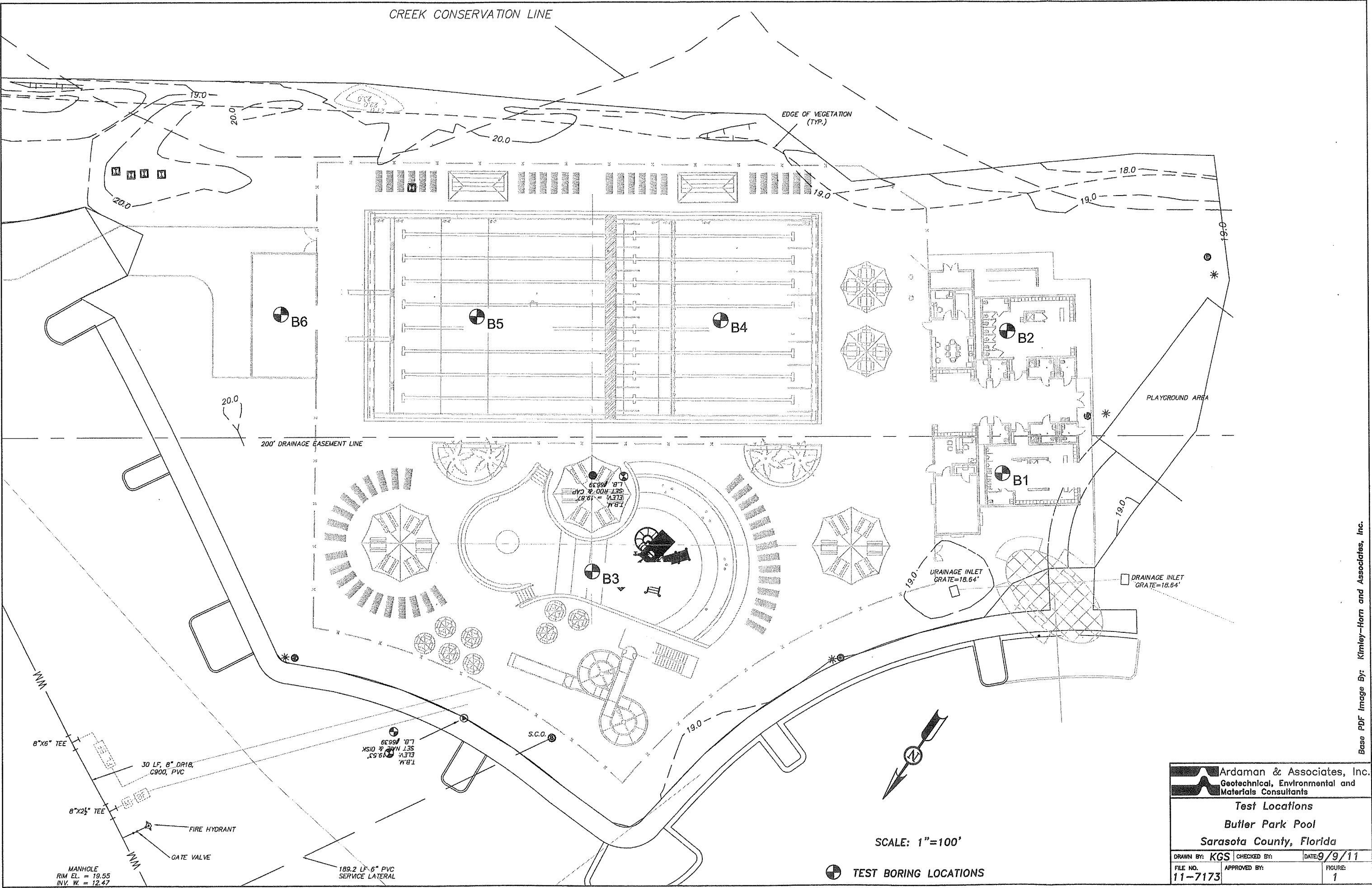
TEST BORING LOCATIONS

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

Test Locations
Butler Park Pool
Sarasota County, Florida

DRAWN BY: KGS	CHECKED BY:	DATE: 9/9/11
FILE NO. 11-7173	APPROVED BY:	FIGURE: 1

Base PDF Image By: Kimley-Horn and Associates, Inc.



PART III

TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010 – SUMMARY OF WORK

PART I – GENERAL

1.1 Work covered by Contract Documents for Butler Park Aquatic Center in North Port, Florida.

- A. This project shall consist of all work, complete and in place including but not limited to: Site Preparation, Grading, Utilities, Paving, Fencing, Pools, Bath House and Filtration Building, Electrical, Site Lighting, Landscape, and Irrigation to construct complete and in place a new aquatic center at Butler Park in North Port, Florida.
- B. All work shall comply with all Federal, State, and Local accessibility standards as mandated and enforced by the American with Disabilities Act (ADA).
- C. Contractor's Duties
 - 1. Provide and pay for:
 - a. Labor, materials, and equipment.
 - b. Tools, construction, equipment, and machinery.
 - c. Other facilities and services necessary for proper execution and completion of work.
 - 2. Owner is exempt from sales tax on products permanently incorporated into the work. Follow instructions issued by State Comptroller's Office for purchase of such products free of tax.
 - 3. Secure as necessary for proper execution and conditions of work:
 - a. License/Business Registration; paid by Contractor.
 - b. Permits/Approvals required by governing entities; paid by Contractor.
 - 4. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of work.
 - 5. Promptly submit written notice to Owner of observed variances of Contract Documents from legal requirements.
 - 6. Enforce strict discipline and good order among employees. Do not employ on work:
 - a. Unfit persons.
 - b. Persons not skilled in assigned task.
 - 7. Checking Dimensions at Site:
 - a. Verify measurements as necessary before ordering any materials or doing any work.
 - b. Report any discrepancies to Owner for instructions before proceeding.
 - 8. Approval of Working Conditions:
 - a. Notify the Owner of any unsatisfactory condition before beginning to perform work.
 - b. Beginning of work by Contractor shall constitute his acceptance of substrate and surface conditions.
 - 9. Under no condition shall a portion of work proceed prior to preparatory work having been completed, cured, dried, or otherwise made satisfactory to receive such related work.
 - 10. The Contractor shall establish and maintain his own grades, lines, levels, and bench marks. Verify all grades, lines, levels, and dimensions shown on drawings and report in writing any observed errors or inconsistencies to the Owner before beginning work. Establish his own basic lines and grades in conformity with Owner's permanent bench marks and coordinate systems for the construction area.
 - 11. It is the intent of this project that all items of work include the materials, standards, trades, procedures, etc., customarily associated with the items of work, whether or not such materials, standards, trades, procedures, etc., are expressly stated. In case of ambiguity, unclarity, or conflict in these Construction Documents, the matter shall be promptly submitted in writing for determination by the Owner. The Owner will render in writing a clarification reasonably inferable from these Documents and consistent with the intent of this proposed work.
 - 12. Contractor shall employ only experienced and qualified workers and subcontractors.

1.2 Contracts

- A. Perform work under Lump Sum Contract

1.3 Conditions of the Contract

- A. The following Special Conditions also shall govern the work under each Section in the Technical Requirements.
1. Uninterrupted Operations. Work on this Project shall not interrupt or compromise the routine operations of the Owner unless specifically authorized by the Architect/Engineer.
 2. Experienced Supervision. Employ a competent Supervisor for work on this Project, approved by the Owner, skilled in coordination of the trades involved and the type of scheduling required by a project of this nature. Replace approved Supervisor only with the permission of the Owner.
 3. Contract Administration. The Architect/Engineer has the authority to act on behalf of the Owner to the extent provided for in the Contract Documents, unless otherwise modified by written instrument which will be shown to the Contractor at his request.
All instructions affecting Contract Sum, Contract Time, or Contract interpretations shall be confirmed expeditiously in writing only by owner, with copies furnished to the Owner's designated representative and the Contractor by the party issuing the instructions.
 4. Conduct of the Contractor
 - a. Type of Dress:
 - 1.) Workmen must wear shirts at all times.
 - 2.) Wearing apparel that portrays obscene or vulgar language and/or art work is prohibited.
 - b. Alcoholic Beverages and other Drugs:
 - 1.) Alcoholic beverages and other drugs will not be permitted on the property of the Owner.
 - 2.) Persons under the influence of alcoholic beverages and/or any other drug are prohibited from the Project.
 - c. Obscenity:
 - 1.) The Owner reserves the right to require dismissal from the Project of any person using obscene gestures.
 - d. Portable Radios and Other Sound-Producing Devices:
 - 1.) Hold the volume of portable radios or other sound-producing devices to such a level so that individuals not related to the construction are not disturbed.
 - 2.) Do not broadcast obscenity.

1.4 Contractor Use of Premises

- A. Confine operations at site to areas permitted by:
1. Law.
 2. Ordinance.
 3. Permits.
 4. Contract Documents.
- B. Limit use of site and premises to allow:
1. Uninterrupted Owner activity where required for Owner's business purposes.
 2. Work by Others and Work by Owner.
 3. Use of site and premises by public where required for Owner's business purposes.
- C. Construction Operations:
1. Yard Operations and/or New Construction: Limited to areas noted on Drawings unless specifically approved otherwise by the Owner.
 2. Protection:

- a. Take over and assume responsibility for the premises necessary for each portion of the Work. Provide and maintain all protections required by governing laws, regulations, and ordinances. Be responsible for any loss or damage caused by workmen to the property of the Owner or to the work or materials installed. Make good any loss, damage, or injury without cost to the Owner.
 - b. The protection of adjacent property shall include, but will not necessarily be limited to, the erection and maintenance of shoring, underpinning, and fences as necessary to protect and to support existing work to be left in place.
 - c. Protect against damage to all trees and all shrubs on the site which do not have to be removed for the Work. Remove or trim any tree or shrub only with the written approval of the Owner.
 - d. Send proper notices, make necessary arrangements, and perform other services required for the care, protection, and maintenance of utilities, including fire hydrants, piping, wires, and all other such items on and around the building site.
 - e. At no additional cost to the Owner, hold the Owner harmless from, and make good, any damage occurring as a result of the Contractor's failure to provide required protection.
 - f. Provide a temporary chain link construction fence with lockable gates.
3. Other:
- a. No fires on the site.
 - b. No dumping on the Owner's property.
 - c. Do not unreasonably encumber site with materials or equipment.
 - d. Assume full responsibility for protection and safekeeping of products stored on premises.
 - e. Obtain and pay for use of additional storage or work areas needed for operations.

1.5 Concealed Piping and Conduit

- A. Should active piping or conduit be encountered below grade or concealed by existing construction and be found at variance with the conditions indicated by the Drawings and Specifications, relocate such piping and/or conduit as directed by the Owner.

PART II – PRODUCTS

Not used.

PART III - EXECUTION

3.1 Cleaning Up

- A. Contractor shall clean the work area at the end of each work day.

END OF SECTION 01010

SECTION 01020 - CONTRACT CONSIDERATIONS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Allowances
- B. Schedule of Values
- C. Application for Payment
- D. Proposal Request (Changes)
- E. Architect/Engineer's Supplemental Instructions
- F. Request for Interpretation

1.3 ALLOWANCES

- 1. None Specified.

1.4 SCHEDULE OF VALUES

- A. Schedule of Values shall be submitted on AIA Document G703 - Continuation Sheet of Application and Certification for Payment, or electronic media printout.
- B. Submit a Schedule of Values to the Architect/Engineer/Engineer within two calendar days after the date of the Owner-Contractor Agreement being executed. Upon request of the Owner or Architect/Engineer the Contractor shall furnish additional line item breakdown of the Schedule of Values.
- C. Use Table of Contents of Project Manual as basis of format for listing cost of work.

1.5 APPLICATION FOR PAYMENT

- A. At least ten calendar days before each progress payment falls due, the Contractor shall submit to the Architect/Engineer a notarized, itemized Application For Payment based on the previously approved Schedule Of Values, of 90 percent of the value of labor and materials incorporated in the Work and of all stable materials suitably stored at the site, to and including the last day of the proceeding month, less the aggregate total of all previous payments, provided the aggregate total of all monthly payments shall not exceed 90 percent of the contract price. Applications for payment shall be supported by data substantiating the Contractor's right to payment as the Owner or the Architect/Engineer may require.

1.6 CHANGE PROCEDURE

- A. Proposal Request: The Architect/Engineer may issue a Proposal Request during the course of the Work. A Proposal Request is a description of a change in the Work under Contract such as additional work or revisions to work already completed, work not yet

started or work in progress. The Proposal Request is issued to obtain a mutually accepted lump sum for the Work described, add, deduct or no change.

- B. The Contractor shall promptly submit to the Architect/Engineer his completed Proposal, properly itemized and supported by sufficient substantiating data to permit evaluation.
- C. The Contractor shall not proceed with the Work described in a Proposal Request until the Proposal has been evaluated, found to be fair and equitable by the Architect/Engineer, presented to the Owner for approval and authorized in writing or issued in a Change Order. The Contractor upon issuance of a Proposal Request shall make every attempt to not install items of work that are affected by the Proposal and will notify the Architect/Engineer of any and all items that cannot be postponed.
- D. Unless agreed otherwise, five (5) days shall be allowed for evaluation by the Architect/Engineer. If in the opinion of the Architect/Engineer a Proposal is not found to be fair and equitable, the Contractor will reevaluate the cost and no additional cost or time extension will be considered for the time required for the reevaluation.
- E. Three (3) days will be required to issue authorization to proceed after the Proposal Request is found to be fair and equitable. The Contractor's Proposal must be valid for the four weeks stated above unless agreed otherwise.

1.7 ARCHITECT/ENGINEER'S SUPPLEMENTAL INSTRUCTIONS

- A. Architect/Engineer's Supplemental Instructions are issued for work that is not described in sufficient detail or is generally stated but not specifically described to the extent required for the exact construction of such items. This information shall be issued to the Contractor(s) in the form of Architect/Engineer's Supplemental Instructions (A.S.I.), AIA Document G710 and shall be considered a minor change in the Work.
- B. Should the Contractor consider Architect/Engineer's Supplemental Instructions an item to be a change in the Contract Documents, he may notify the Architect/Engineer in writing of the items in dispute and include the actual cost increase or decrease associated with each item.
- C. Claims by the Contractor for additional cost, in response to a Architect/Engineer's Supplemental Instruction, must be received by the Architect/Engineer within 20 days after the posted date on the A.S.I. or claims will not be considered. Proceeding with work described in an A.S.I. shall constitute waiver of rights to claims.

1.8 REQUEST FOR INTERPRETATION

- A. Request for Interpretation (R.F.I.) shall be submitted to the Architect/Engineer in written form conforming to the following:
 - 1. Each R.F.I. shall be numbered, as for referencing and entering into a log which shall be kept by the Construction Manager and the Architect/Engineer.
 - 2. R.F.I.'s shall have a designated space titled Category. The Contractor shall enter the proper Category No. in this space, which will identify the urgency of the R.F.I., as shown below:
 - a. Category 1 - an emergency and requires an answer in 24-48 hours or work will stop.
 - b. Category 2 - a normal request and requires a three (3) calendar day response.
 - c. Category 3 - is low priority and requires an answer within five (5) days.

3. The R.F.I. log shall be reviewed during each progress meeting and any problems discussed.

END OF SECTION 01020

SECTION 01039 - COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Coordination
- B. Cutting, Patching and Touch-up
- C. Pre-Construction Conference
- D. Progress Meetings

1.3 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction.

1.4 CUTTING, PATCHING AND TOUCH-UP

- A. Employ skilled and experienced installers to perform cutting and patching of new and existing Work; restore Work with new Products.
- B. Establish elevations, lines, and levels and certify that elevations and locations of the Work conform to Contract Documents.
- C. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- D. Execute cutting and demolition by methods that will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
- E. Restore work that has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
- F. Refinish entire surfaces to match adjacent finishes to the nearest intersections. Refinish assemblies entirely.

- G. Execute excavating and backfilling by methods that will prevent damage to other work and will prevent settlement.

1.5 PRE-CONSTRUCTION CONFERENCE

- A. Prior to the start of the Work of this Contract, the Contractor, the Architect/Engineer and the Owner's Representative will meet for the purpose of reviewing schedules and conditions of the buildings and site.
- B. The location and date of the Pre-Construction Meeting will be scheduled after the Award of Contract to all effected parties.
- C. Pre-Construction Conference Agenda:
 - 1. Introduction of Key Personnel.
 - 2. Dates will be selected for meetings.
 - 3. All required contract forms, bonds and insurance will be reviewed.
 - 4. Schedules and Submittal Process will be reviewed.
 - 5. Use of Site.
 - 6. Contractor questions.

1.6 PROGRESS MEETINGS

- A. Weekly Job Site Progress Meeting Agenda (Owner/Contractor):
 - 1. Monitor the progress of construction.
 - 2. Discuss any coordination issues.
 - 3. Discuss any RFI's.
 - 4. Discuss any shop drawing issues.
 - 5. Discuss questions from subcontractors.
 - 6. Confirm next week meeting date and time.
- B. Monthly (Twelve Meetings Total) Job Site Progress Meeting Agenda (Owner/Contractor/Architect/Engineer):
 - 1. Review Project Schedule: An up-to-date project schedule shall be submitted at each monthly meeting. Review list of construction items to be observed before being covered or completed.
 - 2. Review detailed 3 week look ahead.
 - 3. Review Record Set of Drawings: Record set of drawings must be kept current with any changes to utilities, partitions, etc.
 - 4. Review Pay Request: Submit four (4) rough-draft copies of the pay request for review. Corrections must be made on the rough-draft copies and four (4) corrected, notarized, and signed copies shall be sent to the Architect/Engineer for Certification. Three copies shall be sent to the Owner for processing.
 - 5. Review overall safety and Trench Safety Report.
 - 6. Discuss any coordination issues.
 - 7. Discuss any RFI's.
 - 8. Discuss any shop drawing issues.
 - 9. Discuss any weather days or anticipated delay days.
 - 10. Discuss questions from subcontractors.
 - 11. Confirm next month meeting date and time.
 - 10 Submit Daily Activity Reports.

END OF SECTION 01039

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Submittal Procedures
- B. Schedules
- C. Reports, Warranties, Certificates and Manuals
- D. Schedule of Submittals
- E. Construction Schedule

1.3 SUBMITTAL PROCEDURES

- A. Identify long lead or specialty submittals (slides, interactive play features, and site features, etc.) and submit within first 30 days of contract.
- B. Submit shop drawings and product data in the quantity as required by the various sections of the Specifications or if not specified, submit three copies for the use of the Architect/Engineer, plus the number of copies the contractor's needs may dictate. In no case shall fewer than seven copies be submitted. All submittals, regardless of the source of origin, shall be submitted via the General Contractor.
- C. For each product specified or noted on the Drawings, submit pdf copies of product data with installation directions as applicable to the construction requirements of this project, together with any required samples for approval. Shop drawings and product data shall be submitted within 30 days of Notice to Proceed.
- D. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- E. Apply Contractor's stamp, signed or initialed certifying that review for verification of product required, field dimensions, adjacent construction Work and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- F. Provide space for Contractor and Architect/Engineer review stamps.
- G. Revise and resubmit submittals as required; identify all changes made since previous submittal.
- H. Submittals shall be executed in sufficient time to allow at least ten (10) calendar days for each review by the Architect/Engineer.
- I. Each product submitted shall be submitted with it's own transmittal form, stating the product name, manufacturer and related specification section. Number each submittal consequently in order of submission (1, 2, 3, etc.), also reference the Project Manual specification number for the submittal identity. (example: 07270- 1 for the first submittal for Firestopping and 07270-2 for the

second item submitted under the same section). Revised submittals should have original number and a sequential alphabetic suffix. (example: 1A for a revised submittal).

1.4 SCHEDULES

- A. The following schedules must be prepared and submitted to the Architect/Engineer for approval at the Pre-Construction meeting. Refer to City of North Port Special Provisions SP-04.
 - 1. List of Subcontractors and Suppliers, including category of work, contact name, address, and telephone number.
 - 2. 24 Hour Emergency Contact Numbers for:
 - a. Contractor
 - b. Major Sub-Contractors
 - 3. Construction Schedule. Refer to Paragraph 1.7 below.
 - 4. Schedule of Values. Refer to Section 01020, Paragraph 1.4.
 - 5. Cash flow schedule of anticipated amount of monthly estimates.
 - 6. Schedule of Submittals.
 - 7. Requests for Substitutions: Submit within 30 days, in accordance with Section 01600, Paragraph 1.5.
 - 8. Schedule of Operation and Maintenance Data for Manuals. Refer to Section 01700, Paragraph 1.6.

1.5 REPORTS, WARRANTIES, CERTIFICATES AND MANUALS

- A. Warranties:
 - 1. On all materials for a period of one year or as per the maintenance bond and as required by various specification sections.
 - 2. For General Contractor and roofing subcontractor on roofing.
 - 3. Warranty on wood and veneered fire doors.
- B. Special warranties in conjunction with mechanical equipment.
- C. Test reports and certificates in conjunction with electrical equipment.
- D. City Certificates:
 - 1. Electrical inspector's certificate for compliance with city requirements.
 - 2. Plumbing inspector's certificate for compliance with city requirements.
 - 3. Fire department inspector's certificate for occupancy.
 - 4. Building department certificate for occupancy.
 - 5. Provide as required by the City's Building Inspection Department a letter of certification from an independent, registered surveyor verifying that the accepted grading plan has been accomplished.
- E. Operation and Maintenance Manuals. Refer to Section 01700, Paragraph 1.7.
- F. Concrete Design and Test Reports:
 - 1. In conjunction with concrete paving.
 - 2. In conjunction with structural concrete.
 - 3. Earthwork and Compaction.
 - 4. Leakage and pressure.

1.6 SCHEDULE OF SUBMITTALS

- A. Provide list of all items requiring shop drawings, product data or samples.
- B. Organize list by specification sections, and provide exact break down of phased portions of work.
- C. Provide proposed date for each initial submittal. Allow sufficient time as may be required for resubmittals.

1.7 CONSTRUCTION SCHEDULE

- A. The Construction Schedule shall be prepared in the form of a bar graph, identifying the first work day of each week and provide dates for completion of phases in the various categories of the work.
- B. Revise and resubmit as required. Submit revised schedule with each Application for Payment.
- C. The purpose of the Construction Schedule shall be to allow the Owner and Architect/Engineer to evaluate the Contractor's performance and adherence to the schedule on a monthly basis along with the Contractor's Application for Payment.
- D. Liquidated Damages will be paid by the Contractor to the Owner at a rate of one-thousand (\$1,000.00) for each and every calendar day that actual Substantial Completion exceeds the time for Final Completion authorized under the terms of this Contract. Refer to City of North Port Special Provisions – SP-09.

END OF SECTION 01300

SECTION 01340 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Submit to the Architect/Engineer shop drawings, product data, and samples required by specification sections.

1.2 SHOP DRAWINGS

- A. Prepared by a qualified detailer.
- B. Identify details by reference to sheet and detail numbers shown on Contract Documents.
- C. Shop Drawings shall be submitted only to clarify, amplify, or revise information shown or called for in the contract documents.

1.3 PRODUCT DATA

- A. Manufacturer's standard schematic drawings and diagrams:
 - 1. Modify drawings to delete information which is not applicable to the work.
 - 2. Supplement standard information to provide additional information specifically applicable to the work.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data:
 - 1. Clearly mark each copy to identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring or piping diagrams and controls.

1.4 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of product or material, with integrally related parts and attachment devices.
 - 2. Full range of color samples.
- B. Field Samples and Mock-ups:
 - 1. Erect at project site at location acceptable to Architect/Engineer.
 - 2. Construct each sample or mock-up complete, including work of all trades required in finish work.

1.5 SUBMISSION REQUIREMENTS

- A. Submit shop drawing and product data as soon as practicable after award of contract but not later than 30 days before dates reviewed submittals will be needed.
- B. Submit all office samples as soon as practicable but not later than 30 days after award of contract in order to facilitate color selections and coordination of the various materials. Final color selections and release of shop drawings contingent upon color selection will not be made until all office samples have been submitted, coordinated, and approved.
- C. Number of submittals required:

1. Shop Drawings: Submit six prints and one sepia only of each shop drawing, unless otherwise indicated.
 2. Product Data: Submit six copies of product data.
 3. Samples: Submit the number stated in each specification section, minimum of three samples for each item.
- D. Submittals shall include:
1. Date and revision dates.
 2. Project title and number.
 3. Names of Contractor, subcontractor, supplier, and manufacturer.
 4. Identification of product or material and specification section number.
 5. Relation to adjacent structure, materials or other critical features.
 6. Field dimensions, clearly identified as such.
 7. Applicable reference standards.
 8. A blank space 4" x 8" for Architect/Engineer's stamp.
 9. Other pertinent data required by specifications.
 10. Identification of variation from contract documents.
 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, compliance with contract documents, and coordination with requirements of the work.

Note: Absence of the Contractor's stamp shall constitute grounds for rejection of the submittal until such time as the submittal has been processed in accordance with this requirement.

1.6 RESUBMISSION REQUIREMENTS

- A. Resubmission: Make corrections and changes in submittals required by Architect/Engineer and resubmit until approved.
- B. Shop Drawings:
1. Revise initial drawings and resubmit as specified for initial submittal.
 2. Indicate on drawings any changes which have been made, other than those requested by Architect/Engineer.
- C. Product Data and Samples: Submit new data and samples as specified for initial submittal.

1.7 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute reviewed copies of shop drawings and product data which carry Architect/Engineer's stamp as follows:
1. Job Site File.
 2. Record Documents File.
 3. Other affected contractors.
 4. Subcontractors.
 5. Supplier or Fabricator.

Architect/Engineer will retain three (3) copies: one for his file, one for his consultants, and one for the owner.

END OF SECTION 01340

SECTION 01410 - TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting work.
- B. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
- C. Where no testing requirements are described, but the Owner decides, that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in Paragraph 1.3.

1.3 PAYMENT FOR TESTING

- A. Initial Testing: The Owner will select a pre-qualified independent testing laboratory and pay for all initial services of the testing laboratory as required by the Contract Documents and testing as the Owner deems necessary.
- B. Retesting: When initial testing indicates non-compliance with the Contract Documents, subsequent retesting required by the non-compliance shall be performed by the same testing agency, and costs thereof will be paid by the Contractor deducted by the Owner from the Contract Sum.
- C. In the event an area is not ready for testing. Any charges for trip changes will be the responsibility of the Contractor.

1.4 LABORATORY DUTIES

- A. Cooperate with Architect/Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials and work procedures with requirements of Contract Documents.
- C. Promptly notify Architect/Engineer and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test and inspection; one copy each to Owner, Contractor and Engineer, and two copies to Architect/Engineer and City Building Inspector. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.

5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Interpretation of test results, when requested by Architect/Engineer.

E. Perform additional tests as required by Architect/Engineer of the Owner.

1.5 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.
4. Stop the Work.

1.6 CONTRACTOR'S RESPONSIBILITIES

A. Schedule all testing with laboratories.

B. Cooperate with laboratory personnel, provide access to Work.

C. Furnish copies of Products tests reports as required.

D. Furnish incidental labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the Project site.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

E. Notify Architect/Engineer and Laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

F. Payment for all retesting required because of non-conforming work of materials and for calls for inspection when work is not ready for testing.

1.7 SCHEDULE OF INSPECTIONS AND TESTS

A. Section 02200 – Earthwork (refer to Specifications)

1. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698.
2. Frequency of Tests: Field density tests should be taken as each lift of fill material is placed. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of two tests per lift should be required.

B. Section 03200 – Concrete Reinforcement

1. Prior to each concrete pour, inspect reinforcing sizes, bending of bars, quantities, spacing, placement, clearance of reinforcing from forms and tying in accordance with the Contract Documents and ACI 315.

2. Inspect support and securement of reinforcing.
3. Inspect condition of reinforcing.
4. Prior to each concrete pour, inspect positioning of steel inserts and assemblies, sizes and spacing of reinforcement and inspect fusion-welded anchors and sheer connectors.

C. Section 03300 – Cast-In-Place Concrete (Building)

1. Sample Cylinders: During the progress of the work, test cylinders shall be made from each different mix. Four compression test cylinders will be taken during the pour for every pour of 100 cubic yards or part thereof. One tested at 7 days, two tested at 28 days, and one retained in reserve for further testing.
2. Make a slump test in accordance with ASTM C-143 slump shall be a minimum of 4 inches to a maximum of 6 inches for each 60 cubic yards, or portion thereof, of concrete placed.
3. If tests of concrete do not meet the specified strength, coring shall be required. All coring shall be at the Contractor's expense.
4. Testing and coring shall be in compliance with ACI, Section 301.
5. Mix design: The Contractor shall submit a concrete mix design for approval.

D. Section 03310 - Cast-In-Place Concrete

1. Sample Cylinders: During the progress of the work, test cylinders shall be made from each different mix. Four compression test cylinders will be taken during the pour for every pour of 100 cubic yards or part thereof. One tested at 7 days, two tested at 28 days, and one retained in reserve for further testing.
2. Make a slump test in accordance with ASTM C-143 slump shall be a minimum of 4 inches to a maximum of 6 inches for each 60 cubic yards, or portion thereof, of concrete placed.
3. If tests of concrete do not meet the specified strength, coring shall be required. All coring shall be at the Contractor's expense.
4. Testing and coring shall be in compliance with ACI, Section 301.
5. Mix design: The Contractor shall submit a concrete mix design for approval.

E. Section 03361 – Pneumatically Placed Concrete for Swimming Pools

1. Sample Cylinders: During the progress of the work, test cylinders shall be made from each different mix. Four compression test cylinders will be taken during the pour for every pour of 100 cubic yards or part thereof. One tested at 7 days, two tested at 28 days, and one retained in reserve for further testing. Test beams may be required in lieu of cylinders. Provide method and quantity as directed by geotechnical engineer.
2. Make a slump test in accordance with ASTM C-143 slump shall be a minimum of 4 inches to a maximum of 6 inches for each 60 cubic yards, or portion thereof, of concrete placed.
3. If tests of concrete do not meet the specified strength, coring shall be required. All coring shall be at the Contractor's expense.
4. Testing and coring shall be in compliance with ACI, Section 301.
5. Mix design: The Contractor shall submit a concrete mix design for approval.

END OF SECTION 01410

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.02 SECTION INCLUDES

- A. Security
- B. Protection of Completed Work
- C. Water Control
- D. Use of Site
- E. Temporary Controls
- F. Project Identification and Signs
- G. Field Offices and Sheds
- H. Removal of Utilities
- I. Fire Protection
- J. Protection of Trees and Vegetation
- K. Traffic Control

1.3 SECURITY

- A. A night watchman is not a requirement. However, protection of the property at all times is the responsibility of the Contractor, as well as replacement of any loss due to thieves or damage by vandals.

1.4 PROTECTION OF COMPLETED WORK -DAMAGED ITEMS

- A. The Contractor shall be fully responsible for the protection of all items, finishes, etc., from the time they are delivered to or installed in the Work, until finished work is turned over to the Owner. Whenever such items, finishes, etc., are damaged, they shall be completely replaced, including all required removal work, patching, repairing, refinishing, and reinstallation as required to turn item over to Owner in new condition.

1.5 WATER CONTROL

- A. Provide pumps, piping, fittings, hose, trenching, sumps, etc., as required to control and remove surface and subsurface water from excavation and the site. Dispose of water in accordance with E.P.A. storm water management for construction activities #482N.

1.6 USE OF SITE

- A. The Contractor will be responsible for protection of the Owner's property, including all adjacent structures, trees and shrubs.
- B. Temporary toilets may be located in the construction area.
- C. The extent of the construction site shall be enclosed by a temporary eight foot (8') tall chain link fence. Provide gates with locks as required for access. If shown on the Drawings the layout for all construction fences is diagrammatic. Exact routing is the responsibility of the Contractor. The Contractor may use whatever space is available within the fenced area, and not required for construction, for job offices, tool storage, vehicle parking, etc. Preserve existing trees. All other storage parking etc. requirements of the Contractor or subcontractor must be located in the area delineated in the plans or off the site.
- D. Prior to construction, inspect all areas of the site to be used including adjacent landscaping and irrigation, etc and prepare a photographic record of the conditions. As a part of the Work of this contract the site will be restored to its previous condition. All damaged in the proximity of the construction area, not represented by the photographic survey shall be repaired to "like new condition."

1.7 TEMPORARY CONTROLS

- A. Temporary Services and Utilities:
 - 1. Owner shall pay for utilities and water for the project during the construction period. Contractor to arrange and pay for all other services and utilities required and all deposits therefore, including but not limited to telephone, service, during the construction period.
 - 2. Provide and maintain in a neat and sanitary condition such toilet accommodations for use of employees as may be necessary to comply with requirements and regulations of the City and State Department of Health, or other "authorities" having jurisdiction. Permanent toilets within adjacent buildings shall not be used by employees. Maintain temporary toilet facilities on the site until final acceptance of Work, unless permission is given by the Architect/Engineer for earlier removal.
 - 3. Contractor shall coordinate for temporary electrical service and pay all costs.
 - 4. Contractor to use all water through City water meter and pay all installation costs.
 - 5. Water will be free for construction use. Contractor shall not waste or let water run.
- B. Temporary Heat: Provide and maintain heat as required for the work during and throughout the entire period of construction to protect all work, materials and equipment against injuries. The permanent heating system may be utilized for this purpose if the building is completely enclosed. However, if so utilized, the Contractor shall.
 - 1. Obtain the written permission from the Mechanical Contractor for the use of heating equipment in building.
 - 2. Pay for all charges in conjunction with repairs or replacement to heating equipment and devices during use of such equipment in order that heating equipment is turned over to the Owner in first class operation and equal to new condition.
 - 3. Pay for all utility bills and services required for the use of this equipment.

- C. Temporary Hoists: The General Contractor shall furnish, install and operate all temporary hoists as his needs may require; shall erect temporary stairs as may be required for his operations and shall erect and maintain suitable handrails and toeboards around all openings in floors and roofs and wherever else required for proper safety precautions. All of the foregoing requirements of the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America.

1.8 PROJECT IDENTIFICATION AND SIGNS

- A. No signs or advertising of any kind will be permitted without the approval of the Owner.
- B. Project signs or other signs or advertising of any kind will not be permitted.

1.9 FIELD OFFICES AND SHEDS

- A. Provide a suitable office with telephone, fax, and email throughout construction. Keep an approved set of Drawings and Project Manual, including revisions, approved shop drawings, and samples on job at all times.

1.10 REMOVAL OF UTILITIES

- A. Should active piping or conduit be encountered below grade within the construction site and be found at variance with the known conditions indicated by the Drawings and Specifications, relocate piping or conduit as directed by the Architect/Engineer. Provide temporary support of active piping and conduit encountered in the excavations until permanent support or removed is accomplished. Cut off, and cap or plug abandoned lines at least 3 feet outside the building lines. In all cases, conform to the applicable requirements of the locality or governing agency.

1.11 FIRE PROTECTION

- A. All contractors and subcontractors shall observe and the General Contractor shall enforce throughout the work, during the whole period of construction all requirements of the City, State and Insurance Authorities, to minimize the fire hazards during the progress of the work. In addition, the General Contractor shall post signs and warnings and insure the following requirements are met:
 - 1. Combustible refuse shall be removed from the building daily.
 - 2. Storage of materials inside the building shall be restricted to fireproof areas with no-smoking signs posted.
 - 3. No oils, gasoline or other volatile liquids shall be stored inside the building.
 - 4. No bitumen kettles shall be operated inside the building.
 - 5. Space heaters and other types of heaters shall be set on incombustible flooring only. Building refuse shall not be burned in salamanders. Heaters shall not be placed closer than 15 feet to any combustible hanging or eight feet to a combustible partition or ceiling.
 - 6. Tarpaulins shall be flame proofed and when in use, securely braced and tied.
 - 7. Provide metal canisters with covers for storage of paint contaminated and oil waste materials.
 - 8. During all welding operations, a safety man with a fire extinguisher shall be on hand at all times to control any fire that may result from welding operations.
 - 9. The General Contractor shall provide fire extinguishers within 75 feet of any point of the area under construction. In addition, the General Contractor shall also provide one fire extinguisher outside each paint storage room and every other storage room where combustible materials are stored and in each field office.

10. Burning of trash and excess materials on the premises is prohibited. No fires, including roofer's kettles, will be permitted within 40 feet of the buildings, sheds, shrubs or other material subject to fire, heat or smoke damage. The Contractor shall be solely responsible for any loss resulting from any fires.

1.12 PROTECTION OF TREES AND VEGETATION

- A. The Contractor shall be fully responsible for the protection of all trees and vegetation to remain and/or not in the footprint of the designed facility. The Contractor's failure to comply with the following will cause for the Owner to shut the project down at the Contractor's expense:
 1. Contractor will be required to install (and maintain throughout construction) protective fencing at least 10' outside the drip line of all trees to remain.
 2. Parking vehicles under trees will not be permitted. The Contractor will be fined \$100.00 for each violation, which will be deducted from the contract amount by Change Order.
 3. All branches that interfere with construction activity shall be temporarily tied back to prevent damage. Branch removal is permitted only as approved by the Architect/Engineer.
 4. Tree damage will be assessed from the International Shade Tree Conference formula, D (diameter of tree measured 12" above ground) $\times 0.7854 \times \$36.00$. Total damages will be deducted from the contract amount by Change Order.
 5. Trenching for utilities in wooded areas must be staked and approved by Owner prior to construction. The Owner reserves the right to adjust line locations to avoid damage to existing trees.
 6. Where plans call for disturbance of the root system of existing trees, roots must be pruned (by machine manufactured for that purpose) prior to any other construction activity. Immediately after excavation, exposed roots must be immediately covered with a finely shredded mulch and kept moist until backfilling is complete.

1.13 TRAFFIC CONTROL

- A. Prior to installation of the drive approach(es) or other improvement or alteration of public street, the contractor shall submit to the City or County having jurisdiction for review and approval, a traffic control plan that complies with their requirements. Contractor shall erect, maintain and remove such traffic controls as required by the authority having jurisdiction.

END OF SECTION 01500

SECTION 01580 - PROJECT SIGNS (BY OWNER-NOT IN CONTRACT)

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain project identification sign.
- B. Provide temporary on-site informational signs to identity key elements of construction facilities.
- C. Remove signs on completion of construction.
- D. Allow no other signs to be displayed without owner's permission.

1.2 PROJECT IDENTIFICATION SIGN

- A. One painted sign of size, lettering, and construction shown on the plans. Locate on site as directed by Owner (Architect/Engineer will provide a jpeg for fabricator's use).
- B. Refer to C-Sheets for sign layout and construction detailing.

1.3 INFORMATIONAL SIGNS

- A. Painted signs with painted lettering, or standard products.
 - 1. Size of signs and lettering: as required by regulatory agencies or as appropriate to usage.
 - 2. Colors: As required by regulatory agencies, otherwise of uniform colors throughout Project.
- B. Erect at appropriate locations to provide required information.

1.4 QUALITY ASSURANCE

- A. Sign painter: Professional experience in type of work required.
- B. Finishes and Painting: Adequate to resist weathering and fading for scheduled construction period.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS

- A. Structure and Framing: New, wood or metal, in sound condition, structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
 - 1. Thickness: 3/4" exterior grade ND face veneers.
- C. Paint: Exterior quality, *[as specified in Section 09910]*.
 - 1. Use Bulletin colors for graphics.

2. Colors for structure, framing, sign surfaces and graphics: as selected by Architect/Engineer.

PART 3 - EXECUTION

3.1 PROJECT IDENTIFICATION SIGN

- A. Paint exposed supports, framing and surface material; one coat of primer and two coats of exterior paint.
- B. Paint graphics in styles, sizes and colors as selected.

3.2 INFORMATIONAL SIGNS

- A. Paint exposed surfaces; one coat primer and one coat of exterior paint.
- B. Paint graphics in styles, sizes and colors as selected.
- C. Install at a height for optimum visibility, on ground-mounted poles or attached to temporary structural surfaces.

3.3 MAINTENANCE

- A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing or sign.
- B. Relocate informational signs as required by the progress of the Work.

3.4 REMOVAL

- A. Remove signs, framing, supports and foundations at completion of Project.

END OF SECTION 01580

SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Products
- B. Transportation and Handling, Storage and Protection
- C. Substitutions
- D. Manufacturer's Directions
- E. Color Schedule

1.3 PRODUCTS

- A. Products include new material, machinery, components, equipment, fixtures, and systems forming the Work, but do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.

1.4 TRANSPORTATION AND HANDLING

- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.
- B. Materials shall be new, delivered and stored in authorized locations in unopened containers and in ample quantity to prevent delay. Ordering of materials shall be made well in advance so as not to hinder the progress of work. Grade marks, labels, etc. shall be kept readable.

1.5 SUBSTITUTIONS

- A. The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
- B. The details on the Drawings and the requirements of the Specifications shall be based on the first listed materials, products or equipment in the Contract Documents. All other products will be considered substitutions. If the Contractor desires to use any of the other listed materials, products or equipment other than that listed first or if the Contractor substitutes a material, product or equipment, the Contractor alone shall be responsible for the correct function, operation and accommodation of the other materials, products or equipment into the spaces allotted on the Drawings.
- C. The "listing" of a manufacturer does not imply "acceptance" or "approval" of any standard product of that manufacturer.
- D. Limitations of Substitutions:

1. Substitutions will not be considered when indicated or implied on shop drawings or product data submittals by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.
 2. Substitute product shall not be ordered or installed without written acceptance.
 3. Only one request for substitution for each product will be considered. If substitution is not accepted, Contractor shall provide specified product.
 4. Architect/Engineer will determine acceptability of substitutions and the Architect/Engineer's decision of approval or disapproval of a requested substitution shall be final.
 5. All proposed substitutions shall be submitted to the Architect/Engineer for approval prior to bid opening.
- E. Whenever, in any of the Contract Documents, any material, product or equipment is defined through the use of any federal association or other standard specification, the Contractor shall present satisfactory evidence of compliance with the particular specification for the material, product or equipment he proposes to furnish.
- F. Request for Substitution Submittal Procedures:
1. No substitution will be considered unless three copies are submitted on General Contractor's Request for Substitution Form (see Section 01630-3 and 01630-4).
 2. Request for Substitution during the bidding period:
 - a. Substitutions shall be submitted to the Architect/Engineer at least ten days prior to the date for receipt of bids by the General Contractor.
 - b. If the Architect/Engineer approves a proposed substitution prior to receipt of bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
 3. Request for Substitution after award of contract:
 - a. Substitutions shall be submitted to the Architect/Engineer within at least 30 (thirty) calendar days after the award of contract. No substitutions will be considered after that time and the Contractor must provide the specified product.

1.6 MANUFACTURER'S DIRECTIONS

- A. All manufactured articles, material, appliance and equipment shall be delivered, stored, applied, installed, connected, erected, used, cleaned, conditioned and placed in operation, as directed by the respective manufacturers, insofar as these directions are applicable to this particular project and are not in conflict with superior requirements in the Specifications or requirements of applicable Building Codes.

1.7 COLOR SCHEDULE

- A. After receipt of all submittals requiring a color selection, the Architect/Engineer will prepare a Color Schedule, listing each product with the colors, patterns and textures selected, and where color changes occur.
- B. From the date of receiving all submittals requiring a color selection, the Architect/Engineer shall have three (3) weeks to prepare the schedule.
- C. After Owner approval, the Architect/Engineer shall issue the Color Schedule to the Contractor.
- D. No color selections shall be made until the issuance of the Color Schedule.

END OF SECTION 01600

SECTION 01610 - HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Articles and portions of articles of the Division 1 not amended, supplemented or superseded by the Standard Form of Agreement shall remain in effect.

1.2 SECTION INCLUDES

- A. Documentation of exclusion of Hazardous Materials from the Work, including Asbestos Containing Materials (ACM's) and lead in conjunction with potable water system.
- B. Related Sections:
 - 1. Section 01600 - Materials and Equipment.
 - 2. Section 01700 - Project Closeout.

1.3 REQUIREMENTS

- A. As a condition of Final Payment, the Contractor shall submit to the Architect/Engineer a written and notarized statement certifying that all materials used in the construction of this Project contain less than 0.10 percent by weight of asbestos and for which it can be demonstrated that, under reasonably foreseeable job site conditions, will not release asbestos fibers in excess of 0.1 fibers per cubic centimeter. Certification letter shall be dated, shall reference this specific Project, and shall be signed by not less than two officers of the construction company. If the Architect/Engineer has inadvertently specified an ACM not meeting this condition for use on this Work, it shall be the sole responsibility of the Contractor to discover and to bring to the attention of the Architect/Engineer any such conflict in the intent of the Contract Documents.
 - 1. The manner of resolution of such a conflict shall be handled as either a Field Order or as a Change Order, as proves appropriate and fair in the sole judgment of the Architect/Engineer, whose opinion on this matter shall be final.
 - 2. Accreditation by the State of Florida or by EPA shall be required of the inspector representing the Contractor on this matter.
- B. The Contractor's statement required by this section shall specifically warrant against the installation of any of the following during the course of Work.
 - 1. Any friable ACM;
 - 2. Any friable suspected ACM;
 - 3. Any nonfriable ACM that is newly friable; and/or
 - 4. Any thermal system insulation ACM.
- C. The Contractor's statement required by this section shall include the following information.
 - 1. Name of accredited inspector.
 - 2. Signature of accredited inspector.
 - 3. Date of the inspection performed for this purpose.
- D. Contractor shall submit to the Architect/Engineer a letter addressed to the Owner certifying that all materials used in conjunction with potable water systems contain no lead. Certification letter shall be dated, shall reference this specific project, and shall be signed by not less than two officers of the construction company.

END OF SECTION 01610

SECTION 01630 - SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Furnish and install products specified, under conditions for options and substitutions stated in this Section.

1.2 PRODUCTS LIST

- A. Within 30 days after award of Contract, submit to Architect/Engineer six copies of complete list of major Products which are proposed for installation.
- B. Tabulate Products by Specification Section number and title.
- C. For products specified only by reference standards, list for each such Product:
 - 1. Name and address of manufacturer.
 - 2. Trade name.
 - 3. Model or catalogue designation.
 - 4. Manufacturer's data:
 - a. Reference standards.
 - b. Performance test data.

1.3 CONTRACTOR'S OPTIONS

- A. For Products specified only by reference standard, select Product meeting that standard, by any manufacturer.
- B. For Products specified by naming several Products or manufacturers, select anyone of products and manufacturers named which complies with Specifications.
- C. For Products specified by naming only one Product and manufacturer, there is no option and no substitution will be allowed (unless substitution is approved prior to bid opening).

1.4 SUBSTITUTION PROCEDURE

- A. Prior to the Bid Date: Architect/Engineer will consider substitutions only as specified in Section 01600.
- B. After the Bid Date: Architect/Engineer will consider formal written requests from Contractor for substitution of products in place of those specified only when submitted in accordance with the requirements of this Section. One or more of the following conditions must be documented.
 - 1. The substitution must be required for compliance with final interpretation of code requirements or insurance regulations.
 - 2. The substitution must be due to the unavailability of the specified products, through no fault of the Contractor. Long delivery period will not qualify as unavailability.
 - 3. The substitution may be requested when subsequent information discloses the inability of the specified products to perform properly or to fit in the designated space.
 - 4. The substitution may be due to the manufacturer's or fabricator's refusal to certify or guarantee performance of the specified product as required.

5. The substitution may be requested when it is clearly seen, in the judgement of the Architect/Engineer that a substitution would be substantially to the Owner's best interests in terms of cost, time or other considerations.
- C. Submit a separate request for each substitution on a copy of the request form attached to this section. Support each request with:
1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature;
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which product has been used, and date of each installation.
 2. Itemized comparison of the proposed substitution with product specified; list significant variations.
 3. Data relating to changes in construction schedule.
 4. Any effect of substitution on separate contracts.
 5. List of changes required in other work or Products.
 6. Accurate cost data comparing proposed substitution with product specified.
 - a. Amount of any net change to Contract Sum.
 7. Designation of required license fees or royalties.
 8. Designation of availability of maintenance services, sources of replacement materials.
- D. Substitutions will not be considered for acceptance when:
1. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor.
 2. They are requested directly by a subcontractor or supplier.
 3. Acceptance will require substantial revision of Contract Documents.
- E. Substitute products shall not be ordered or installed without written acceptance of Architect/Engineer and Owner.
- F. Architect/Engineer and Owner will determine acceptability of proposed substitutions within ten (10) days of receiving request. All requests shall be submitted as instructed in Section 01600, Paragraph 1.5.

1.5 CONTRACTOR'S REPRESENTATION

- A. In making formal request for substitution Contractor represents that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitution as for product specified.
 3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent, unless otherwise directed by the Architect, Engineer, and Owner.
 5. Cost data is complete and includes related costs under his Contract, but not:
 - a. Costs under separate contracts.
 - b. Architect/Engineer's costs for redesign or revision of Contract Documents.
 6. He will reimburse the Owner separately for fees paid to the Architect/Engineer for redesign, revision of Contract Documents, and review of each substitution request.

1.6 ARCHITECT/ENGINEER'S DUTIES

- A. Review Contractor's requests for substitutions within ten (10) days of receiving request. All requests shall be submitted as instructed in Section 01600, Paragraph 1.5.
- B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

END OF SECTION 01630 – See Attached General Contractor's Request for Substitution

GENERAL CONTRACTOR'S REQUEST FOR SUBSTITUTION

Request No. _____ Date _____

Project Name: _____

Project Name: _____

Contractor Name and Address: _____

Hereby requests approval of the following product or system as an "approved substitution."

Specification Section No. _____ Page(s) _____ Paragraph _____

Drawing No (s). _____ Detail or Section No (s). _____

USE SEPARATE FORM FOR EACH SUBMITTAL

Name and description of submittal for substitutions.

Manufacturer: _____

Address: _____

Telephone: _____

Vendor: _____

Address: _____

Telephone: _____

Are maintenance services and replacement parts available through vendor? _____

Differences between proposed substitution and specified item? _____

For finish materials and prefinished equipment, list the colors available for the proposed substitution: _____

Manufacturer's guarantees of the proposed and specified items are:

☐ Same

☐ Different Explain differences on an attachment.

Reason for not giving priority to specified item:

Substitution affects other material or systems: ☐ No ☐ Yes (If yes, attach complete data.)

Enclosed data is (with specific marks related to substitution):

☐ Catalog ☐ Drawings ☐ Sample ☐ Tests ☐ Reports

☐ Other _____

List items or elements that are the same as the specified item.

Attach list of similar projects using the product attachment. Include Owner, and Owner's representative to contact.

State effects of substitution on construction schedule, and changes in other work or project.

What license fees or royalties are required?

The undersigned states that the function, appearance, quality and results are equivalent or superior to the specified items and that Substantial Completion will not be affected.

Submitted by:

Contractor's Signature

Firm

Address

Telephone

Date

Owner's Signature: _____

For the Design Professional

☐ Accepted ☐ Accepted as noted

☐ Not accepted ☐ Received late

By: _____

Date: _____

Remarks: _____

SECTION 01700 - 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. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Section 01100 "Summary" for limits on use of Project site.
 - 2. Section 01330 "Submittal Procedures" for submitting surveys.
 - 3. Section 01770 "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 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit two copies signed by land surveyor.
- F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5

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.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch 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.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or 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.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction 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.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: 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; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. 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 Owner 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. 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.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01310 "Project Management and Coordination."
- E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

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 limits on use of Project site.
 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 7. 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 rim 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. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Engage a land surveyor to 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 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
 - F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
 - G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
 - H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 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.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
 - I. 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.
 - J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, 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 in-place 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. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place 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.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."

- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
 - G. Cutting: Cut in-place 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 neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. 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 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.
 - H. 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 practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical 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 minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 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 in-place 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate 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 in-place 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 and ensures thermal and moisture integrity of building enclosure.
 - I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
- 3.7 OWNER-INSTALLED PRODUCTS
- A. Site Access: Provide access to Project site for Owner's construction personnel.
 - B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 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 personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. 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 waste materials more than seven days during normal weather or three 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.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- 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 in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."
- H. 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.
- I. 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.
- J. 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.

3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

- 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: Comply with qualification requirements in Section 01400 "Quality Requirements."

3.10 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.

END OF SECTION 01700

- 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: Comply with qualification requirements in Section 01400 "Quality Requirements."

3.10 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.

END OF SECTION 01700

SECTION 01740 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section "Project Closeout."
 - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions-2 through -16.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. 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, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- 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 Contract Documents. 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: Written 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, nor shall warranty periods be interpreted as limitations on 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 selections to products with warranties not in conflict with requirements of the Contract Documents.

- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- F. Provide a general warranty in addition to specific warranties for a duration of one year beyond Substantial Completion.

1.5 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 fifteen days of completion of that designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties.
- C. Refer to individual Sections of Divisions-2 through -16 for specific content requirements, and particular requirements for submittal of special warranties.
- D. Form of Submittal: At Final Completion compile two copies of each required warranty and bond 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.
- E. 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" 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 the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.
 - 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION (not applicable)

END OF SECTION 01740

SECTION 01770 - 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01322 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 01700 "Execution Requirements" for progress cleaning of Project site.
 - 3. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction

- photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 5. Submit test/adjust/balance records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. 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, 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.
 2. Results of completed inspection will form the basis of requirements for final completion.
- 1.7 FINAL COMPLETION PROCEDURES
- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01290 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. 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.

a. The Contractor will compensate the Architect at a rate of \$95.00 per hour per person to review any outstanding Report item more than one time. Compensation will be made to the Architect by Change Order to the Contract Sum (credit in the amount of the Architect's charges). To prevent this compensation, the Contractor is advised not to request the Final Completion Report until each item in the Substantial Completion Report and previous or subsequent Field Visit Reports has been carefully verified to be completed.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: 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. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first.
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.
4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: 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, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 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 Project Manual.

1. Bind warranties and bonds in heavy-duty, three-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.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling

navigation to each item. Provide bookmarked table of contents at beginning of document.

- 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 FINAL CLEANING

- A. General: Perform 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 designated 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. 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

- 1) Clean HVAC system in compliance with NADCA Standard 1992-01.
Provide written report on completion of cleaning.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
 - C. Pest Control: Comply with pest control requirements in Section 01500 "Temporary Facilities and Controls." Prepare written report.
 - D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."
- 3.2 REPAIR OF THE WORK
- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
 - B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770

SECTION 01781 – 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01700 "Execution Requirements" for final property survey.
 - 2. Section 01770 "Closeout Procedures" for general closeout procedures.
 - 3. Section 01782 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT 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:
 - 1) Submit PDF electronic files of scanned record prints and one of file prints.
 - 2) Submit record digital data files and one set of plots.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
 - c. Final Submittal:
 - 1) Submit record digital data files and three sets of record digital data file plots.
 - 2) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
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 provide information for preparation of corresponding 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 acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 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 and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 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 Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software 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 digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01330 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.

- 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. Format: Annotated PDF electronic file with comment function enabled.
 - 3. Record Digital Data Files: Organize digital data 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 digital data file.
 - 4. 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.
- B. Format: Submit record Specifications as annotated PDF electronic file.

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.
- B. Format: Submit record Product Data as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

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.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

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 revisions to project record documents as they occur; do not wait until 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 01781

SECTION 01782 – 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. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 01330 "Submittal Procedures" for submitting copies of submittals 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 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of

Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. 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 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- 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: 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 and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. 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.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-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, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. 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 storage media 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 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.

4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 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. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has 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. Use designations for products indicated on Contract Documents.
 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.

2.5 PRODUCT MAINTENANCE MANUALS

- 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 and drawing or schedule designation or identifier where applicable.
- 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.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- 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 and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 1. Standard 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 video recording, 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. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. 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.
- E. 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.
- F. 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 Section 01781 "Project Record Documents."
- G. Comply with Section 01770 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

DIVISION 2 – SITEWORK

SECTION 02100 - SITE PREPARATION/TREE PROTECTION FENCING

PART 1 - GENERAL

- 1.1 SCOPE: Work in this section includes furnishing all labor, materials, equipment, and services required for clearing and grubbing, minor demolition, removal and disposal of items as specified herein and on the plans.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 02200 - Earthwork.
 - B. Existing Conditions, Removal and Demolition Items, and Grading Plan: Refer to plan sheets.

PART 2 - PRODUCTS

- 2.1 No products are required to execute this work, except as the Contractor may deem necessary.

PART 3 - EXECUTION

- 3.1 CLEARING AND GRUBBING:
 - A. Clearing and grubbing shall consist of removing all natural and artificial objectionable materials from the project site or from limited areas of construction specified within the site.
 - B. In general, clearing and grubbing shall be performed in advance of grading and earthwork operations and shall be performed over the entire area of earthwork operations.
 - C. Unless otherwise specified on the plans, all trees and shrubs of three (3") inches caliper and less (caliper is the diameter as measured twelve (12") inches above the ground) and all scrub growth, such as cactus, yucca, vines, and shrub thickets, shall be cleared. All dead trees, logs, stumps, rubbish of any nature, and other surface debris shall also be cleared.
 - D. Buried material such as logs, stumps, roots of downed trees that are greater than one and one-half (1-1/2") inches in diameters, matted roots, rubbish, and foreign debris shall be grubbed and removed to a minimum depth of twenty-four (24") inches below proposed finished grades.
 - E. Ground covers of weeds, grass, and other herbaceous vegetation shall be removed prior to stripping and stockpiling topsoil from areas of earthwork operations. Such removal shall be accomplished by "blading" off the uppermost layers of sod or root-matted soil for removal.
- 3.2 TREES AND SHRUBS TO BE PRESERVED AND PROTECTED:
 - A. Unless otherwise specified on the plans, trees and shrubs with calipers greater than three (3") inches shall not be cleared (removed) provided that both of the following conditions are met:
 - 1. The vegetation exists in an area that is not proposed for pavement, a structure, or the playing bounds of an athletic field.
 - 2. The vegetation is in an area where the cut or fill does not exceed six (6") inches.

- B. The Owner will assist the Contractor in identifying trees that are to be saved from clearing. The Contractor will protect such trees from construction damage such as trunk impacts and scrapes, limb breakage, compaction of soil within the drip line, and other injurious construction activities.
 - 1. If necessary, the Owner may direct the Contractor, at the Contractor's expense, to erect protective stockades along the drip lines of trees that the Owner considers vulnerable to damage. Such stockades shall be of eight (8') foot long x six (6") inch diameter posts vertically buried three (3') feet deep at six (6') foot intervals along the drip line.
- C. Where grading or clearing and grubbing operations are to occur between trees that are to be preserved and protected, the Contractor will prune the lower branches of these trees as necessary to prevent their breakage and to permit access by construction machinery. Branches will be cut off to the trunk or major limb in a workmanlike manner. The Architect/Engineer may direct that the Contractor remove additional branches in such a manner that the tree presents a balanced appearance. Scars will be treated with a heavy coat of an approved tree sealant.

3.3 PAVEMENT REMOVAL:

- A. Bituminous and concrete pavements shall be removed to neatly sawed edges. Saw cuts shall be made to a minimum depth of two (2") inches. If a saw cut in concrete pavement falls within three (3') feet of an existing score joint, construction joint, saw joint, cold joint, expansion joint, or edge, the concrete shall be removed to that joint or edge. All saw cuts shall be parallel and/or perpendicular to the line of existing pavement. If an edge of a cut is damaged subsequent to saw cutting, the concrete shall again be sawed to a neat, straight line for the purpose of removing the damaged area.
- B. Concrete curb and gutter shall be removed as specified above. No section to be replaced shall be smaller than thirty (30") inches in length or width.

3.4 UTILITIES REMOVAL: In general, those utilities on the site that are to be removed or abandoned and that belong to the Owner shall be removed or abandoned by the Contractor. The Owner is responsible for arranging the relocation or removal of other utilities owned by utility companies or other parties.

3.5 MISCELLANEOUS DEMOLITION: There may be certain items on the site such as old building foundations, fences and other undetermined structures and improvements that must be removed before construction can commence. Unless otherwise specified, such items become the property of the Contractor for subsequent disposal.

3.6 USE OF EXPLOSIVES: The use of explosives will not be permitted in site preparation operations unless specifically permitted by the Owner in writing.

3.7 BACKFILLING: All holes, cavities, and depressions in the ground caused by site preparation operations will be backfilled and tamped to normal compaction and will be graded to prevent ponding of water and to promote drainage. In areas that are to be immediately excavated, the Architect/Engineer may permit holes, etc., to remain open.

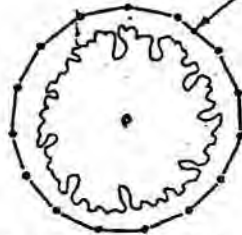
3.8 DISPOSAL OF WASTE MATERIALS:

- A. Unless otherwise stated, materials generated by clearing, grubbing, removal, and demolition shall be known as "waste" or "spoils" and shall be removed from the site and disposed of by the Contractor. Similar materials may be unearthed or generated by earthwork operations or by the drilling of piers. Unless otherwise specified any merchantable items become the property of the Contractor.

- B. In certain cases, the Owner or Architect/Engineer may grant special permission for the Contractor to dispose of certain “wastes” or “spoils” by deep burial on the site. Such material would be buried in an approved area; would not be organic, biodegradable, or crushable; and would be buried in lifts or layers with soil thoroughly compacted around and over the material. A minimum of thirty (30”) inches of cover would be required over the burial site.

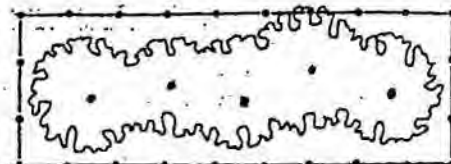
END OF SECTION 02100

TYPICAL TREE PROTECTION FENCING



TREE IN OPEN AREAS W/GRASS OR PLANTING

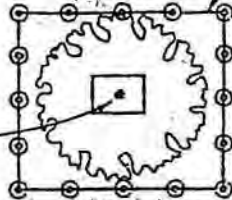
SITUATION "A"



STEEL DRIVE IN POST AND NON-CLIMB FENCE PAST DRIP LINE OF ALL TREES.
POSTS TO BE APPROX. 8' O.C.
SEVERAL TREES IN OPEN AREAS W/GRASS OR PLANTS

SITUATION "B"

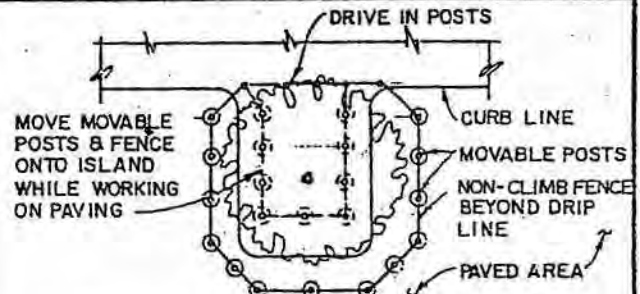
OPENING IN
PAVEMENT
AROUND
TREES



TREE IN CONCRETE OR PAVED AREAS

SITUATION "C"

MOVABLE STEEL
POSTS WITH NON-
CLIMB FENCE PAST
DRIP LINE. FENCE
MAY BE ROUND AS
INDICATED IN
SITUATION "A".
POSTS TO BE
APPROX. 8' O.C.



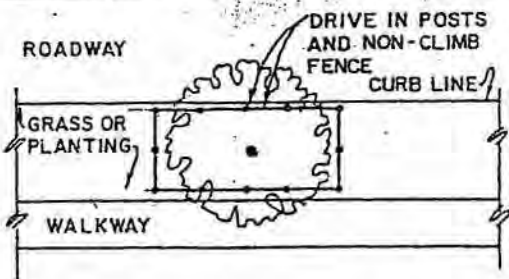
TREE IN A TRAFFIC ISLAND OR PROJECTION

SITUATION "D"

ROADWAY

GRASS OR
PLANTING

WALKWAY



TREE BETWEEN WALK AND ROAD

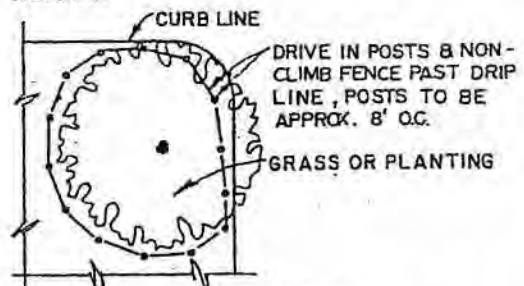
SITUATION "E"

ROADWAY

CURB LINE

DRIVE IN POSTS & NON-
CLIMB FENCE PAST DRIP
LINE, POSTS TO BE
APPROX. 8' O.C.

GRASS OR PLANTING



TREE IN SOIL AREA IN CORNER

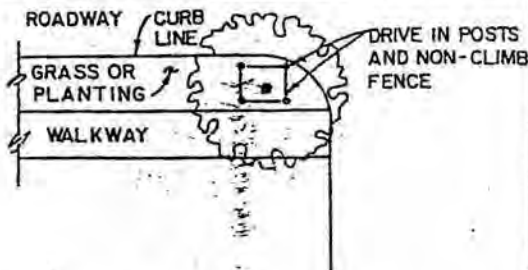
SITUATION "F"

ROADWAY

CURB LINE

GRASS OR
PLANTING

WALKWAY



SITUATION "G"

UNDER NO CONDITIONS WILL THE CONTRACTOR BE PERMITTED TO TRIM A TREE. ALL TRIMMING MUST BE DONE BY GROUNDS MAINTENANCE PERSONNEL.

FENCING & POSTS MUST AT ALL TIMES BE KEPT A MINIMUM OF 3'-0" FROM TREE TRUNK.

SEE STANDARDS SHEET FOR FENCING, FOR DETAILS OF TREE PROTECTION FENCING.

FENCING INSTALLED PAST DRIP LINE MUST BE FAR ENOUGH TO PROTECT LIMBS FROM TRUCKS AND MOVING MECHANICAL EQUIPMENT.

WHERE LOCATION OF TREE PRECLUDES ADAPTATIONS AS SHOWN AT SITUATIONS "D", "E", "F", & "G", CONTRACTOR WILL INSTALL TREE PROTECTION AS DIRECTED BY PROJECT ARCHITECT / ENGINEER.

GENERAL NOTES:

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

- 1.1 SCOPE: Work in this section includes furnishing all labor, materials, equipment, and services required to construct, shape, and finish earthwork to the required lines, grades, and cross sections as specified herein and on the plans.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 02100 - Site Preparation.
 - B. Grading Plan: Refer to plan sheets.
- 1.3 TEST REPORTS: The Owner will bear the cost of all testing requirements (unless re-testing is required) and the Testing Laboratory will submit test reports from a commercial testing laboratory as specified herein and in the Conditions of the Contract.
- 1.4 METHOD OF PAYMENT: Earthwork is a necessary and incidental part of the work. The total cost will be included in the Bid Proposal. Payment will not be made on a unit price basis or by any other separate measured payment method.

PART 2 - PRODUCTS

- 2.1 UNCLASSIFIED EXCAVATION: Unclassified excavation shall consist of all excavation, unless separately designated, within the limits of the work. Unclassified excavation includes all material encountered regardless of its nature or the manner in which it is to be excavated.
- 2.2 UNCLASSIFIED FILL:
 - A. Unclassified fill shall consist of all fill within the limits of the work. All suitable native materials removed in unclassified excavation, or similar imported materials, shall be used insofar as practicable as unclassified fill. Properly deposited, conditioned, and compacted fill is hereinafter referred to as "earth embankment."
 - B. Rock: Minor quantities of rock not greater than four (4") inches in greatest dimension are permissible in fill materials used to construct earth embankment. Minor quantities of rock of greater dimensions may be placed in the deeper fills in accordance with the State Department of Highways and Public Transportation requirements for construction of rock embankments, provided such placement of rock is not immediately adjacent to structures or piers. Also, rock may be placed in the portions of embankments outside the limits of the completed graded width where the size of the rock prohibits their incorporation in the normal embankment layers.
- 2.3 TOPSOIL: Shall be as follows:
 - A. On-Site Topsoil: Topsoil shall consist of an average depth of six (6") inches of native surface soil left in place after the ground cover of herbaceous vegetation and other objectionable matter has been cleared by "blading," as specified in Section 02100, "Site Preparation." Topsoil may be greater or less than the upper six (6") inches in depth. However, it must be removable without contamination by the subsoil or substratum or other objectionable matter that would render it as "unsuitable material" as described herein.
 - B. Imported Topsoil: In the event that there is insufficient topsoil for a full 6" layer, import clean sandy loam topsoil free of roots, rocks, and deleterious materials. Submit sample for approval.

- C. Full 6" Depth of Topsoil: All areas to receive turf grass will have a full 6" depth of replaced (new or existing) topsoil.

2.4 IMPORTED FILL:

- A. Imported fill materials shall be used for the construction of earth embankment in the event that (1) the volume of unclassified excavation is less than the volume of fill required for earth embankment and/or (2) the condition of materials removed in unclassified excavation makes them unsuitable for use in the construction of earth embankment.
- B. The Contractor shall haul and place imported fill obtained from off-site sources as necessary to construct the embankment and various other details of the construction plans. All costs related to such imported fill will be included in the contract price, and no additional or separate payment for imported fill will be due the Contractor.
- C. A sample of the proposed imported fill must be provided by the Contractor and be approved by the Architect/Engineer. In general, imported material must be equal to or better than native material in quality and engineering characteristics. The Architect/Engineer may also require the Contractor to provide a material analysis test of the proposed fill.

2.5 SELECT MATERIALS:

- A. Not Required – Refer to Geotechnical Report

2.6 UNSUITABLE MATERIALS:

- A. Topsoil, select material, imported fill, or unclassified fill will be declared as "unsuitable" by the Owner if, in his opinion, any of the following conditions or matter and particles are present to a degree that is judged detrimental to the proposed use of the material.
 - 1. Moisture.
 - 2. Decayed or undecayed vegetation.
 - 3. Hardpan clay, heavy clay, or clay balls.
 - 4. Rubbish.
 - 5. Construction rubble.
 - 6. Sand or gravel.
 - 7. Rocks, cobbles, or boulders.
 - 8. Cementious matter.
 - 9. Foreign matter of any kind.
- B. Unsuitable materials will be disposed of as "waste" as specified in Section 02100.
- C. Wet Material: If fill material is unsatisfactory for use as embankment solely because of high moisture content, the Architect/Engineer may grant the Contractor permission to process the material to reduce the moisture content to a usable optimum condition.

PART 3 - EXECUTION

- 3.1 SITE PREPARATION: In general, "site preparation," as specified in Section 02100, shall be performed in advance of grading and earthwork operations and shall be completed over the entire area of earthwork operations.
- 3.2 TOPSOIL:

- A. The removal and storage of topsoil shall occur after site preparation is complete and before excavation and embankment construction begin. Likewise, topsoil will be replaced after excavation and embankment construction are complete.
- B. Removal: Topsoil shall be stripped to an average depth of six (6") inches from areas where excavation and embankment construction are planned. Topsoil may be obtained from greater depths if it is uncontaminated by the substratum and it is of good quality in the opinion of the Architect/Engineer.
- C. Storage: Topsoil shall be stored in stockpiles conveniently located to areas that will later receive the topsoil. Stockpiles shall be out of the way of earthwork operations in locations approved by the Owner or Architect/Engineer. Stored topsoil shall be kept separate from other excavated materials and shall be protected from contamination by objectionable materials that would render it unsuitable.
- D. Timing: Topsoil will not be replaced (deposited) until construction activities are complete that would create undesirable conditions in the topsoil, such as overcompaction or contamination. Trenching for items such as electrical conduit and irrigation pressure lines must be complete before topsoil replacement may begin.
- E. Replacement: Topsoil will be deposited in a single layer or lift. It will be placed, processed, compacted, and graded to leave a finished layer of topsoil not less than six (6") inches in depth. Unless otherwise indicated, topsoil will be replaced over all areas of earthwork (including slopes), except where pavement is planned.
- F. Grading: Topsoil will be final graded to the elevations shown on the plans. Unless otherwise indicated, the final plane of compacted topsoil will be between 0.10 foot and one (1") inch below adjacent paved surfaces. Fine grading will be accomplished with a weighted spike harrow, weighted drag, tractor box blade, light maintainer, or other acceptable machinery. Grading operations and equipment will be such that topsoil does not become overcompacted. Bulldozer blades and front-end loader buckets are not acceptable devices for topsoil grading operations.
- G. Plant Bed Areas: Excavate to a depth of 12" to receive proposed soil mix.
- H. Acceptability: Finished areas of topsoil are satisfactory if they are true to grade, true in plane, even in gradient (slope), uniform in surface texture, and of normal compaction. Areas of loose granular pockets or of overcompacted soils are not acceptable and will be reworked. Finished areas will promote surface drainage and will be ready for turfgrass planting.

3.3 UNCLASSIFIED EXCAVATION:

- A. All excavated areas shall be maintained in a condition to assure proper drainage at all times, and ditches and sumps shall be constructed and maintained to avoid damage to the areas under construction.
- B. Surplus Material:
 - 1. Surplus excavation is that quantity of material that may be left over after the grading plan is executed, and all earthwork operations, including excavation, embankment construction, topsoil replacement, and final grading, are completed. Unless otherwise specified, the Contractor shall dispose of surplus material as "waste" as specified in Section 02100.

2. In certain cases, if the on-site excavation and embankment quantities are not balanced and there is a surplus of excavated material, the Architect/Engineer may permit the Contractor to "waste" the surplus by constructing additional embankment in an approved location. No additional payment for such work would be due that Contractor.

3.4 EARTH EMBANKMENT:

- A. Earth embankment is defined as embankment composed of suitable materials removed in unclassified excavation and/or imported fill. The construction of embankment includes preparing the area on which fill is to be placed and the depositing, conditioning, and compaction of fill material.
- B. General: Except as otherwise required by the plans, all embankment shall be constructed in layers approximately parallel to the finished grade of the graded area, and each layer shall be so constructed as to provide a uniform slope as shown on the grading plan. Embankments shall be constructed to correspond to the general shape of the typical sections shown on the plans, and each section of the embankment shall correspond to the detailed section or slopes established by the drawings. After completion of the graded area, embankment shall be continuously maintained to its finished section and grade until the project is accepted.
- C. Preparation: Prior to placing any embankment, all preparatory operations will have been completed on the excavation sources and areas over which the embankment is to be placed. Stump holes or other small excavations in the limits of the embankments shall be backfilled with suitable material and thoroughly tamped by approved methods before commencing embankment construction. The surface of the ground, including plowed, loosened ground, or surfaces roughened by small washes or otherwise, shall be restored to approximately its original slope by blading or other methods, and, where indicated on the plans or required by the Architect/Engineer, the ground surface, thus prepared, shall be compacted by sprinkling and rolling.
- D. Scarification: The surface of all areas and slopes over which fill is to be placed, other than rock, shall be scarified to a depth of four (4") to six (6") inches to provide a bond between the existing surface and the proposed embankment. Scarification shall be accomplished by plowing, discing, or other approved means. The material that has been loosened shall be recompact with the new embankment.
- E. Benching: Scarification is normally adequate for sloping surfaces. However, in certain cases where fill is to be placed against hillsides or existing embankment with slopes greater than four to one (4:1), the Architect/Engineer may direct the Contractor to key the fill material to the existing slopes by benching. A minimum of two (2') feet normal to the slope shall be removed and recompact to insure that the new work is constructed on a firm foundation free of loose or disturbed material.
- F. Depositing: Fill material shall be placed in horizontal layers or lifts, evenly spread, not to exceed eight (8") inches in loose depth before conditioning and compaction. Unless otherwise permitted, each layer of fill material shall cover the length and width of the area to be filled and shall be conditioned and compacted before the next higher layer of fill is placed. Adequate drainage shall be maintained at all times.
- G. Watering: At the time of compaction, the moisture content of fill material shall be such that the specified compaction will be obtained and the fill will be firm, hard, and unyielding. Fill material, which contains excessive moisture, shall not be compacted until it is dry enough to obtain the specified compaction.

- H. Compacting: Each layer of earth fill shall be compacted by approved tamping or sheepsfoot rollers, pneumatic tire rollers, or other mechanical means acceptable to the Architect/Engineer. Hand-directed compaction equipment shall be used in areas inaccessible to vehicular compactors.
- I. Grading: Embankments shall be constructed in proper sequence and at proper densities for their respective functions. All embankment serves in one capacity or another as subgrade (e.g., under topsoil, under concrete and asphalt pavement, under structures, etc.). Accordingly, the upper layer of embankment shall be graded to within plus or minus 0.10 foot of proper subgrade elevation prior to depositing topsoil, and prior to the construction of pavements, slabs, etc.

3.5 SELECT EMBANKMENT:

- A. Refer to Geo-Technical Report

3.6 DENSITY CONTROL:

- A. Backfill Placement and Compaction (Buildings, Paving, Pools): The backfill material should be placed in maximum of eight (8)-inch lifts and compacted to 95% of modified proctor maximum density to at least 1 foot below subgrade.

For additional information, refer to the Subsurface Investigation, located in Part I of the Project Manual.

- 3.7 MOISTURE MAINTENANCE: The specified moisture content shall be maintained in all embankments that are to function as subgrade for structures, areas of pavement, or for select embankment. After completion of the embankment, the Contractor shall prevent excessive loss of moisture in the embankment by sprinkling as required. Loss of moisture in excess of two (2%) percent below optimum in the top twelve (12") inches of the fill will require that the top twelve (12") inches of the embankment be scarified, wetted, and recompact prior to placement of the structure, select fill or pavement. If desired, the Contractor may place an asphalt membrane of emulsified or cutback asphalt over the completed embankment and thus eliminating the sprinkling requirement.
- 3.8 TESTING: Spot field tests of embankment densities shall be required of the Contractor by the Owner at the place and time of their choosing. Any area not meeting density control requirements shall be immediately excavated, reconstructed, and retested, at the expense of the Contractor, until satisfactory results are obtained. See Section 01410.

END OF SECTION 02200

SECTION 02220 - EXCAVATION, TRENCHING, AND BACKFILLING

PART 1 - GENERAL

- 1.1 SCOPE: The work to be performed under this section of the specifications shall consist of furnishing all labor, equipment and materials, and performing all operations in connection with the excavation, trenching, and backfilling for the installation of water, sanitary sewer, drain lines, and perforated pipe underdrains as shown on the plans and as specified herein.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
- A. Section 02630 – Polyvinyl Chloride Pipe Storm Drains.
 - B. Water Supply System – Reference the City's Standard Specifications for Public Works Construction, latest edition.
 - C. Sanitary Sewer – Reference the City's Standard Specifications for Public Works Construction, latest edition.
- 1.3 SUBMITTALS: Submit to the Engineer in conformance with the requirements of the Conditions of the Contract.

PART 2 - PRODUCTS

- 2.1 MATERIALS: No materials are required in this section.

PART 3 - EXECUTION

- 3.1 EXCAVATION:
- A. General: Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles that may obstruct the line of work and the excavation and removal of all earth, rock, or other materials to the extent necessary to install the pipe, appurtenances, and structures in conformance with the line and grades shown in the plans or as specified.
 - B. Maximum and Minimum Width of Trenches: The sides of all trenches shall be cut as nearly vertical as possible from the bottom of the trench to a point twelve (12") inches above the top of the pipe when it is laid to grade. The minimum width of trench in which the pipe may be installed shall be as shown in the plans, measured at an elevation in the trench which is twelve (12") inches above the top of the pipe when it is laid to grade.
 - 1. Whenever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher class of embedment or encasement than specified, based upon the load factors shown on the plans, and the additional cost incurred will be borne by the Contractor.
 - 2. Nothing herein shall be construed as prohibiting the Contractor from moving the upper portion of earth to a depth twelve (12") inches above the top of the pipe, in sections of the line where the cut is deep, by means of scrapers, bulldozers, or other dirt moving equipment, as a preliminary to trenching for the pipe if he elects to do so and has permission therefor from the property owner whose land will be affected. Such permission must be obtained from the property owner prior to the start of any such earth moving operations.

- C. **Sheeting and Shoring:** In caving ground, or in wet, saturated, or flowing materials, the sides of all trenches and excavation shall be adequately sheeted and braced so as to maintain the excavation free from slides or cave-ins and safe for workmen. It shall be the sole responsibility of the Contractor to conform to the requirements of Occupational Safety and Health Act of 1970.
 - 1. Sheeting and shoring shall not be left in place unless its removal is impractical, as determined by the Architect/Engineer.
- D. **Dewatering Excavation:** The Contractor shall, commencing sufficiently in advance of excavation, during the excavation period, and as long thereafter as the condition of the work may require, provide and maintain in good operating condition such equipment as may be required to prevent all water from entering any trench excavation. This shall include, but is not limited to: surface water which would drain into the excavation; seepage water which would enter the trench as a result of the excavation and a high ground water level; and the water which could penetrate the trench bottom due to the anticipated piezometric head coupled with the removal of overburden should the Contractor not lower the water table in advance of the excavation. Backfilling operations shall be completed before dewatering operations are suspended. Water removed from the excavation shall be disposed of in such a manner as to prevent damage to adjacent property or to other work under construction. Damage of whatever nature caused by dewatering the work or failure to dewater the work satisfactorily shall be promptly repaired and/or remedied by the Contractor at his own expense.
 - 1. Provision shall be made for the satisfactory disposal of water pumped from excavations so as to prevent damage to public or private property. In all cases, accumulated water in the trench shall be removed before placing embedment, laying pipe, placing any concrete or backfilling.
- E. **Subgrade in Earth:** Where a firm and stable foundation for the pipe can be obtained in the natural soil and where special embedment is not shown on the plans or specified herein, the bottom of the trench shall be carefully and accurately trimmed to fit the lower portion of the pipe barrel. Bell holes shall be excavated for each joint. The bell holes shall be accurately located and shall be of sufficient width and depth to allow ample room for making the joint and to relieve the pipe bell of all load.
 - 1. Should the excavation be carried below grade, except as herein specifically provided, the Contractor shall, at his own expense, refill it to the proper elevation with gravel or crushed stone, which shall be compacted by tamping until it is firm and unyielding.
- F. **Soft Subgrade:** If soft or spongy material is encountered in the excavation at subgrade level, after proper dewatering has been performed, it shall be removed, to such a depth that, by replacing the unsuitable material with tamped crushed stone or gravel, a firm and stable foundation can be secured.
- G. **Disposal of Excavated Materials:** Excavated material shall be piled adjacent to the work to be used for backfilling as required. Where required, desirable topsoil shall be piled separately in a careful manner and replaced in its original position.
 - 1. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of in a manner approved by the Owner.
- H. **Subgrade in Rock:** If the bottom of the excavation for the pipeline is found to be in rock or other hard material that cannot be excavated to a true subgrade and shaped to provide uniform bearing for the pipe barrel, the rock or other material shall be removed to a depth

not less than three (3") inches below subgrade and the bottom of the trench brought to true subgrade elevation by filling with gravel or suitable rock cuttings and shavings from the excavation and compacting by means of tamping until a firm and uniformly unyielding foundation is obtained.

- I. Not Used.
- J. Damage to Existing Utilities: Where existing utilities are damaged, they shall be replaced immediately with material equal to or better than the existing material. Such work shall be at the entire expense of the Contractor. The Contractor shall immediately notify the Owner of the damaged utility facility.

3.2 BACKFILLING:

- A. Backfilling shall include the refilling and consolidating of the fill in trenches and excavations up to the surrounding ground surface or road grade at crossings. Backfilling shall be done with good earth, sand, or gravel and shall be free from large rocks or hard lumpy material. No material of a perishable, spongy or otherwise unsuitable nature shall be used in backfilling.
- B. After the pipe and embedment have been placed, the method of backfilling pipe trenches shall be as follows: Select material shall first be carefully placed on both sides of the pipe simultaneously in layers of not more than four (4") inches in loose thickness, and these layers shall be firmly compacted by hand or mechanical tamping. The layers of backfill shall be sprinkled lightly with water if additional moisture is required for proper compaction. This process of filling and tamping in layers shall be continued until the backfill is brought up to the level of the pipe spring line. A sufficient amount of selected material shall then be carefully placed over the top of the pipe so that, when consolidated, the level of the select material will be not less than twelve (12") inches above the top of the pipe. Before backfilling the remainder of the trench, the select material shall be consolidated by mechanical tamping, at the option of the Contractor, to such an extent as to secure uniform consolidation.
- C. The remainder of the trench shall then be filled with suitable material obtained from the spoil bank. The earth shall then be consolidated mechanical tamping until full settlement has been reached. Mechanical tamping in six (6") inch maximum lifts should be used.
- D. Excavated material which is unsuitable for backfilling and excess material shall be disposed of in a manner approved by the Architect/Engineer.

END OF SECTION 02220

SECTION 02361 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Soil treatment with termiticide.

1.3 PERFORMANCE REQUIREMENTS

- A. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than **five** years against infestation of subterranean termites.

1.4 SUBMITTALS

- A. Product Data: For termiticide.
 - 1. Include the EPA-Registered Label for termiticide products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualification Data: For Installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.
- E. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source Limitations: Obtain termite control products through one source.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.7 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

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1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Termiticides:
 - a. Aventis Environmental Science USA LP; Termidor.
 - b. Bayer Corporation; Premise 75.
 - c. Dow AgroSciences LLC; Dursban TC
 - d. FMC Corporation, Agricultural Products Group; Talstar
 - e. Syngenta; Demon TC.

2.2 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
 - 1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

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3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 - 4. Masonry: Treat voids.
 - 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

SECTION 02580 - PAVEMENT MARKING

PART 1 - GENERAL

- 1.1 Drawings, Standard General Conditions of Contract, Supplementary Conditions and Division - 1 Specification sections, apply to work of this section.
- 1.2 DESCRIPTION:
- The work under this section consists of furnishing all labor, materials and equipment to paint stripping of new concrete paving as indicated and detailed on the drawings.
- 1.3 QUALITY ASSURANCE:
- A. Include on label of containers:
1. Manufacturer's name.
 2. Type of paint.
 3. Manufacturer's stock number.
 4. Color.
 5. Instructions for reducing, where applicable.
- 1.4 SUBMITTALS:
- A. Submit complete manufacturer's project data sheets for all paints.
- B. Prepare color/texture sample in each type of surface to be painted.
- C. Make samples not less than 12 inches square.
- D. All samples to remain at project site for reference.

PART 2 - PRODUCTS

2.1 MATERIALS

Paint for pavement marking shall be thermoplastic paint and conform to local standards, color as selected.

PART 3 - EXECUTION

3.1 METHODS OF APPLICATION

- A. Equipment: All machines, tools and equipment used in the performance of the work shall be approved by the Owner's representative and shall be maintained in satisfactory operating condition.
1. Paint Application: The equipment for applying paint to pavements shall be self-propelled or mobile drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall be capable of applying the stripe widths indicated, shall have a speed during application not less than 5 miles per hour and shall be capable of applying the paint at the coverage rate specified in paragraph APPLICATION, at an even uniform thickness with clear-cut edges. Equipment used for marking pavements shall be capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines or a combination of solid and intermittent lines using a maximum of three different colors of paint as specified.

The paint applicator shall have paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with the requirements specified. The tanks shall be equipped with suitable air-driven mechanical agitators. The spray

mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gages in full view and reach of the operator. Paint strainers shall be installed in the paint supply lines to insure freedom from residue and foreign matter that may cause malfunction of the spray guns. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

2. Sandblasting equipment shall include an air compressor, hoses and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cubic feet of air per minute at a pressure not less than 90 pounds per square inch at the nozzle for each nozzle used.

B. Surface Preparation: New concrete pavement surfaces shall be allowed to cure for a period of not less than ten days, and asphalt surfaces for thirty days before application of marking materials. All surfaces to be marked shall be thoroughly cleaned before application of the paint. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, and other coatings adhering to the pavement shall be completely removed with abrasion as directed. Where oil or grease is present on pavements to be marked, the affected areas shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser and rinsed thoroughly after application. After cleaning, the oil soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint.

C. Application:

1. Rate of Application: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.
2. Paint shall be applied to clean, dry surfaces, and only when the air and pavement temperatures are above 40° and less than 95° F. The paint temperature shall be maintained within these limits. Paint shall be applied pneumatically with approved equipment and at the rate of coverage specified herein. The Contractor shall provide guidelines and templates as necessary to control paint application.

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and so there will be no pickup, displacements, or discoloration by tires or traffic. If there is a deficiency in drying of the markings, painting operations shall be discontinued until the cause of the slow drying is determined and corrected. If discoloration of the paint occurs due to bleeding of bituminous materials, the paint should be applied in two coats. A light coat of paint should first be applied at coverage of about 35 to 40 percent of the specified coverage. After drying, a second coat should be applied to complete the specified coverage.

D. CLEANING

1. Touch up and restore all finish surfaces where damaged.
2. Remove spilled, splashed or splattered paint from all surfaces.
3. Do not mar surface finishes being cleaned.
4. Dispose of all paint and containers as per environmental requirements.

END OF SECTION 02580

SECTION 02590 - ACRYLIC CEMENT DECK COATING (Or Approved Equal)

PART 1 - GENERAL

- 1.0 SUBMITTALS: Submit to the Architect/Engineer in conformance with the requirements of the CONDITIONS OF THE CONTRACT.
- A. Color Samples of Acrylic Cement Deck Coating: Submit manufacturer's chart of standard colors for color selection by the Architect/Engineer.
 - B. The manufacturer's literature shall be submitted prior to installation

PART 2 - EXECUTION

1.0 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Verify concrete deck is free of ridges and sharp projections.
 - 2. Verify concrete has cured for a minimum of 5 days. Concrete that is over 28 days old must have primer applied to improve bonding.

1.1 PREPARATION

- A. Cleaning:
 - 1. Remove oil or grease by scrubbing with a power broom and strong non-sudsing detergent. Thoroughly wash, clean, and allow to dry.
- B. Repair:
 - 1. Repair cracks, surface damage as required prior to proceeding.
- C. Protection:
 - 1. Mask adjacent surfaces not scheduled to receive Acrylic Cement Deck Coating.
- D. Expansion Joints on New Decks
 - 1. Cover plastic joints to protect (if plastic joints are used).
 - 2. Mark joints for sawcutting if deck will be sawcut..

1.2 INSTALLATION

- A. Primer:
 - 1. On old concrete, saturate surface with Weathermaster CMX-4 acrylic modifier as a bond aid. Apply base coat before the bond aid is completely dry. If the bond aid dries, reapply Weathermaster prior to base coat..
- B. Base Coat Mixture (per batch):
 - 1. Three gallons of Weathermaster CMX-4 acrylic modifier
 - 2. Add water in limited quantities based on temperatures
 - 3. One 100#bag of Type 1 ASTM white Portland cement
 - 4. One 100# bag of #4 silica sand
 - 5. Mix to be mixed by hand in clean container
- C. Base Coat:
 - 1. Apply base coat to primer while primer is still damp. (Primer is only necessary on cured concrete)
 - 2. Apply base coat using pattern gun, squeegee or towel over the area to be treated to a uniform thickness of 1/16".
 - 3. Allow to dry.

- D. Texture Coat Mixture (per batch)
 - 1. Three gallons of Weathermaster CMX-4 acrylic modifier
 - 2. Add water in limited quantities based on temperatures
 - 3. One 100#bag of Type 1 ASTM white Portland cement
 - 4. One 100# bag of #4 silica sand
 - 5. Mix to be mixed by hand in clean container
 - E. Texture Coat:
 - 1. Spray texture coating using pattern pistol over 60-70 percent of base coat.
 - 2. Lightly trowel moist texture in a circular motion as required to produce the approved texture.
 - 3. Allow surface to completely dry.
 - 4. Sawcut all marked expansion joints if plastic joints are not used.
 - F. Finish:
 - 1. Spray apply Acrylic Finish Coat color to entire application to a uniform color.
 - 2. When dry, remove all protective materials from adjacent surfaces.
 - 3. When dry, scrape surface with scrapers to remove loose cement.
- 1.3 PROTECTION:
- A. Restricted Access:
 - 1. Protect acrylic deck coating during the period of installation.
 - 2. No traffic to be allowed on acrylic deck coating for at least 48 hours after installation.

END OF SECTION 02590

SECTION 02630 - POLYVINYL CHLORIDE PIPE STORM DRAINS

PART 1 - GENERAL

- 1.1 SCOPE: The work to be performed under this section shall consist of furnishing unplasticized polyvinyl chloride (PVC) plastic sewer pipe and fittings for gravity flow sewers, including all clearing and grubbing excavation, sheetings, shoring, dewatering, pipe laying, jointing, backfilling and any other work that is required or necessary to complete the installation as shown on the plans and as specified herein.
- 1.2 SUBMITTALS: The Contractor shall furnish an affidavit that the pipe, specials, fittings, and appurtenances furnished comply with all provisions of this and the ASTM specifications as shown herein.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Polyvinyl Chloride (PVC) Pipe: All PVC plastic pipe furnished on this project shall meet the requirements of ASTM Standard D 1784, "Rigid Poly (Vinyl Chloride) and Chlorinated Poly (Vinyl Chloride) Compounds," and ASTM Standard D 3034 (SDR-35), "Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings," latest revisions. Pipe and fitting markings shall include appropriate ASTM Designations and Cell Classification Numbers (12454-B or 12454-C or other approved classifications). Pipe and fittings not so marked will be rejected. Unless otherwise approved by the Engineer, pipe lengths may be glued or joined utilizing elastomeric gaskets as referenced in D 3034, and shall be tested per the requirements of ASTM Standard D 3212, "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals."
- B. Fittings: All fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and spigot configurations identical to that of the pipe. Coupling adapters shall be used to tie into existing pipe for any service lines and at structures. No separate payment will be made for adapters, tees, bends, or other necessary fittings used in the installation of this line, but shall be considered subsidiary to the various other unit prices.
- C. Deck and Trench Drains: Shall be as manufactured by NDS Ph: (888) 825-4716 or approved equal. See "L" or "C" Sheets of construction plans for details. Color of Box and Grate to be Black.

PART 3 - EXECUTION

- 3.1 BEDDING: All PVC pipe shall receive a sand backfill under pavement areas. Reference Construction Details.
- 3.2 LAYING AND JOINTING:
- A. Installation: Pipe shall be installed in full compliance with the recommended practice for "Underground Installation of Flexible Thermoplastic Sewer Pipe," ASTM Standard D 2321.
- B. Cutting and Beveling Pipe: For shorter than standard pipe lengths, field cuts may be made with either hand or mechanical saws or plastic pipe cutters. Ends shall be cut square and perpendicular to the pipe axis. Spigots shall have burrs removed and ends smoothly beveled by a mechanical beveler or by hand with a rasp or file. Field spigots shall be stop-marked with felt tip marker or wax crayon for the proper length of assembly

insertion. The angle and depth of field bevels and lengths to stop-marks shall be comparable to factory pipe spigots.

- C. Bell Holes for Elastomeric Seal Joints: The bell hole shall be not larger than necessary to accomplish proper joint assembly. When the joint has been made, the void under the bell should be filled with bedding or haunching material to provide adequate support to the pipe throughout its entire length.
- D. Assembly of Joints: All joints shall be assembled in accordance with the recommendations of the manufacturer. Proper jointing may be verified by rotation of the spigot by hand or with a strap wrench. If unusual joining resistance is encountered or if the insertion mark does not reach the flush position, disassemble the joint, inspect for damage, reclean the joint components and repeat the assembly steps.

3.3 BACKFILL:

- A. Initial Backfill: Pipe shall be installed in an "envelope" of embedment material extending from six (6") inches below the pipe to twelve (12") inches above the pipe. The granular embedment material shall be placed in three (3") to six (6") inch lifts and compacted to ninety (90%) percent of maximum dry density in areas that will not be under future paving or walks. Where paving or sidewalks will be over the pipe, compaction shall be ninety-five (95%) percent of maximum dry density. The area requiring compaction shall include the bed side fill material and also the material placed above the pipe for a distance of six (6") to twelve (12") inches over the top of the pipe.
- B. Final Backfill - Native Material: Material excavated from the ditch may be used for backfill provided that all hard rock, stones or boulders having any dimensions greater than six (6") inches and debris and roots larger than two (2") inches are removed. If hand pneumatic tampers are used, the backfill shall be placed in layers not exceeding six (6") inches in compacted thickness and thoroughly tamped. If heavy tampers are used such as those operated by combustion engine, electric motor, or hydraulic cylinders, the thickness of layers may be increased to twenty-four (24") inches provided the required density is obtained. Backfill shall be placed in uniform layers completely across the trench, and compaction shall progress in an orderly and uniform manner. During the tamping process, care shall be taken to avoid pipe damage.
- C. Final Backfill - Sand: At the option of the Contractor, granular embedment material may be used as backfill material. If this option is selected, sand shall be placed on the embedment material in lifts not exceeding six (6') feet in thickness.

END OF SECTION 02630

SECTION 02825 - ORNAMENTAL STEEL FENCE SYSTEM, INDUSTRIAL AEGIS II™ - MAJESTIC
STYLE

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. The contractor shall provide all labor, materials, and appurtenances necessary for installation of the industrial ornamental steel fence system defined herein at Butler Park Pool or approved equal.

1.2 RELATED WORK

- A. Section 2200 - Earthwork
- B. Division 3 - Concrete

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total industrial ornamental steel fence system of the Ameristar® Aegis II™ Majestic™ design. The system shall include all components (i.e., pickets, rails, posts, gates and hardware) required.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- A. *ASTM A653/A653M* - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zincron Alloy Coated (Galvannealed) by the Hot Dip Process
- B. *ASTM A924/A924M* - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process
- C. *ASTM A1011/A1011M* - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength and High-Strength Low-Alloy with Improved Formability
ASTM B117 - Practice for Operating Salt Spray (Fog) Apparatus
- D. *ASTM D523* - Test Method for Specular Gloss
- E. *ASTM D822* - Practice For Conducting Tests On Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus
- F. *ASTM D1654* - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- G. *ASTM D2244* - Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates
- H. *ASTM D2794* - Test Method for Resistance of Organic Coatings to The Effects of Rapid Deformation (Impact)
- I. *ASTM D3359* - Test Method for Measuring Adhesion by Tape Test

1.6 SUBMITTAL

- A. See Section 01300 and 01340 for submittal procedures.
- B. The manufacturer's literature shall be submitted prior to installation.
- C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- D. Samples: Submit two samples of fence fabric, 12 inch by 12 inch in size illustrating construction and colored finish.

- E. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.7 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

PART 2 - MATERIALS

2.1 MANUFACTURER

- A. The industrial ornamental steel fence system shall conform to Ameristar® Aegis II™, Majestic™ (2-Rail) style manufactured by Ameristar Fence Products, Inc., in Tulsa, Oklahoma.

2.2 MATERIAL

- A. Steel material for fence framework (i.e., tubular pickets, rails, and posts), when galvanized after forming, shall conform to the requirements of ASTM A1011/1011M, with a minimum yield strength of 50,000 psi (344 MPa). The exterior shall hot-dip galvanized with a 0.45 oz/ft² (138 g/m²) minimum zinc weight. The interior surface shall be coated with a minimum 81% nominal zinc pigmented coating, 0.3 mils (0.0076mm) minimum thickness.
- B. Steel material for fence framework (i.e., tubular pickets, rails, and posts), when galvanized prior to forming, shall conform to the requirements of ASTM A924/924M, with a minimum yield strength of 50,000 psi (344 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
- C. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a zinc-rich thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (black). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

Table 1 – Coating Performance Requirements

Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822, D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

- D. Material for fence pickets shall be 1" square x 14ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner™ design with outside cross-section dimensions of 1.75" square and a minimum thickness of 14ga. Picket holes in the ForeRunner™ rail shall be spaced 4.98" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. Posts shall be a minimum of 2-1/2" square x 12ga. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.

2.3 FABRICATION

- A. Pickets, rails, and posts shall be precut to specified lengths. ForeRunner™ rails shall be pre-punched to accept pickets.
- B. Grommets shall be inserted into the pre-punched holes in the rails and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal upper raceway of the ForeRunner™ rails. (Note: This can best be accomplished by using an alignment template.) Retaining rods shall be inserted into each ForeRunner™ rail so that they pass through the predrilled holes in each picket, thus completing the panel assembly.
- C. Completed panels shall be capable of supporting a 600 lb. load (applied at midspan) without permanent deformation. Panels without rings shall be biasable to a 25% change in grade; panels with rings shall be biasable to a 12.5% change in grade.
- D. Gates shall be fabricated using Aegis II™ panel material and gate ends having the same outside cross-section dimensions as the ForeRunner™ rail. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined either by welding or by the same retaining rod process used for panel assembly.

PART 3 – EXECUTION

3.1 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

- A. Fence posts shall be set in accordance with the spacings shown in Table 2, plus or minus 1/2", depending on the nominal span specified.

Table 2 – Post Spacing Requirements

Span	6' Nominal (67-3/4" Rail)				8' Nominal (92-5/8" Rail)			
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Standard (BB301)		Angle (BB304)		Standard (BB301)		Angle (BB304)	
Post Settings $\pm \frac{1}{2}$ O.C.	71-1/2"	72"	73"	73-1/2"	96"	96-1/2"	97-1/2"	98"

- B. Gate posts shall be spaced according to the gate openings specified in the construction plans. The "Earthwork" and "Concrete" sections of this specification shall govern post base material requirements. Aegis II™ panels shall be attached to posts using mechanically fastened panel brackets supplied by the manufacturer.

3.3 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION 02825

DIVISION 3 – CONCRETE

SECTION 03010 - CONCRETE FOR POOL STRUCTURES (Cast-In-Place)

PART 1 - GENERAL

- 1.1 DESCRIPTION: This section shall govern the furnishing of all labor, materials, tools, plant, performing all operations required to install all concrete and reinforcing steel, and completely finishing the concrete items in strict accordance with the requirements of these specifications and the applicable drawings and subject to all conditions of the contract including but not limited to the following:
- A. Pool, Slab-on-Grade and Walls
 - B. Refer to Section 03370 - "Pneumatically Placed Concrete for Swimming Pools." (This is the primary option provided to Contractors in lieu of Cast-In-Place Concrete.)

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Reinforcing Steel: Reinforcement shall conform to the requirements of Section 03200.
- B. Cement: The cement shall be either Type I or Type III of a standard brand of Portland cement which shall conform to ASTM Specification C-150. The Contractor, if he so elects in order to facilitate his own operations, may use Type III cement. All cement shall be protected against dampness, and no cement will be accepted which has become caked.
- C. Water: Water for use in concrete mixtures shall conform to the provisions of AASHTO Test Method T-26 for quality of water.
- D. Coarse Aggregate: Aggregate shall conform to the requirements of ASTM C-33. The maximum size of coarse aggregate shall not be larger than one-fifth (1/5) of the narrowest dimension between forms of the member for which concrete is to be used nor large than three-fourths (3/4) of the minimum clear spacing between reinforcing bars.
- E. Fine Aggregate: The fine aggregate shall consist of sand conforming to ASTM designation C-33. The sand shall not contain more than 1-1/2% clay and shall not show darker than very light amber when tested by the colorimetric method.

The fine aggregate shall conform to the following grade requirements:

Retained on 3/8" screen	0% by weight
Retained on 1/4" screen	0 to 5% by weight
Retained on No. 20 sieve	15 to 50% by weight
Retained on No. 100 sieve	85% to 100% by weight

- F. Admixtures:

<i>Generic Product:</i>	<i>Approved Products:</i>	<i>Required Usage:</i>
High Range Water Reducer (Super plasticizer) ASTM C-494 Type F/G	Master builders Rheobuild: 716-Temp. – 80 degree F 1000-Temp. – 80 degree F	ALL vertical structural walls or other work requiring two-sided forming and tightly confined concreting; concrete columns above grade; Concrete drops >5'0"
Air-Entrainment ASTM C-260	Master Builders Micro Air	All concrete except pneumatic
Accelerator ASTM C-494 Type C	Pozzolite 555-Accelerator Pozzolite 122-HE (chloride) Pozzotec 20 (low temp)	Concrete placed on permanent steel floor and deck systems; bridge deck repair; concrete pavement patching; tilt walls
Retarder ASTM C-494 Types B/D	Pozzolite 100-XR	For delayed set; with approval of Engineer only

All concrete shall have air entrainment based on the maximum size coarse aggregate:

<u>Max. Size Aggregate</u>	<u>Total Air Percent</u>
1"	6.0% +/- 1%

Install admixtures per manufacturer's instructions.

PART 3 – EXECUTION

- 3.1 CONCRETE QUALITY: The concrete shall be composed of Portland cement fine aggregate, coarse aggregate, and water, all as specified herein.

The concrete shall be homogenous, readily placeable and uniformly workable. The maximum allowable water content and minimum compressive strength shall meet the requirements of the structural documents.

The net amount of water shall be the amount added at the mixer, plus the free water in the aggregate, and minus the absorption of the aggregate based on a thirty-minute absorption period. No allowance will be made for evaporation of water after batching.

- A. Class Requirements: Unless otherwise specified elsewhere in the plans or Special Provisions all concrete is Class A. The following are maximum slumps and the class of concrete required for various types of construction. (Slump test prior to addition of plasticizer.)

Type of Construction	Slump Inches Maximum	Class of Concrete
Pool Slab on Grade	Match Lab Slump Sections	A
Pool Walls	Match Lab Slump Sections	A

- B. Characteristics of Mix: Concrete shall be of such consistency as to insure the required workability and result in compact masses having dense, uniform surfaces. In cases where the characteristics of the aggregates are such that with the maximum allowable amount of water, the consistency requirements cannot be satisfied, additional aggregates, mineral filler or

aggregates of a different character may be furnished to produce the desired results. If these materials are not provided, then the mix design will be modified to insure proper workability by adding additional cement. Concrete temperature shall not be less than 50 degrees F nor more than 90 degrees F.

In general, the consistency of the concrete mixtures shall be such that:

- (a) The cement will cling to the coarse aggregate.
- (b) The aggregates will not segregate in the concrete when it is transported to the place of the deposit.
- (c) The concrete and mortar will show no free water when removed from the mixer.
- (d) The surface of the finished concrete will be free from a surface film of "laitance."

Any concrete mix failing to meet the above outlined consistency requirement, although meeting the slump requirements, will be considered unsatisfactory, and the mix shall be changed to correct such unsatisfactory conditions. In cases where the characteristics of the aggregates furnished are such that, with the maximum allowable amount of water, the specified slumps and consistency requirements are not met, aggregates of an improved grading must be furnished and the mix design must be modified to meet the slump and consistency requirements by adding either cement or mineral filler, or both, as may be necessary. In case mineral filler is used, the combined total quantity of mineral filler and fine aggregate passing the 100 mesh sieve shall not exceed twenty percent (20%) of the weight of the fine aggregate.

It is the intent of these specifications to secure for every part of the work, and particularly so where the concrete is to be liquid containing, concrete of homogeneous structure having the required strength and resistance to weathering, which is free of honeycomb, concealed voids or other defects, and which for the various structures and appurtenances shall develop the minimum compressive strengths as indicated in these specifications.

The minimum quantity of cement and mixing water should be used that will safely produce concrete of the strength required, in order to minimize heat of hydration and shrinkage in the concrete.

PART 4 - MIXING CONDITIONS

4.1 GENERAL: The concrete shall be mixed in quantities required for immediate use, and any concrete which is not in place within thirty (30) minutes after being discharged from the mixer shall not be used. Re-tempering of concrete will not be permitted. Concrete improperly mixed shall not be placed in the structure. Ready-mixed concrete will comply with the following requirements:

- 1. Central mixed concrete shall be mixed completely in a stationary mixer and mixed concrete transported to the point of delivery in a truck agitator or in a truck mixer operating at agitator speed.
- 2. Shrink-mixed concrete shall be partially mixed in a stationary mixer, and the mixing completed in a truck mixer.
- 3. Transit-mixed concrete shall be completely mixed in a truck mixer.
- 4. Mixers and agitators shall be operated within the limits of capacity and speed of rotation as designated by the manufacturers.
- 5. When a stationary mixer is used for partial mixing of the concrete, the mixing time in the stationary mixer may be reduced to the minimum required to intermingle the ingredients (about 30 seconds).

6. When a truck mixer is used either for complete mixing or to finish partial mixing in a stationary mixer, each batch of concrete shall be mixed not less than 50 nor more than 100 revolutions of the drum or blades at the rate of rotation designed by the manufacturer of equipment as mixing speed. Additional mixing, if any, shall be at the speed designed by the manufacturer of the equipment as agitating speed.
7. Delivery of concrete to the site of the work and its discharge from the truck mixer, agitator or non-agitating equipment shall be completed within the time limits shown in the following table, after the introduction of the mixing water to the cement and aggregates, unless otherwise authorized by the Engineer.

Temperature-Time Requirements

Concrete Temperature (at point of placement)	Maximum Time (No retarding agent) Minutes	Maximum Time ¹ (With retarding agent) Minutes
Non-Agitated Concrete		
All Temperature	30	45
Agitated Concrete		
Above 90 degrees F	45	75
Above 75 degrees F through 90 degrees F	60	90
75 degrees F and below	90	120

¹Normal dosage of retarder

All transit mix delivery tickets shall have the time of departure from the plant as well as water, cement, aggregates and admixture contents.

Hand mixing of concrete will be permitted; it shall be done on a watertight platform. The fine aggregate and cement shall first be mixed until a uniform color is attained, and then spread over the mixing board in a thin layer. The coarse aggregate shall be thoroughly saturated with water, and it shall then be spread over the fine aggregate and cement in a uniform layer, and the whole mass turned as the additional water is added. After all ingredients have been added, the mass shall be turned at least six times, or more if necessary, to make the mixture uniform in color and smooth in appearance. Hand mixed batches shall not exceed a two (2) bag batch volume.

PART 5 – FORM WORK

- 5.1 GENERAL: The Contractor shall provide forms that will produce correctly aligned concrete. The centering shall be true and rigid, and thoroughly braced both horizontally and diagonally. The forms shall be sufficiently strong to carry the dead weight of the concrete as a liquid without deflection, and tight enough to prevent leakage of mortar.

1. For exposed interior and exterior concrete surfaces of columns and walls, plywood or other approved forms, thoroughly cleaned and tied together with approved corrosion resistant devices shall be used.
2. Rigid care shall be exercised in seeing that all poured walls and columns are plumb and true and thoroughly cross-braced to keep them so.
3. Beveled strips shall be provided in form angles and in corners of column and beam boxes for chamfering of corners where shown on drawings or directed by the Engineer.
4. The inside of the forms shall be coated with an approved oil or thoroughly wetted. Oil shall be applied before reinforcement is placed.

5. Temporary openings for cleaning and inspection shall be provided at the base of vertical forms and other places where they are necessary.

Forms may be removed at the following minimum times:

	*Over 95 degrees F	70-95 degrees F	60-70 degrees F	50-60 degrees F	Below 50 degrees F
Walls	5 days	1 day	2 days	3 days	Do not remove Forms until site Cured test Cylinder Develops 50% Of
Columns	7 days	2 days	3 days	4 days	
Beam	10 days	4 days	5 days	6 days	
Structural	10 days	5 days	6 days	7 days	
Slabs over 5" Thick					

*Where exposed surfaces of concrete can be effectively sealed to prevent loss of water, these times may be reduced to the 70-95 degrees F. time.

PART 6 - DEPOSITING CONCRETE

6.1 GENERAL:

A. Prior to Placement: Before placing concrete, thoroughly clean the forms of wood chips, shavings or other debris. Do not deposit concrete in standing water. Before placing new concrete on or against concrete which has acquired its initial set, retighten forms, roughen hardened surfaces, clean off foreign matter and laitance, and saturate with water. Immediately before depositing new concrete, coat the contact surface with neat cement grout.

B. Placement: Concrete shall be deposited, when practicable, in its final position without segregation, rehandling, or flowing. When possible, concreting shall be continuous until the section is complete. Concrete shall be spaded and vibrated with approved mechanical vibrator to maximum subsidence, without segregation, and adjacent to forms and joints. When stoppage of concreting operations occurs for any reason, construction joints shall be placed either horizontally or vertically as needed, provided with keys to resist shear, and dowels to develop bond. Before concreting operations are resumed, the surface of the concrete shall be cut or chipped to remove all laitance and expose the aggregate. Shot-crete applied concrete can be used provided the concrete has been batch mixed.

Water accumulating during placing should be removed. Concrete shall not be deposited in such accumulations. Conveying and chuting of concrete shall be done only with equipment which will insure a continuous flow without segregation. Concrete without super plasticizer admixtures shall not be dropped more than five feet (5') without a tremie or "elephant trunk." Super plasticized concrete may be dropped (free fall) from a height of 15 feet or less.

C. Weather Protection: In threatening weather, which may result in conditions that will adversely affect the quality of the concrete to be placed, the Engineer may order postponement of the work. Where work has been started and changes in weather conditions require protective measures to be used, the Contractor shall furnish adequate shelter to protect the concrete against damage from rainfall or damage due to freezing temperatures. No concrete shall be placed without the approval of the Engineer when air temperature is at or below 40 degrees F. (taken in the shade away from artificial heat) and falling. If authorized by the Engineer, concrete may be placed when the air temperature is at 35 degrees F. and rising.

D. Expansion/Isolation Joints: Expansion/isolation joints shall be of the type and size shown on the plans.

Joints shall be continuous through the wall and floors at the same location. Sloped joints during shotcrete operations will not be allowed in lieu of expansion joints.

E. Floor Coatings or Color: Any areas designated on the plans for colored or coated floors shall be so treated in accordance with other Sections of these specifications and in accordance with the manufacturer's specifications as approved by the Engineer.

F. Curing Concrete: Unless they are to receive further treatment such as plaster, tile or paint coatings, pool slabs and walls shall be sprayed with an approved curing compound to retard evaporation of water if spraying is not objectionable because of subsequent finish. Curing operations shall begin as soon as the concrete has attained initial set. All materials and facilities for curing concrete shall be on hand and ready for use before concrete is placed. Concrete shall be protected from freezing temperatures for a minimum of five days after placement.

G. Water Proofing: Polyethylene vapor barrier, if shown on the plans, shall be 6 mil thickness, fungi resistant sheets fastened with adhesive backed polyethylene tape. Seal tightly against penetrations. Seal all punctures with tape before placing concrete.

H. Test on Concrete: One set of three test cylinders shall be made by the Contractor for compressive strength tests performed by an approved independent testing laboratory (all at the expense of the Owner) for each thirty (30) cubic yard lot or a minimum of one set for each days pour. Slump tests shall be made on each batch tested in accordance with ASTM designation C-143. Each of the test cylinders shall be tested at 7 days and 28 days for compressive strength. The Contractor shall coordinate tests with the Owner's designated laboratory.

If the average strength of the laboratory control cylinders for any portion of the structure falls below compressive strength required for the design, the Engineer shall order further standard ASTM test procedures be performed at Contractor's expense upon concrete sections in question. Should these further tests indicate that any concrete does not meet the requirements of these specifications; the concrete shall be removed and replaced with acceptable concrete by the Contractor and at Contractor's expense.

Copies of reports of all tests shall be furnished to the Engineer and Contractor as soon as available.

Tests on concrete shall conform to the following applicable ASTM designations:

ASTM C-173 or C-231	Air Content of Freshly Mixed Concrete.
ASTM C-172	Standard Method of Sampling Fresh Concrete.
ASTM C-143	Standard Method of Slump Test.
ASTM C-39	Standard Method of Test for Compressive Strength of Molded Concrete Cylinders.
ASTM C-31	Standard Method of Making and Curing Concrete Compression and Flexure Test Specimen in the Field.

PART 7 - PROTECTION

- 7.1 GENERAL: Protect the work from freezing, from rainfall, blowing dust or other natural hazards. The Contractor is responsible for protecting from acts of vandalism from the time concrete is placed until the project is completed and accepted by the Owner. Remove any graffiti or other defacing of concrete.

PART 8 – MEASUREMENT

- 8.1 GENERAL: The concrete quantities of the various classifications which constitute the completed and accepted structure will not be measured unless otherwise noted in the proposal, but will be considered as a part of the lump sum payment for the item constructed.

PART 9 – PAYMENT

- 9.1 GENERAL: All concrete shall be considered as a part of the lump sum price bid for the various items of construction. The lump sum price shall include full compensation for furnishing, hauling, and mixing all concrete materials; placing, curing, and finishing all concrete; all grouting and pointing; furnishing and placing all drains, forms, and falsework, labor, tools, equipment, and incidentals necessary to complete the work.

END OF SECTION 03010

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

- 1.1 SCOPE: The extent of formwork is indicated by the concrete items shown on the drawings. The work includes the design, construction, erection, maintenance, and removal of all formwork for concrete paving, curbs, and any other appropriate concrete item called for.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 03200 - Concrete Reinforcement.
 - B. Section 03300 - Cast-In-Place Concrete (Buildings).
 - C. Section 03310 - Cast-In-Place Concrete.
- 1.3 CODES AND STANDARDS: Comply with provisions of the following codes, specifications, and standards, except as modified or amended herein.
 - A. ACI 347R-94, "Recommended Practice for Concrete Formwork."
 - B. ACI 301-99, "Specifications for Structural Concrete for Buildings."

PART 2 - PRODUCTS

- 2.1 DESIGN OF FORMWORK:
 - A. Design, erect, support, brace and maintain formwork so that concrete items will be of the correct size, shape, alignment, elevation, and position.
 - B. Design formwork to be readily removable without impact, shock, or damage to the cast-in-place concrete surfaces and adjacent materials.
 - C. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt all joints and provide backup material at joints as may be required to prevent leakage and fins.
 - D. Wood Forms: Shall be No.2 common southern yellow pine, or equivalent, materials milled to reasonably uniform width and thickness, at least two (2) edges and one (1) side dressed for tight fit.
 - E. Metal Forms: Clean, unpainted, and in good condition to provide members of widths and depths required. Severely damaged or indented forms are not acceptable.

PART 3 - EXECUTION

- 3.1 FORMWORK:
 - A. All forms shall be observed by the Architect/Engineer prior to placement of concrete. The Contractor shall notify the Architect/Engineer at least twenty-four (24) hours prior to placing concrete.
 - B. Forms shall be built to the shapes and dimensions of the concrete on the drawings, shall be set to lines and grades, braced and secured to withstand placing of concrete.

3.2 PREPARATION OF FORM SURFACES:

- A. Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. Thin form-coating compounds only with the thinning agent of the type and in amount and under the conditions of the form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with the manufacturer's instructions.
- B. Coat steel forms with a non-staining, rust preventive form oil or otherwise protect against rusting. Rust stained steel formwork is not acceptable.

3.3 REMOVAL OF FORMS: Forms shall not be removed until concrete has adequately hardened and in any event, not less than two (2) days.

3.4 RE-USE OF FORMS: Clean and repair the surfaces of forms that are to be re-used in the work, except that warped, split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable. Apply new form-coating compound material to all concrete contact form surfaces as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure all joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to the Architect/Engineer.

- A. All formwork shall comply with ACI 302.1R-96. "Recommended Practice for Concrete Floor and Slab Construction."

END OF SECTION 03100

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

- 1.1 SCOPE: The extent of concrete reinforcement is shown on the drawings and in schedules. The work includes fabrication and placement of reinforcement for the cast-in-place concrete, including bars, ties and supports.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 03100 – Concrete Formwork.
 - B. Section 03300 – Cast-In-Place Concrete (Buildings).
 - C. Section 03310 – Cast-In-Place Concrete.
- 1.3 CODES AND STANDARDS: Comply with requirements of the following codes and standards, except as herein modified:
 - A. American Concrete Institute, ACI 315-92 “Manual of Standard Practice for Detailing Reinforced Concrete Structures.”
 - B. American Welding Society, AWS, D 12.1 “Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connection in Reinforced Concrete Construction.
 - C. Concrete Reinforcing Steel Institute, “Manual of Standard Practice.”
- 1.4 SUBMITTALS: Submit to the Engineer in conformance with the requirements of the CONDITIONS OF THE CONTRACT.
 - A. For information only, submit two (2) copies of steel producer’s certificates of mill tests for reinforcing steel.
 - B. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315-92 “Manual of Standard Practice for Detailing Reinforced Concrete Structures.” Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.
- 1.5 PRODUCT, DELIVERY, HANDLING, AND STORAGE:
 - A. Deliver reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
 - B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 - PRODUCTS

- 2.1 MATERIALS:
 - A. Reinforcing Bars: ASTM A615 of grade shown on drawings with minimum yield strength of 60,000 psi.
 - B. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place.

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1. Use wire bar type supports or plastic-type chairs, complying with P57-66, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic or plastic-tipped metal.

2.2 FABRICATION:

- A. General: Shop-fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances complying with ACI 315-92. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:
 1. Bar lengths, depths and bends exceeding specified tolerances.
 2. Bends or kinks not indicated on drawings or final shop drawings.
 3. Bars with reduced cross section due to excessive rusting or other cause.

PART 3 - EXECUTION

- 3.1 INSTALLATION: Comply with the specified codes and standards and the Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
 - A. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 - B. Position, support, and secure reinforcement against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
 - C. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with No.16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that ends are directed away from exposed concrete surfaces.
 - D. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than two (2") inches beyond the last leg of any continuous bar support. Do not use supports as bases for concrete conveying equipment and similar construction loads.
 - E. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Comply with requirements of ACI 318-99 for minimum lap of spliced bars.

END OF SECTION 03200

SECTION 03250 - METAL FASTENERS AND BOLTS FOR CONCRETE

PART 1 - GENERAL

- 1.1 This section shall govern furnishing and installing anchoring bolts for securing machinery, railings, structural steel, metal frames or other incidental equipment to concrete or masonry walls.

The bolt or system selected by the Contractor from the approved materials shall be appropriate for the type and direction of load, clearances, and thickness of the anchoring concrete. Refer to manufacturer's specifications.

PART 2 - PRODUCTS

- 2.1 FASTENING SYSTEMS: Anchoring bolts and fasteners shall be equal to Hilti Corporation, Tulsa, Oklahoma (800) 933-9235 whose item and catalog numbers are referred to herein.

2.2 MATERIALS:

A. In general, use zinc chromate coated fasteners except for supporting or anchoring stainless steel in which case stainless steel bolts are required.

B. Unless approved otherwise the following anchoring systems are required.

Application	Anchor Diameter	Method
1. Heavy duty anchoring to concrete or stone dynamic loading; machinery, pumps, motors, blowers.	3/4", 1", or 1-1/4"	HVA Adhesive Anchor ASTM A-307 Grade A; has anchor rod with nut & washer
2. Medium duty anchoring concrete for shelf angles, channels, minor dynamic loads; small pumps, hand rails.	1/4" to 1"	Kwik-Bolt II Stud Anchor Expansion Bolt <i>or</i> HDI Drop In Impact Expansion Sleeve Anchor HX; Expansion Bolt
3. Medium duty anchoring to hollow concrete block shelf angles, channels, hand rails.	3/16" to 1/2"	Sleeve Anchor HX; Expansion Bolt
4. Medium duty anchoring to solid brick shelf angles, channels, hand rails.	3/16" to 3/4"	Sleeve Anchor HX; Expansion Bolt
5. Special duty to dowel rebar or threaded rods into concrete, hard stone, or soft natural stone.	3/8" to 1-1/4"	HIT Dowelling Anchor; chemical bonding to base

C. Do not exceed manufacturer's loading limitations.

PART 3 - EXECUTION

- 3.1 REQUIREMENTS FOR THE JOB: The Contractor shall furnish all anchors not supplied by the manufacturer of special equipment. Satisfy this specification if items supplied by manufacturer are, in the Engineer's opinion, unsuitable for the intended purpose.

END OF SECTION 03250

SECTION 03290 – UNDER-SLAB VAPOR BARRIER

PART 1 – GENERAL

1.1 SUMMARY

- A. Products Supplied Under This Section
 - 1. Vapor Barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.
- B. Related Sections
 - 1. Section 03300 Cast-in-place Structural Concrete

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM E 1745-97 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs
 - 2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
 - 3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
 - 4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI)
 - 1. ACI 302.1R-96 Vapor Barrier Component

1.3 SUBMITTALS

- A. Quality Control / Assurance
 - 1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
 - 2. Manufacturer's samples, literature
 - 3. Manufacturer's installation instructions for placement, seaming and pipe boot installation

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Vapor Barrier
 - 1. Vapor Barrier membrane must have the following properties.
 - a. Minimum 15-mil thick polyolefin geomembrane.
 - b. Minimum WVTR as tested by ASTM E96 of 0.008
 - c. Water Vapor Barrier ASTM E-1745, 0.01 Perms. Meets or exceeds Class B
 - c. Water Vapor Transmission Rate ASTM E-96, 0.006 gr./ft²/hr. or lower.
 - d. Permeance Rating ASTM E-96, 0.01 gr./ft²/hr. or lower.
 - e. Puncture Resistance ASTM E-1745, minimum 1970 grams.
 - f. Tensile Strength ASTM E-1745, minimum 45.0 lbf/in.

2.2 ACCESSORIES

- A. Seam Tape
 - 1. High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.
- B. Pipe Boots

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2. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by architect.
 1. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION

- A. Install Vapor Barrier:
 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98.
 - a. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Barrier over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) with manufacturer's pipe boot.
 - e. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 03290

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

1.3 SUBMITTALS

- A. General - Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.
- B. Shop drawings for reinforcement, prepared by registered Professional Engineer for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- C. Shop drawings for formwork, prepared by a registered Professional Engineer for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually. Formwork shop drawings must be signed and sealed by a professional engineer in the State of Florida.
 - 1. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
- D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
 - 1. Normal weight aggregates.
 - 2. Fibrous reinforcement.
 - 3. Reglets.
 - 4. Waterstops.
 - 5. Vapor retarder.
- E. Laboratory test reports for concrete materials and mix design test. Provide test data sample with standard deviation calculations for each mix submitted.
- F. Materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards - Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 2. ACI 301 "Specifications for Structural Concrete for Buildings."

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3. ACI 304 "Recommended Practice for Measuring, Transporting, and Placing Concrete."
 4. ACI 311 "Recommended Practice for Concrete Inspection."
 5. ACI 315 "Manual of Standard Practice for Detailing Concrete Structures"
 6. ACI 347 "Recommended Practice for Concrete Formwork"
 7. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Concrete Testing Service - Engage a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- D. Full cooperation shall be given to mechanical, electrical, and plumbing installers to allow them time to coordinate and install all items of their work which are to be encased or built into concrete. Contractor to assure that other work such as sleeves, electrical conduits, pipes, anchors, etc., are properly placed and secured in position before concrete is placed. Items that require inspection shall have been inspected and tested for both material and mechanical operation and shall have been completed before concrete is placed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep reinforcement steel under cover and off the ground using supports. Protect reinforcing steel from rusting, oil, grease, or distortion.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise shown or specified, construct all formwork for exposed concrete surfaces with a rigid non-absorptive material to offer optimum appearance and leave a smooth, stain-free surface. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without objectionable bow or deflection. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete - Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings - Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties - Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.
- E. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars - Reinforcing steel must be correctly rolled to section and free from all surface defects and shall be in accordance with ASTM A615 Grade 60 as evidenced by manufacturer's certificates. The grade of steel shall be intermediate, new billet stock. All bars shall be deformed and rolled with raised symbols to identify the manufacturer and the size of the bar.
- B. Galvanized Reinforcing Bars - ASTM A 767, Class II (2.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars - ASTM A 775.
- D. Steel Wire - ASTM A 82, plain, cold-drawn steel.
- E. Welded Wire Fabric - ASTM A 185, welded steel wire fabric.
- F. Welded Deformed Steel Wire Fabric - ASTM A 497.
- G. Supports for Reinforcement - Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class a) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement - ASTM C 150, Type I.
 - 1. Use one brand of cement throughout project unless otherwise acceptable to Architect.
- B. Fly Ash - ASTM C 618, Type C or Type F., 20% max.
- C. Normal Weight Aggregates - ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 - 2. Local aggregates not complying with ASTM C 33 but that special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Architect.
 - 3. Use #89 Georgia Granite aggregate in all concrete mixtures for all interior polished concrete floor slabs including the Apparatus Bay floor slab.
- D. Lightweight Aggregates - ASTM C 330.
- E. Water - Drinkable.
- F. Admixtures, General - Provide admixtures for concrete that contain not more than 0.05 percent chloride ions.
- G. Air-Entraining Admixture - ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Air-Tite," Cormix.
 - b. "Air-Mix" or "Perma-Air," Euclid Chemical Co.
 - c. "Darex AEA" or "Daravair," W.R. Grace & Co.
 - d. "MB-VR" or "Micro-Air," Master Builders, Inc.
 - e. "Sealtight AEA," W.R. Meadows, Inc.
 - f. "Sika AER," Sika Corp.

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- H. Water-Reducing Admixture - ASTM C 494, Type A.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Chemtard," ChemMasters Corp.
 - b. "PSI N," Cormix.
 - c. "Eucon WR-75," Euclid Chemical Co.
 - d. "WRDA," W.R. Grace & Co.
 - e. "Pozzolith Normal" or "Polyheed," Master Builders, Inc.
 - f. "Prokrete-N," Prokrete Industries.
 - g. "Plastocrete 161," Sika Corp.
- I. High-Range Water-Reducing Admixture (Super Plasticizer) - ASTM C 494, Type F or Type G. May be used in all pumped concrete and concrete with a water-cement ratio below 0.50.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Super P," Anti-Hydro Co., Inc.
 - b. "PSI Super," Cormix.
 - c. "Eucon 37," Euclid Chemical Co.
 - d. "WRDA 19" or "Daracem," W.R. Grace & Co.
 - e. "Rheobuild," Master Builders, Inc.
 - f. "PSP," Prokrete Industries.
 - g. "Sikament 300," Sika Corp.
- J. Water-Reducing, Accelerating Admixture - ASTM C 494, Type E.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Q-Set," Conspec Marketing & Manufacturing Co.
 - b. "Gilco Accelerator," Cormix.
 - c. "Accelguard 80," Euclid Chemical Co.
 - d. "Daraset," W.R. Grace & Co.
 - e. "Pozzutec 20," Master Builders, Inc.
- K. Water-Reducing, Retarding Admixture - ASTM C 494, Type D.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "PSI-R Plus," Cormix.
 - b. "Eucon Retarder 75," Euclid Chemical Co.
 - c. "Daratard-17," W.R. Grace & Co.
 - d. "Pozzolith R," Master Builders, Inc.
 - e. "Protard," Prokrete Industries.
 - f. "Plastiment," Sika Corporation.
- L. Fibrous Reinforcement - Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Fiberstrand 100," Euclid Chemical Co.
 - b. "Fibermesh," Fibermesh, Inc.
 - c. "Forta CR," Forta Corp.
 - d. "Grace Fibers," W.R. Grace & Co.

2.4 RELATED MATERIALS

- A. Joint Filler: Expansion joint fillers shall be asphalt impregnated fiber board conforming to ASTM D-1751. Joint fillers shall extend full depth of slab or joint and be thickness and lengths indicated on drawings.
- B. Anchor Slots: Hot-Dipped galvanized, #22 ga. metal, felt filled, equal to No. 305 made by Hohman & Bernard or approved equal.

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- C. Inserts: Inserts shall be either adjustable, threaded or wedge types depending on use as manufactured by Hohman & Bernard or approved equal.
- D. Reglets - Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217 inch thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- E. Waterstops - Provide flat, dumbbell-type or centerbulb-type waterstops at construction joints and other joints as indicated. Size to suit joints.
- F. Rubber Waterstops - Corps of Engineers CRD-C 513.
 - 1. Available Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Progress Unlimited.
 - c. Williams Products, Inc.
- G. Polyvinyl Chloride Waterstops - Corps of Engineers CRD-C 572.
 - 1. Available Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Greenstreak Plastic Products Co.
 - c. W.R. Meadows, Inc.
 - d. Progress Unlimited.
 - e. Schlegel Corp.
 - f. Vinylex Corp.
- H. Granular Base - Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- I. Sand Cushion - Clean, manufactured or natural sand.
- J. Vapor Retarder - Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
 - 1. Water-resistant barrier consisting of heavy Kraft papers laminated together with glass-fiber reinforcement and overcoated with black polyethylene on each side.
- K. Vapor Barrier - Premoulded membrane, seven-ply construction consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weathercoating, and plastic antistick sheet. Water vapor transmission rate of 0.00 grains/sq. ft./hr. when tested in accordance with ASTM E 96, Method B. Provide manufacturer's recommended mastics and gusset tape.
 - 1. Product - "Sealtight Premoulded Membrane with Plasmatic Core," W.R. Meadows, Inc.
 - 2. Absorptive Cover - Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- L. Moisture-Retaining Cover - One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- M. Water-Based Acrylic Membrane Curing Compound - ASTM C 309, Type I, Class B.
 - 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Conhard," Conspec Marketing and Mfg. Co.
 - b. "Safe Cure and Seal," Dayton Superior Corp.
 - c. "Aqua-Cure," Euclid Chemical Co.
 - d. "Dress & Seal #18WB," L&M Construction Chemicals, Inc.

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- e. "Masterseal W," Master Builders, Inc.
 - f. "Intex," W.R. Meadows, Inc.
 - g. "Sika Membrane," Sika Corp.
- N. Evaporation Control - Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Eucobar," Euclid Chemical Co.
 - b. "E-Con," L&M Construction Chemicals, Inc.
 - c. "Confilm," Master Builders, Inc.
- O. Underlayment Compound - Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "K-15," Ardex, Inc.
 - b. "Conflow," Conspec Marketing and Mfg. Co.
 - c. "LevelLayer II," Dayton Superior Corp.
 - d. "Flo-Top," Euclid Chemical Co.
 - e. "Levelex," L&M Construction Chemicals, Inc.
 - f. "Pourcrete," Master Builders, Inc.
 - g. "Stoncrete UL1," Stonhard, Inc.
 - h. "Thoro Underlayment Self-Leveling," Thoro System Products.
- P. Bonding Compound - Polyvinyl acetate or acrylic base.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. Polyvinyl Acetate (Interior Only):
 - 1. "Superior Concrete Bonder," Dayton Superior Corp.
 - 2. "Euco Weld," Euclid Chemical Co.
 - 3. "Weld-Crete," Larsen Products Corp.
 - 4. "Everweld," L&M Construction Chemicals, Inc.
 - b. Acrylic or Styrene Butadiene:
 - 1. "Acrylic Bondcrete," The Burke Co.
 - 2. "Strongbond," Conspec Marketing and Mfg. Co.
 - 3. "Day-Chem Ad Bond," Dayton Superior Corp.
 - 4. "SBR Latex," Euclid Chemical Co.
 - 5. "Daraweld C," W.R. Grace & Co.
 - 6. "Hornweld," A.C. Horn, Inc.
 - 7. "Everbond," L & M Construction Chemicals, Inc.
 - 8. "Acryl-Set," Master Builders Inc.
 - 9. "Intralok," W.R. Meadows, Inc.
 - 10. "Sonocrete," Sonneborn-Rexnord.
 - 11. "Stonlock LB2," Stonhard, Inc.
- Q. Epoxy Adhesive - ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Burke Epoxy M.V.," The Burke Co.
 - b. "Spec-Bond 100," Conspec Marketing and Mfg. Co.
 - c. "Euco Epoxy System #452 or #620," Euclid Chemical Co.
 - d. "Epoxite Binder 2390," A.C. Horn, Inc.
 - e. "Epabond," L&M Construction Chemicals, Inc.
 - f. "Concresive 1001," Master Builders, Inc.
 - g. "Sikadur 32 Hi-Mod," Sika Corp.

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- R. Non-Shrink Grout: Non-Shrink Grout: Pre-mixed non-shrink grout as called for on drawings shall be manufactured by:
1. The Euclid Chemical Company - "Euco N-S Group" (All exposed grout).
 2. The Euclid Chemical Company - "Firmix".
 3. Master Builders - "Embeco 885".
 4. Anto-Hydro Company - "Axpandcrete Metallics."
 5. Sonneborn - "Ferrolith G".
 6. Lambert Corporation - "Vibropruf #11"
- S. Chemical Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicate per gal.

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batches are selected as the method of proportioning, the mix design shall be proportioned to achieve an average 28-day compressive strength of 1200 psi in excess of the design strength indicated on the Contract drawings, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
1. Limit use of fly ash to not exceed 20 percent of cement content by weight.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
1. 5000-psi, 28-day compressive strength; W/C ratio, 0.42 maximum (non-air-entrained), 0.40 maximum (air-entrained).
 2. 4000-psi, 28-day compressive strength; W/C ratio, 0.45 maximum (non-air-entrained), 0.42 maximum (air-entrained)
 3. 3500-psi, 28-day compressive strength; W/C ratio, 0.48 maximum (non-air-entrained), 0.45 maximum (air-entrained).
 4. 3000-psi, 28-day compressive strength; W/C ratio, 0.52 maximum (non-air-entrained), 0.48 maximum (air-entrained).
 5. 2500-psi, 28-day compressive strength; W/C ratio, 0.56 maximum (non-air-entrained), 0.54 maximum (air-entrained).
 6. Maximum water-cement (W/C) ratio for the following conditions should be as follows:
 - a. Subjected to freezing and thawing; W/C 0.45.
 - b. Subjected to brackish water, salt spray, or deicers; W/C 0.40
 - c. Concrete required to be watertight; W/C 0.40.
- D. Lightweight Concrete - Proportion mix as specified. Design mix to produce strength and modulus of elasticity as noted on drawings, with a splitting tensile strength factor (Fct) of not less than 5.5 for 3000-psi concrete and a dry weight of not less than 95 lbs. or more than 110 lbs. after 28 days. Limit shrinkage to 0.03 percent at 28 days.
- E. Maximum Slump:
1. Concrete containing the specified high range water reducing admixture (superplasticizer) shall have a maximum slump of 8 inches after addition of HRWR, unless otherwise approved by the Architect.
 2. Ramps Slabs, and sloping surfaces – Not more than 3 inches.
 3. Reinforced foundations system – Not less than 1 inch and not more than 4 inches.
 4. All other concrete shall have a maximum slump of 4 inches, +/- 1 inch.

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- F. Adjustment to Concrete Mixes - Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.
- B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1.5% within following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) 1-1/2-inch max. aggregate.
 - b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) 1-inch max. aggregate.
 - c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) 3/4-inch max. aggregate.
 - d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) 1/2-inch max. aggregate.
 - 2. Other concrete (not exposed to freezing, thawing, or hydraulic pressure) or to receive a surface hardener: 3% air.
- E. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Job-Site Mixing - Mix materials for concrete in appropriate drum-type batch machine mixer. For mixers of one cu. yd. or smaller capacity, continue mixing at least 2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum and maximum mixing time by 15 seconds for each additional cu. yd. or fraction thereof.
- B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- C. Ready-Mix Concrete - Comply with requirements of ASTM C 94, and as specified.
- D. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and

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reinforcing steel.

3.2 FORMS

- A. General - Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades - Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening - Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General - Following leveling and tamping of granular base for slabs on grade, place vapor retarder/barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
- C. After placement of vapor retarder/barrier, cover with sand cushion and compact to depth as shown on drawings.

3.4 PLACING REINFORCEMENT

- A. General - Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
- B. Avoid cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
- C. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

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- D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- E. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- F. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints - Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect. Construction joints must be per FBC Sections 1907.4.1 and 1907.4.2.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Waterstops - Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions.
- F. Isolation Joints in Slabs-on-Ground - Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
- G. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.
- H. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth or inserts 1/4 inch wide by 1/4 of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 3. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
- I. Joint Spacing: Unless otherwise noted, the maximum spacing of construction joints shall be as follows:
 - 1. Foundation walls, walls: Forty-five (45) feet.
 - 2. Slabs: Fifteen (15) feet.

3.6 INSTALLATION OF EMBEDDED ITEMS

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- A. General - Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Forms for Slabs - Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. General - Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. General: Concrete shall be conveyed from the mixer to the forms as quickly as possible by method which will prevent segregation and loss of materials. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid re-handling. Special care shall be exercised to prevent splashing of forms or reinforcement with concrete in advance of pouring. Concrete shall be deposited in a continuous manner until a given unit of construction, as approved by the Architect, has been completed.

Placement of the following concrete shall be prohibited:

- 1. Partially hardened concrete.
- 2. Contaminated concrete.
- 3. Re-tempered concrete.
- 4. Concrete that has been re-mixed after initial set.

- B. Inspection - Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
- C. General - Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- E. Placing Concrete in Forms - Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 - 1. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete

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that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

- G. Placing Concrete Slabs - Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position during concrete placement.
- H. Cold-Weather Placing - Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement. Water shall not be heated over 180 deg. F.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 - 4. Concrete work shall be protected by wind breaks, curing compounds, and blanket covers if necessary in order to maintain the concrete in-place temperatures of at least 50 deg. F. for a period of seven (7) days after placing. If high early strength concrete is used, this time period may be reduced to three (3) days
- I. Hot-Weather Placing - When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
 - 4. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 - 5. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - 6. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 7. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish - For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish - For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth Rubbed Finish - Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.

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1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish - Provide grout-cleaned finish to scheduled concrete surfaces that have received smooth form finish treatment.
 1. Combine one part portland cement to 1-1/2 parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
 2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces - At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish - Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (FI) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish - Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.

After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - FI 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish - Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - FI 17. Grind smooth surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish - Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scuffing surface by fine brooming.
- E. Nonslip Broom Finish - Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with

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Architect before application.

- F. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
- G. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

3.11 CONCRETE CURING AND PROTECTION

- A. General - Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days at 50 degrees F minimum temperature.
- C. Curing Methods - Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
- D. Provide moisture curing by following methods.
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:
 - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces - Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces - Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

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3.12 SHORES AND SUPPORTS

- A. General - Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.
- B. Extend shoring from ground to roof for structures 4 stories or less, unless otherwise permitted.
- C. Extend shoring at least 3 floors under floor or roof being placed for structures over 4 stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.
- D. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without excessive stress or deflection.
- E. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.13 REMOVAL OF FORMS

- A. General - Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.14 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.15 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In - Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Reinforced Masonry - Provide concrete grout for reinforced masonry lintels and bond

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beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas - Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
- C. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- D. Repair of Formed Surfaces - Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
- E. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
- F. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- G. Repair of Unformed Surfaces - Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
- H. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
- I. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
- J. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
- K. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- L. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate.

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gate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

- M. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- N. Repair methods not specified above may be used, subject to acceptance of Architect.

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General - The Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.
 - 1. Sampling Fresh Concrete - ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 2. Slump - ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - 3. Air Content - ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - 4. Concrete Temperature - Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
 - 5. Compression Test Specimen - ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
- C. Compressive Strength Tests - ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- D. When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
- E. When total quantity of a given class of concrete is less than 50 cu. yds., Architect may waive strength test if adequate evidence of satisfactory strength is provided.
- F. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- G. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- H. Test results will be reported in writing to Architect, Structural Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

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- I. Nondestructive Testing - Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- J. Additional Tests - The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with
- K. ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03300

SECTION 03310 - CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

- 1.1 SCOPE: This item shall consist of concrete paving and miscellaneous concrete items composed of Portland cement concrete, with reinforcing steel, constructed as herein specified on an approved subgrade, and in conformance with the lines and grades shown on the plans and details.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 03100 - Concrete Formwork.
 - B. Section 03200 - Concrete Reinforcement.
 - C. Section 02200 - Earthwork.
- 1.3 CODES AND STANDARDS: Comply with the following codes and standards except as modified or amended herein:
 - A. ACI 301-99 "Specifications for Structural Concrete for Buildings."
 - B. ACI 318-99 "Building Code Requirements for Reinforced Concrete."
 - C. ACI 304R-00 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
- 1.4 TESTING: Refer to Section 01410.
- 1.5 WORKMANSHIP: All concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes, shall be removed and replaced or corrected as directed by the Architect/Engineer at the Contractor's expense, without extension of time.
- 1.6 SUBMITTALS: Submit to the Architect/Engineer in conformance with the requirements of the CONDITIONS OF THE CONTRACT.
 - A. Laboratory Test Reports: Submit two (2) copies of laboratory test reports for concrete materials, mix design tests, and field quality control tests as specified under "Testing."
 - B. Delivery Tickets: Furnish duplicate delivery tickets to the Architect/Engineer as specified under "Production of Concrete."
 - C. Color Samples of Gun-Applied Sealants: Submit manufacturer's chart of standard colors for color selection by the Architect/Engineer.
 - D. Aggregate for Exposed Aggregate Concrete Paving: Submit a one (1) quart sample of the specified aggregate for approval by the Architect/Engineer.
- 1.7 SPECIALTY SUBCONTRACTOR: Sealants shall be furnished and applied only by an applicator who can present positive proof of having successfully applied materials and used methods specified herein under comparable conditions over a period of at least five (5) years.

PART 2 – PRODUCTS

2.1 CONCRETE: All concrete shall be 3,500 psi or greater at twenty-eight (28) days, portland cement mix, reinforced as specified, and shall be of the size, dimension, and detail shown on the drawings and in accordance with these specifications.

A. Cement: Provide Portland cement, Type 1, ASTM C150, except as otherwise indicated.

B. Aggregates for Normal Weight Concrete;

1. Coarse: Shall conform to ASTM C33 and as herein specified. Use clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter. Shall be crushed stone, processed from natural rock or stone or washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.
2. Fine: Shall conform to ASTM C33 and as herein specified. Use clean, sharp, natural sand, free from loam, clay lumps, or other deleterious substances.
3. In proportioning, fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as combination of sizes when two or more are used, shall conform to the appropriate grading requirements of applicable ASTM specifications. Maximum sizes of aggregates shall be determined by proportioning requirements.
4. Provide aggregates of each type from one source to ensure uniformity of color, size, and shape.
5. Maximum size of coarse aggregate and proportion of design mix as follows:

	CONCRETE FOOTINGS, WALLS AND 6", 7" and 8" CONCRETE PAVING	4" or 5" THICK CONCRETE PAVING AND OTHER CONCRETE
Maximum Water and Cement Ratio, Gal/Sack	6 (max.)	6
Aggregate, Maximum Size	1-1/2"	3/4"
Weight	Normal	Normal
Slump Range, Inches	3-5	3-5
Percent Air Entrainment	---	---
PSI	3,500 min.	3,000 min.

C. Water for Mixing and Curing: Clean, fresh, free from oil, acid, organic matter, or other deleterious substances. Provide water for curing that does not contain impurities in sufficient amount to etch concrete surfaces or cause discoloration to concrete indicated to remain exposed and unpainted.

2.2 REINFORCING STEEL: Reinforcing steel shall be as called for on the drawings and shall conform to Section 03200.

2.3 SUBGRADE: All subgrade for concrete paving shall be compacted or lime treated as shown on the drawings and as specified in Section 02200 - Earthwork.

2.4 EXPANSION JOINTS: Material for expansion joints shall be one-half (1/2") inch or three-quarter (3/4") inch pre-molded fiber or redwood to the thickness of the concrete paved cross section as shown on the plans. Provide a zip-strip to facilitate joint sealing.

2.5 EXPANSION JOINT DOWELS:

- A. Dry Brush 4" or 5" Thick Concrete Paving: Shall be 5/8" diameter smooth bar dowels twelve (12") inches long, with 5" embedment, and with one (1) end capped with felt or polyethylene film and placed at twenty-four (24") inches on center (areas shown) through the center of each expansion joint.
- B. Dry Brush 6" Thick Concrete Paving: Shall be 3/4" diameter smooth bar dowels fourteen (14") inches long, with 6" embedment, and with one (1) end capped with felt or polyethylene film and placed at twenty-four (24") inches on center (areas shown) through the center of each expansion joint.
- C. Dry Brush 7" or 8" Thick Concrete Paving: Shall be 7/8" diameter smooth bar dowels fourteen (14") inches long, with 6" embedment, and with one (1) end capped with felt or polyethylene film and placed at twenty-four (24") inches on center (areas shown) through the center of each expansion joint.

2.6 FORMS: Concrete forms shall conform to Section 03100 - Concrete Formwork.

2.7 CHAIRS: Use wire-bar type supports or plastic-type chairs, as approved by the Architect/Engineer. Do not use wood, brick or other unacceptable materials.

2.8 EXPANSION JOINT SEALER:

- A. Walks: All joint sealer for concrete sidewalks, expansion joints at backs of curbs and other expansion joints occurring in walks shall be a two-part pourable polyurethane sealant, conforming to Interim Federal Specification TT-S-00227E and shall be Pecora Corporation's Urexpan NR-200 or Tremco Manufacturing Company's THC/900 sealant, colors to be selected by Architect/Engineer. Sonneborne paving joint sealer will be acceptable with prior approval.
- B. Walls: Sealant for vertical walls shall be Pecora, Dynaflex-2, Sonneborne NP-2, or Tremco Dymeric Elastomeric Sealant.

2.9 SAND CUSHION: Not permitted.

2.10 CURING COMPOUND: Curing compound shall be Type I (clear or translucent) or Type II (white-pigmented), as defined by ASTM Designation C309. Products offered by manufacturers which comply with the requirements include the following:

Horncrete 30D: A. C.Horn/W. R. Grace.
 Clear-Bond: Guardian Chemical Company.
 LR 151: Protex Industries, Inc.

2.11 ANCHORAGE MATERIALS: All threaded inserts, anchors, etc., shall be the type, size, and location as shown on the plans.

2.12 EPOXY-RESIN ADHESIVE BINDER: Provide a two (2) component, mineral filled, epoxy polysulfide polymer complying with FS-MMM-G-650, Type I or II, Grade A. Complying products include the following:

Epoxite Grout: W.R. Grace
 Colma Dur: Silka Chemical

PART 3 - EXECUTION

- 3.1. GENERAL: Concrete work will have a thickness as shown on the details and shall be placed subgraded as shown. Standard slopes for paving, unless otherwise shown on the plans, will be one-quarter (1/4") inch per foot.
- 3.2 GRADES: Verify proposed grades, establishing surface elevation of paving as shown on the drawings. Before proceeding with the work, all such proposed grades shall be verified in consideration of the drainage conditions and job conditions. The intent of this contract is to require grades which will permit proper drainage of the site, proper drainage away from the various constructed surfaces thereon. Any grade or condition, proposed or existing, which, in the opinion of the Contractor, represents a hazard to such drainage shall be brought to the Architect/Engineer's attention immediately.
- 3.3 FORMS: All formwork shall be observed and approved by the Owner's Representative prior to placing any concrete. See Section 03100 - Concrete Formwork. Forms shall be securely staked to line and grade and maintained in a true position during the placement of concrete.
 - A. Forms for Making Placed Concrete: Forms shall be set true to line and grade in advance of the concreting for a distance sufficient to permit a finished subgrade for a length of one hundred (100') feet ahead of the concrete. They shall be joined neatly and tightly and shall be set with exactness to grade and alignment. All forms must be in firm contact with the subgrade throughout their entire length and base width and securely staked with at least three (3) pins per ten (10') foot section. If the subgrade becomes unstable, the forms shall be reset using heavy stakes or other additional supports such as may be required to provide sufficient stability to withstand vibration and movement of all equipment operated thereon.
 1. If forms settle over one-eighth (1/8") inch under finishing operation, paving operations shall be stopped; forms shall then be reset to line and grade, and pavement brought up to standard section and thickness.
 2. Forms must be cleaned and oiled before concrete is placed against them.
 3. Forms shall remain in place until the concrete is at least twelve (12) hours old, and removal of forms shall be followed immediately by coating the sides of the slab with curing compound and then banking earth against the sides of the slab and wetting same.
- 3.4 PLACEMENT OF REINFORCEMENT: All reinforcement shall be placed in the center of formwork and securely held in place by the use of chairs.
- 3.5 PRODUCTION OF CONCRETE:
 - A. Concrete shall be transit mixed (on-site batching optional) as specified herein. All plant facilities are subject to acceptance of the Architect/Engineer.
 - B. Ready Mixed Concrete: Comply with requirements of ASTM C94, and as herein specified, provided the quantity and rate of delivery will permit unrestricted progress of the work in accordance with the placement schedule. Proposed changes in mixing procedures other than specified herein must be accepted by the Architect/engineer before implementation. Modifications to ASTM C94 are as follows:
 1. Provide concrete materials, proportions, and properties as herein specified in lieu of ASTM Section 4.

2. Slump: Slump range in inches shall be within 3"-5" in lieu of ASTM Section 5.1.
 3. Mixing and Delivery: Delete the references for allowing additional water to be added to the batch of material with insufficient slump. Addition of water to be batch will not be permitted as specified in ASTM Section 9.7. In addition to the requirements of ASTM Section 9.7, when the air temperature is between 85 and 90 degrees Fahrenheit reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is above 90 degrees Fahrenheit reduce the mixing and delivery time to 60 minutes. When the truck mixer is used for the complete mixing of the concrete, begin mixing operation within 30 minutes after the cement has been intermingled with the aggregate.
 4. Certification: Furnish duplicate delivery tickets with each load of concrete delivered to the site. In addition to the requirements of ASTM Section 14.1, provide the following information on delivery tickets: type and brand of cement, cement content per cubic yard of concrete, maximum size of aggregate, amount and brand name of each admixture, and total water content expressed as water/cement ratio.
 5. Strength: Delete ASTM Section 15 and comply with concrete testing requirements as herein specified.
 6. Maintain equipment in proper operating condition with drums cleaned before changing each batch. Schedule rates of delivery in order to prevent delay of concrete too long in the mixer before the addition of water admixtures.
- C. Cold Weather Requirements: No concrete shall be placed when the temperature is below forty (40) degrees Fahrenheit or when the temperature is fifty (50) degrees and dropping.
- 3.6 EMBEDDED ITEMS: Set and build, into the work, anchorage devices and other embedded items required for other work, including, but not restricted to, metal inserts, mechanical and electrical inserts, as required. Refer to drawings for location, type, size, etc.
- 3.7 DRY BRUSH FINISH CONCRETE PAVING:
- A. Placing: Prior to placing concrete, the subgrade shall be moistened and then concrete shall be placed in forms and thoroughly tamped in place so that all honeycombs will be eliminated and sufficient mortar will be brought to the surface. The surface shall be troweled with a steel trowel and then brushed to obtain a smooth uniform brush finish.
 - B. Curing: As soon as possible after the concrete has been poured and finished, it shall be cured by the use of the specified curing compound. The curing compound shall be applied full strength or as recommended by the manufacturer. It shall in no way be diluted by the addition of petroleum products.
 - C. All faces adjacent to the forms shall be spaded so that the forms are stripped. The surface of faces will be smooth and free of honeycombs. Edges of all walks shall be finished to a one-half (1/2") inch radius with a suitable finishing tool.
 - D. Expansion Joint Sealing: Expansion joints shall be sealed by an experienced applicator with the sealant specified to a depth equal to joint width with a minimum depth of one-half (1/2") inch.
1. Preparation: All surfaces in contact with compounds shall be dry, sound, well brushed and wiped free. Remove curing compounds, oil, and other such materials by wire brushing.

2. Application: The ambient temperature shall be as recommended by sealant manufacturers when sealants are applied. Gun-apply compounds with nozzles of proper sizes to fit joints. Force into grooves with sufficient pressure to expel air and fill grooves solidly. Joints shall be free of wrinkles and tooled smooth.
 3. Cleaning: Clean surfaces adjoining sealed joints of smears and other soiling resulting from sealing application. Clean up all debris caused by the work of this section, keeping the premises clean and neat at all times.
- 3.8 PROTECTION: After concrete is placed, finished, and cured as required, permit no traffic thereon for three (3) days thereafter and further protect the surface from damage due to other causes. Vehicles of all types shall be kept off sidewalks, curbs, gutters, etc., during the construction period.
- 3.9 STRIPPING OF FORMS:
- A. Formwork not supporting weight of concrete, such as edges of slabs, etc., may be removed twelve (12) hours after placing concrete provided concrete is sufficiently hard to not be damaged by removal operations and provided that curing and protection operations are maintained.
 - B. After forms are removed and prior to backfilling with earth, the edges of the slabs shall be coated with membrane-curing compound.
- 3.10 4" or 5" CONCRETE PAVING JOINTS:
- A. Contraction Saw Joints: Shall be one-eighth (1/8") inch wide by one (1") inch deep, joints placed on ten (10') foot centers, unless otherwise shown. Contraction joints will not be required to be sealed. Joints will be sawed as soon as sawing can be performed without stripping aggregate from the concrete, generally within six (6) to twelve(12) hours after placement.
 - B. Doweled Expansion Joints: Shall be placed where concrete paving abuts the back of all concrete curbing, at points between pours and at intersections with other walks or concrete paved areas.
- 3.11 DEFECTIVE CONCRETE: Any concrete which, in the opinion of the Architect/Engineer, has crazed or cracked considerably or possesses a bad finish or is not at the proper grade, size or location or does not meet the specified strength will be subject to rejection, and it shall be removed and replaced, at the Contractor's expense. Any concrete which needs to be repaired shall be repaired by methods approved by the Architect/Engineer.
- 3.12 CLEANUP: It is the intent of this contract to ensure that an adequate cleanup job will be performed by the Contractor as soon during the construction procedure as possible. In particular, all concrete edging and sidewalk shall be backfilled as soon as possible. Before the project is accepted by the Owner, all rocks, stones, and other construction debris shall be removed. All necessary cleanup work shall be considered subsidiary to the various bid items in this contract.
- 3.13 SCHEDULE OF TEST SPECIMENS: Provide the indicated number of sets of specimens for testing, there being three cylinder specimens per set as described in this specification. Specimens shall be taken during placement of concrete as directed by the Owner or Architect/Engineer and under the supervision of a representative of the laboratory testing agency.

Provide one (1) set per truck.

END OF SECTION 03310

SECTION 03361 – INTEGRALLY COLORED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.
- B. Section Includes:
 - 1. Integrally colored concrete exterior slabs-on-grade, sidewalks, patios, and other exterior concrete pavements.
 - 2. Curing of integrally colored concrete.
- C. Related Sections:
 - 1. Division 3 Section "Cast-In-Place Concrete" for general applications of concrete and coordination of sample submittal [and color selection].
 - 2. Division 7 Section "Joint Sealants" for colored sealant for joints.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 "Specification for Structural Concrete for Buildings."
 - 2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
 - 3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
 - 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
 - 5. ACI 305R "Recommended Practice for Hot Weather Concreting."
 - 6. ACI 306R "Recommended Practice for Cold Weather Concreting."
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
 - 2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
 - 3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."
- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M194 "Chemical Admixtures."

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical data sheets for the following:
 - 1. Colored admixture.
 - 2. Curing compound.
- B. Design Mixes: For each type of integrally colored concrete.
- C. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- D. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with 10-years experience in the production of specified products.
- B. Installer Qualifications: An installer with 5-years experience with work of similar scope and quality.

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- C. Comply with the requirements of ACI 301.
- D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.
- E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.
- F. Integrally Colored Concrete Mockups:
 - 1. Provide under provisions of Division 1 Section "Quality Requirements."
 - 2. At location on Project selected by Architect, place and finish (3) 4 by 4 feet areas, each colored differently per the Architect's color selection.
 - 3. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards (or not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.
 - 4. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
 - 5. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
 - 6. Accepted mockup provides visual standard for work of Section.
 - 7. Mockup shall remain through completion of work for use as a quality standard for finished work.
 - 8. Remove mockup when directed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

- A. Integrally Colored Concrete Environmental Requirements:
 - 1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
 - 2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
 - 3. Comply with professional practices described in ACI 305R and ACI 306R.
- B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

1.7 PRE-JOB CONFERENCE

- A. One week prior to placement of integrally colored concrete a meeting will be held to discuss the Project and application materials.
- B. It is suggested that the Architect, General Contractor, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. L.M. SCOFIELD COMPANY, Douglasville, Georgia and Los Angeles, California (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Western Division –

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714-568-1870; Central Division Office – 630-377-5959. Local Florida Contact: Steve Rissi – 727-515-1849

- B. Approved equal. Alternate products complying with the performance criteria detailed in this specification section, shall be approved by the Design Professional not less than ten days prior to bid date. All proposed alternates (clearly delineated as such) must be submitted in writing for approval by the Design Professional a minimum of 10 days prior to bid date and must be made available to all bidders.

Note that the same manufacturer must provide all dyed colored ground and polished concrete and integrally colored concrete areas (see Section 03360).

2.2 MATERIALS

- A. Colored Admixture for Integrally Colored Concrete: CHROMIX P® Admixture and CHROMIX ML®; L.M. SCOFIELD COMPANY.
1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
 2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.
- B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.
1. Exterior Integrally Colored Concrete: LITHOCHROME® COLORWAX; L.M. SCOFIELD COMPANY. Use to cure exterior flatwork that will be allowed to cure naturally with only occasional maintenance.
- C. SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:
1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
 2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Architect can examine.

2.3 COLORS

- A. Concrete Color[s]:
1. Cement: Color shall be gray.
 2. Sand: Color shall be locally available natural sand.
 3. Aggregate: Concrete producer's standard aggregate complying with specifications.
 4. Colored Admixture: From Scofield Color Chart A-312.
 - a) C-31 Shadow Slate
 - b) C-32 Quarry Red
 - c) C-25 Sombrero Buff
- B. Curing Compound: Color to match integrally colored concrete.

2.4 CONCRETE MIX DESIGN

- A. Minimum Cement Content: 5 sacks per cubic yard of concrete.
- B. Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches. If super plasticizers or mid-range water reducers are allowed, slump shall not exceed 8-inches.
- C. Do not add calcium chloride to mix as it causes mottling and surface discoloration.

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- D. Supplemental admixtures shall not be used unless approved by manufacturer.
- E. Do not add water to the mix in the field.
- F. Add colored admixture to concrete mix according to manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install concrete according to requirements of Division 3 Section "Cast-In-Place Concrete."
- B. Do not add water to concrete mix in the field.
- C. Surfaces shall be finished uniformly with the following finish:
 - 1. Broomed: Pull broom across freshly [floated] [troweled] concrete to produce [fine] [medium] [coarse] texture in [straight] [wavy] lines perpendicular to main line of traffic. Do not dampen brooms.
- D. Integrally Colored Concrete: Apply curing compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing compound at consistent time for each pour to maintain close color consistency.
- E. Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.
- F. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.
- G. Do not cover concrete with plastic sheeting.

3.2 TOLERANCES

- A. Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

3.3 APPLICATORS

- A. For a list of qualified contractors, contact your local Scofield representative or the appropriate Division Office: Eastern Division – 201-672-9050; Western Division – 714-568-1870; Central Division Office – 630-377-5959.

END OF SECTION 03361

SECTION 03370 - PNEUMATIC CONCRETE FOR SWIMMING POOLS (PRIMARY METHOD)

PART 1 - GENERAL

- 1.1 CONDITIONS OF THE CONTRACT: The conditions of the Contract (General, Supplementary and other Conditions) and the General Requirements are hereby made a part of this Section.
- 1.2 SCOPE: This section shall govern the furnishing and placing of pneumatically placed concrete "shot-crete" for the pool shell.
- 1.3 CODES AND STANDARDS:
- A. ACI 304.2R-71, "Placing Concrete by Pumping Methods"
 - B. ACI 305R-77, "Hot Weather Concreting"
 - C. ACI 306R-78, "Cold Weather Concreting"
 - D. ACI 506.2-77, "Specifications For Materials, Proportioning and Application of Shotcrete"
 - E. ACI 506.3R-82, "Guide To Certification of Shotcrete Nozzlemen"
 - F. ACI 308-81, "Standard Practice For Curing Concrete"
 - G. ACI 318-99, "Building Code Requirements For Reinforced Concrete"
- 1.4 RELATED WORK SPECIFIED ELSEWHERE:
- A. Section 03010 – Concrete for Pool Structures
 - B. Section 03310 – Cast-In-Place Concrete.
 - C. Section 03100 – Concrete Formwork

PART 2 - PRODUCTS

- 2.1 MATERIALS: The cement, water, and sand shall conform to the requirements of Section 03010, "Concrete for Pool Structures."
- 2.2 Bar reinforcement shall also conform to the requirements of Section 03200.

PART 3 - EXECUTION

- 3.1 PROPORTIONING AND MIXING: Unless otherwise specified, the pneumatically placed concrete shall be batch mixed.

At the beginning of work the Engineer may require that cylinders be made to represent the quality of the pneumatically placed concrete. Additional cylinders or test beams will be made during prosecution of the work as directed by the Engineer. If in the opinion of the Engineer, the cylinder strengths are indicating undesirable variation in the concrete, the Contractor may be required to change the mix design and/or method of placing so as to correct this condition.

All concrete shall have a minimum compressive strength of 4,000 psi at 28 days. The Contractor shall furnish specially constructed cylinders six inches in diameter and twelve inches high, made of $\frac{3}{4}$ " square mesh hardware cloth. Test cylinders for pneumatically placed concrete shall be shot with the same air pressure and nozzle tips as the pneumatically placed concrete. At the end of the first 24 hours curing period, the hardware cloth form shall be removed and the cylinders stored and cured, as directed by the Engineer.

- 3.2 OPERATING REQUIREMENTS: The compressor or blower used to supply air shall be capable of delivering a sufficient volume of oil free air, at a pressure range of 30 to 85 psi as required by the size of the nozzle employed. Required capacity of compressor and operating pressures are shown in the table below for the various nozzle sizes. Steady pressure must be maintained

throughout the placing process. The water pump shall be sufficient size and capacity to deliver the water to the nozzle at a pressure of not less than 15 psi in excess of the required air pressure.

Compressor Capacities			
Compressor Capacity Cubic feet per Minute	Hose Diameter Inches	Maximum Size of Nozzle Tip Inches	Operating Air Pressure Psi
250	1	3/4	40
315	1-1/4	1	45
365	1-1/2	1-1/4	55
500	1-5/8	1-1/2	65
600	1-3/4	1-5/8	75
750	2	1-3/4	85

The values shown in the above table are based on a hose length of 150 feet with the nozzle not more than 25 feet above the delivery equipment. Operating pressures shall be increased approximately 5 psi for each additional 50 feet of hose and approximately 5 psi for each 25 feet the nozzle is raised.

- 3.3 REBOUND: Rebound recovered clean and free of foreign matter may be reused as sand in quantity not to exceed 20 percent of the total sand requirements.
- 3.4 FORMING: The top edge of the pool shall be formed with wood forms and finished to accommodate the coping and tile work as detailed on the plans.
- 3.5 PLACING AND FINISHING: Pneumatically placed concrete shall be placed in accordance with the details and to the dimensions shown on the plans. Set taut wire or fine fishing line at the top inside edge of proposed finished wall and intermediate lines as necessary to control vertical faces and meet tolerances.

Before the concrete is placed the pool area shall be compacted uniformly and thoroughly, and brought to a uniform moist condition. Reinforcement shall be supported properly throughout placement of concrete using wire chairs or plastic chairs made for this purpose. Brick, block, wood or similar reinforcing support shall be removed as placement progresses, and not incorporated into the work.

Proper consistency shall be controlled at the nozzle valve by the operator and a low water-cement ratio must be maintained.

The mix shall be sufficiently dry so that it will not sag or fall from vertical or inclined surfaces or separate in horizontal work. The placed concrete shall be struck off with a screed or float to an even line, grade and smooth radius. Removable grade stakes shall be set in walls and floors not more than 25 feet on centers to assure minimum thicknesses of concrete are installed.

The surfaces of the pneumatically placed concrete shall be given a trowel finish. The original surface and each surface which is permitted to harden before applying succeeding layers shall be washed with water and air blast or a stiff hose stream, and loosened material removed. Sand which rebounds and does not fall clear of the work or which collects on horizontal surfaces shall be blown off from time to time to avoid leaving sand pockets. Concrete shall not be applied to a surface containing frost or ice. Where standing or running water is encountered it shall be removed before applying the concrete.

Contractor shall coordinate the installation of light niches, steps, anchors, sleeves, drains, and other appurtenances. These fixtures shall be set in as the gunnite is shot or blocked in for later installation. Gouging out after the concrete is set shall not be allowed.

No work shall be done without the permission of the Engineer when the temperature is lower than 40 degrees F. After placing, the concrete shall be protected from freezing or quick drying.

3.6 EXPANSION/ISOLATION JOINTS: Shall be provided as shown on the plans and be continuous through pool walls and floors. Use of sloped construction joints during the shotcrete processes (ACI Method) shall not be allowed in lieu of joints with waterstops.

3.7 TOLERANCES:

(a) Floors: Floors shall be placed to the depths, lines and dimensions shown on the plans plus or minus 1-inch. Floors shown to be planar shall not vary more than (+/-) 1/4-inch from a 10-foot straight edge.

(b) Walls: Tolerances for pool wall dimensions shall be maintained as follows:

	Course Length	Top 36" below water end walls	Variance between length all lanes
Club Level (Default)	+/- 1"	No more than 1/2" from plumb	

3.7 CURING: Immediately following the finishing operation, the shell shall be cured by frequent moisture application using misting spray nozzles.

END OF SECTION 03370

DIVISION 4 – MASONRY

SECTION 04816 – CONCRETE UNIT MASONRY ASSEMBLIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete Masonry Units
 - 2. Mortar and Grout
 - 3. Steel Reinforcing Bars
 - 4. Masonry Joint Reinforcement
 - 5. Ties and Anchors
 - 6. Embedded Flashing
 - 7. Miscellaneous Masonry Accessories
 - 8. Masonry Cell Insulation
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete".
 - 2. Division 05 Section "Structural Steel Framing".
 - 3. Division 07 Section "Building Insulation".
 - 4. Division 07 Section "Sheet Metal Flashing and Trim".

1.3 QUALITY ASSURANCE

- A. Codes and Standards - Comply with governing codes and applicable provisions of the following:
 - 1. National Concrete Masonry Association (NCMA), including "TEK Bulletins".
 - 2. American Concrete Institute (ACI), including ACI 531, ACI 531R and ACI 531.1.
 - 3. Portland Cement Association (PCA), "Concrete Masonry Handbook".
- B. Fire Performance Characteristics - Where fire-resistance ratings are indicated for unit masonry work, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.
- C. Field Construction Mock-Ups - Prior to installation of masonry work, erect sample wall representative of completed masonry work required for project with respect to qualities of appearance, materials and construction. Locate mock-ups during construction as standard for judging completed masonry work. Build mock-ups which are approximately 6' long by 4' high by full thickness. When directed, demolish mock-ups and remove from site.

1.4 SUBMITTALS

- A. Product Data - Submit manufacturer's product data for each type of masonry unit, accessory and other manufactured products, including certifications that each type complies with specified requirements.
- B. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

1.5 JOB CONDITIONS

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- A. Protection of Work - During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
- B. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- C. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.
- D. Staining - Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over all surface.
- E. Protect sills, ledges and projections from droppings of mortar.
- F. Cold Weather Protection
 - 1. Do not lay masonry units which are wet or frozen.
 - 2. Remove all masonry determined to be damaged by freezing conditions.
 - 3. No masonry work shall be performed when the air temperature is 38 deg. F. and falling.

PART 2 – PRODUCTS

2.1 MASONRY UNITS - GENERAL

- A. Manufacturer - Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.
- B. Masonry Unit Characteristics - Provide units complying with standards referenced and requirements indicated.

2.2 CONCRETE MASONRY UNITS (CMU)

- A. Size - Manufacturer's standard units with nominal face dimensions of 16" long x 8" (15-5/8" x 7-5/8" actual), unless otherwise indicated.
- B. Special Shapes - Provide where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
- C. Hollow Load Bearing (HL) CMU - ASTM C 90 and as follows:
 - 1. Grade N.
- D. Weight Classification: Normal weight units unless otherwise indicated. (125 lbs. per cu. ft. or more, oven dry weight of concrete.)
- E. Cure units by atmospheric drying for not less than 30 days before installation, to comply with ASTM C 90, Type II.
- F. Exposed Faces - Provide manufacturer's standard color and texture, unless otherwise indicated.
 - 1. Where special finishes are indicated, provide units with exposed faces of the following general description matching color and texture as selected by Architect from manufacturers standard color and texture.
 - a. Standard aggregate, ground finish.
 - b. Standard aggregate, split face finish.

2.3 MORTAR MATERIALS

- A. Portland Cement - ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.

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- B. Masonry Cement - ASTM C 91.
- C. Hydrated Lime - ASTM C 207, Type S.
- D. Aggregate for Mortar - ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.
- E. Aggregate for Grout - ASTM C 404.
- F. Water - Clean and potable.

2.4 MASONRY ACCESSORIES

- A. Horizontal Joint Reinforcing and Ties for Masonry - Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner ("L") and intersecting ("T") units. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross rods, into units with widths of approximately 2" less than nominal width of walls and partitions as required to position side rods for full embedment in mortar with mortar coverage of not less than 5/8" on joint faces exposed to exterior and not less than 1/2" elsewhere. Provide the following type of joint reinforcing unless otherwise indicated.
 - 1. Truss type with diagonal cross rods spaced not more than 16" o.c.
- B. Number of Side Rods - Single pair for single wythe masonry.
- C. Wire Sizes - Fabricate with 9-gage side and cross rods, unless otherwise indicated.
- D. Wire Finish - Provide manufacturer's standard mill galvanized finish except as otherwise indicated.
- E. For exterior walls hot-dip galvanized joint reinforcing after fabrication to comply with ASTM A 153, Class B-2 coating (1.5 oz. per sq. ft.).
- F. Steel Strap Anchors - Provide straps, bars, bolts and rods fabricated from not less than 16 ga. sheet metal or 3/8" diameter rod stock, unless otherwise indicated.
- G. Miscellaneous Masonry Accessories
 - 1. Reinforcing Bars - Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.

2.5 MORTAR AND GROUT MIXES

- A. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents.
- B. Do not use calcium chloride in mortar or grout.
- C. Mortar for Unit Masonry - Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.
- D. Limit cementitious materials in mortar to portland cement - lime.
- E. Use Type N mortar for all interior masonry work.
- F. Use Type S mortar for all exterior masonry work.
- G. Grout for Unit Masonry - Comply with ASTM C 476 for grout for use in construction of unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.

2.6 MASONRY-CELL INSULATION

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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1. Forced Foam Insulation in Masonry:
 - a. Core-Fill 500 by Tailored Chemical Products, Inc.
 - b. Thermco Foam Insulation by Thermco Corporation of America.
 - c. cfFOAM, Inc. by Southern Foam Insulation, Inc.

PART 3 – EXECUTION

3.1 INSTALLATION - GENERAL

- A. Thickness - Build masonry construction to the full thickness shown, except, build singlewythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Build chases and recesses as shown and as required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses unless otherwise noted.
- C. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible. Use dry cutting saws to cut concrete masonry units.
- D. Do not wet concrete masonry units.
- E. Pattern Bond - Lay exposed masonry in running bond vertical joint in each course centered on units in courses above and below except as otherwise noted.
- F. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half size units at corners, jambs and wherever possible at other locations.
- G. Lay-up walls plumb and with courses level, accurately spaced and coordinated with other work.
- H. Stopping and Resuming Work - Rack back 1/2-masonry unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required to be wetted), and remove loose masonry units and mortar prior to laying fresh masonry.
- I. Built-In Work - As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.
- J. Fill space between hollow metal frames and masonry solidly with mortar.
- K. Where built-in items are to be embedded in cores of hollow masonry units, place a layer metal lath in the joint below and rod mortar or grout into core.
- L. Fill CMU cores with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar conditions unless otherwise indicated.
- M. Non-Loadbearing Interior Partition Walls: Build full height of story to underside of solid structure above, unless otherwise indicated.

3.2 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout. For starting courses on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- B. Joints - Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not otherwise indicated, lay walls with 3/8" joints. Cut joints flush for ma-

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sonry walls which are to be concealed or to be covered by other materials. Tool all exposed joints in masonry walls slightly concave using a jointer larger than joint thickness. Rake out mortar in preparation for application of caulking or sealants where shown.

- C. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.3 HORIZONTAL JOINT REINFORCING

- A. Provide continuous horizontal joint reinforcing as shown and specified. Full embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap reinforcement a minimum of 6". Do not bridge control and expansion joints with reinforcing, unless otherwise indicated. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, pipe enclosures and other special conditions.
- B. Space conditions horizontal reinforcing as follows:
 - 1. For single wythe walls, space reinforcing at 16" o.c. vertically, unless otherwise indicated.
 - 2. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8" apart, both immediately above lintels and below sills.
 - 3. Extend reinforcing a minimum of 2'-0" beyond jambs of the opening, bridging control joints where provided.

3.4 ANCHORING MASONRY WORK

- A. See Drawings.

3.5 MASONRY-CELL INSULATION INSTALLATION

- A. Foam wall insulation is to be pumped into open masonry cavities indicated to receive insulation, taking care to fill voids completely. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close ports after confirming complete coverage. Follow manufacturer's recommendations for product liquid ratios at mixing gun.
- B. Foam wall insulation shall be installed from exterior face of masonry units. Wherever possible locate holes where they will be covered by the exterior finish material. Plug injection holes and inspection ports with materials matching adjacent materials in type, finish and color

3.6 LINTELS

- A. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed in place lintels. Cure precast masonry before handling or installing. Temporarily support formed-in-place lintels.
- B. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.7 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

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- B. Pointing - During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.
- C. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA TEK Bulletin No. 28.

END OF SECTION 04816

SECTION 04863 - ADHERED STONE MASONRY VENEER

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. Section Includes:
 - 1. Stone masonry adhered to concrete unit masonry backup.
- B. Related Sections:
 - 1. Section 04816 "Concrete Unit Masonry Assemblies".

1.3 REFERENCES

- A. ASTM C 91 – Standard Specification for Masonry Cement.
- B. ASTM C 97 – Standard Specification for Absorption and Bulk Specific Gravity of Dimension Stone.
- C. ASTM C 99 – Standard Specification for Modulus of Rupture of Dimension Stone.
- D. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
- E. ASTM C 150 – Standard Specification for Portland Cement.
- F. ASTM C 170 – Standard Specification for Compressive Strength of Dimension Stone.
- G. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
- H. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
- I. ASTM C 616 – Standard Specification for Quartz-Based Dimension Stone.
- J. ASTM C 780 – Preconstruction Evaluation of Mortar for Plain & Reinforced Masonry.
- K. ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures.
- L. ACI 530.1/ASCE 6/TMS 602 – Specifications for Masonry Structures.
- M. National Concrete Masonry Association TEK 8-2A for masonry cleaning.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.
- B. Samples for Verification:
 - 1. For stone type indicated. Include at least two samples showing the full range of color and other visual characteristics in completed Work.
 - 2. For color of mortar required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as

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required to identify materials used. Include mix proportions for mortar and source of aggregates.

1. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Architect approves such deviations in writing.

C. **Material Test Reports:**

1. **Stone Test Reports:** For stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous three years.
2. **Sealant Compatibility and Adhesion Test Report:** From sealant manufacturer indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified installer who employs experienced stonemasons and stone fitters.
- B. **Mockups:** Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Build mockup of typical wall area as shown on Drawings.
 2. Build mockups for in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.
 - a. Include stone sill at top of mockup.
 - b. Include a sealant-filled joint at least 16 inches long in mockup.
 3. Protect accepted mockups from the elements with weather-resistant membrane.
 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

- A. **Preconstruction Sealant Compatibility and Adhesion Testing:** Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 07920 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

1.10 FIELD CONDITIONS

- A. **Protection of Stone Masonry:** During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

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- B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.11 COORDINATION

- A. Advise installers of other work about specific requirements for placement of items to be built into stone masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Stone: Obtain stone from single quarry with resources to provide materials of consistent quality in appearance and physical properties.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

2.2 STONE MATERIAL

- A. Provide the same variety of stone, matching in appearance and properties, and obtained from the same source as the stone material installed on the Morgan Family Community Center building; the variety and properties of which and, the source from which it was obtained being as listed in the paragraphs below.
- B. Variety: "Sandy Creek Ledgerock" Quartzite Sandstone – no substitutions.
 - 1. 100 percent Split-Face.
 - 2. Depth: 3 to 5 inches.
 - 3. Heights: 1 to 3 inches.
 - 4. Lengths: 8 to 20 inches.
 - 5. Coverage: 40-45 Sq. Ft. per ton.
- C. Source: Krukowski Stone Co. Inc., 3781 County Road C, Mosinee, Wisconsin 54455, ASD.
- D. Properties:
 - 1. Material Type: Quartzite Sandstone.
 - 2. Material Class: Sedimentary.
 - 3. Dry Density: 158.7 pcf.
 - 4. Bulk Specific Gravity: 2.54.
 - 5. Absorption: 0.5 percent.

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6. Modulus of Rupture: 1,850 psi.
7. Compressive Strength: 17,700 psi.
8. Freeze-Thaw Weight Loss: <0.5 percent.
9. Abrasion Resistance: 63.8.
10. Mohs Hardness: 6-7.

2.3 MORTAR MATERIALS

- A. Provide the mortar mix product, matching in appearance and properties, the product installed with the stone masonry veneer on the Morgan Family Community Center building, listed in the paragraph below.
- B. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.
 1. Product: Subject to compliance with requirements, provide the following:
 - a. Holcim (US) Inc.; Rainbow Mortamix Custom Color 200N.
 2. A comparable product by another manufacturer, matching the appearance and properties of the product listed above, may be provided as a substitute for the listed product, subject to the approval of the Architect and the stone material supplier.
- C. Water: Potable.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Cementitious Dampproofing: Cementitious formulation recommended by ILI and nonstaining to stone, compatible with joint sealants.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide 255 MultiMax and Hydro Ban manufactured by LATICRETE, or comparable products by another manufacturer, subject to the approval of the Architect and the stone material supplier.

2.5 WEATHER SEAL TREATMENT FOR NATURAL STONE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Sure Klean Weather Seal Natural Stone Treatment WB" manufactured by PROSOCO, or a comparable product by another manufacturer, subject to the approval of the Architect and the stone material supplier.

2.6 FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
- B. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings.
- C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.
- D. Carefully inspect stone at quarry for compliance with requirements for variety, appearance, and properties. Replace defective units before shipment.
 1. Clean sawed backs of stone to remove rust stains and iron particles.
- E. Gage backs of stones for adhered veneer if more than 81 sq. in. in area.
- F. Thickness of Stone: Provide thickness indicated, but not less than the following:

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1. Thickness: 1 inch plus or minus 1/4 inch.
- G. Shape stone for type of masonry (pattern) as follows:
 1. Match the shape of the stone installed on the North Port Youth Community Center building.
- H. Finish exposed stone faces and edges to comply with requirements indicated for finish and matching the finish on the stone masonry veneer installed on the North Port Youth Community Center building.
 1. Finish: Split face.
 2. Finish for Sills: Smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- B. Stone must be water saturated, surface-dry when placed. Water down the stone 24 hours prior to placement until saturated. Re-apply water to keep stone saturated as required by weather conditions.
- C. Clean all built-in items of loose rust, mud or other foreign matter before incorporating into the wall. All ferrous metal built into the wall shall be primed or galvanized.
- D. If required, provide temporary bracing during installation of masonry work. Maintain bracing in place until building structure provides permanent support.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or more.
- D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.4 INSTALLATION OF ADHERED STONE MASONRY VENEER

- A. Install lath over unit masonry and concrete to comply with ASTM C 1063.

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- B. Install veneer stone and mortar in accordance with ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.
- C. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.
- D. Pattern Bond:
 - 1. Lay stone with the split face exposed. Take care to avoid a concentration of any one color to any one wall surface.
 - 2. Maintain an approximate 1/2 inch joint, as stone allows.
 - 3. Do not use stacked vertical joints.
 - 4. Lay out work in advance and distribute color range of stone uniformly over total work area.
- E. Coat backs of stone units and face of masonry backup with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and masonry backup.
- F. Joining Work: Where fresh masonry joins partially set masonry.
 - 1. Remove loose stone and mortar.
 - 2. Clean and lightly wet surface of set masonry.
 - 3. To avoid a horizontal run of masonry, rake back 1/2 the length of stone in each course.
 - 4. Toothing is not permitted.
- G. Joints:
 - 1. Lay stone with approximate 1/2 inch mortar joint, as stone allows.
 - 2. Tool joints when "thumb-print" hard with a round jointer slightly larger than the width of the joint.
 - 3. Trowel-point or concave tool exterior joints below grade.
 - 4. Flush cut joints to be finished with soft brush only.
 - 5. Retempering of mortar is not permitted.
 - 6. Use non-corrosive stone shims as required to maintain uniform joint thickness.
- H. Rake out joints for pointing with mortar to depth of not less than 1/2 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.
- I. Sealant Recesses: Provide open joint 3/4 inch deep and 1/4 inch wide, where masonry meets doors, windows and other exterior openings. Coordinate sealant joints in accordance with Section 07920-Joint Sealants, for sealant performance.
- J. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, grounds and other penetrations and adjacent materials.

3.5 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
 - 1. Joint Profile: As indicated.

3.6 FIELD QUALITY CONTROL

- A. Test mortar and grout in accordance with Section 01400.

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- B. Testing of Mortar Mix: In accordance with ASTM C780, Annex A4, for mortar aggregate ration and ASTM C780, Annex A5, for mortar water content.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective joints.
 - 3. Stone masonry not matching approved samples and mockups.
 - 4. Stone masonry not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints. Promptly remove excess wet mortar from the face of the stone. Clean stone masonry with a stiff nylon brush and clean water only.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
 - 5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.
 - 6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

3.8 EXCESS MATERIALS AND WASTE

- A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches in greatest dimension.
 - 2. Mix masonry waste with at least 2 parts of acceptable fill material for each part of masonry waste.
 - 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION 04863

DIVISION 5 – METALS

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SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Provide structural steel work as shown on drawings and specified herein. Hoisting of the metal deck shall be the responsibility of Contractor. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.
- B. Related Work Specified Elsewhere
 - 1. Steel Joists: Section 05220.
 - 2. Metal Decking: Section 05300.

1.3 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. Comply with provisions of following, except where more stringent requirements are shown or specified
 - 2. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - 3. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," including the "Commentary" and Supplements thereto as issued.
 - 4. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
 - 5. AWS D1.1 "Structural Welding Code," latest editions.
 - 6. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
- B. Qualifications for Welding Work
 - 1. Qualify welding processes and welding operators in accordance with the WS "Standard Qualification Procedure."
 - 2. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months.
 - 3. If recertification of welders is required, retesting will be the Contractor's responsibility and at his expense.

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1.4 COORDINATION

- A. Contractor shall fully coordinate the structural steel work. Coordinate with Metal Deck Installer for hoisting of the metal deck.
- B. Contractor shall fully verify all dimensions and details. Any discrepancies shall be immediately reported to the Architect.
- C. Contractor shall locate dimensionally on setting plans all anchor bolts, inserts, base plates, etc. and shall prepare and deliver all required templates and fully dimensioned setting plans, all in time for the proper execution of the work.
- D. Contractor shall set the anchor bolts and inserts. Contractor shall field survey all such settings for correctness after they have been cast in place, and before proceeding with steel erection. Checking shall be performed within ten days of notification by concrete installer that his work is complete.
- E. Contractor shall within 10 days report to the Architect and certify that he has complied with the above checking requirements and shall indicate any inaccuracies found and corrections which must be made. Any inaccuracies not included in this report and found during or after steel erection shall be the responsibility of the Contractor, and the cost of corrective measures shall be borne by him.
- F. Use base lines, bench marks, or other standards for survey work. If permanent building bench marks have been established, they will be used for the aforementioned field checking.
- G. Contractor shall coordinate erection areas and sequence and temporary bracing locations.

1.5 SUBMITTALS

- A. Product Data
 - 1. Submit 4 copies of producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - a. Structural Steel (each type), including certified copies of mill reports covering the chemical and physical properties.
 - b. High strength bolts.
 - c. Structural steel primer paint.
- C. Shop Drawings
 - 1. Shop drawings shall give all necessary information for the fabrication and erection of the structure and shall be based on AISC Specifications. Minimum

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connections used shall be as indicated on the drawings and shall support the total uniform load capacity of members. Provisions for the connection of other work required shall be indicated and provided by Steel Installer. Index sheets shall be furnished with all beam and column details at the same time the details are submitted for the review of the Architect. Standard connection details conforming to those shown on the drawings shall be submitted with first erection plan. All details shown are typical; similar details apply to similar conditions, unless otherwise indicated.

2. The review of shop drawings shall be for size and arrangement of principal members and strength of connections only.
3. Provide anchor bolt and setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.
4. Promptly notify the Architect whenever design of members and connections for any portion of the structure are not clearly indicated.
5. Shop drawings shall bear the initials of the detailer's checker prior to submission.
6. Shop drawings shall indicate the sequence and extent of areas to be erected by using division or derrick numbers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so as not to delay that work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. The Contractor shall be responsible for any demurrage charges due to failure to unload or store materials properly. Structural steel shall be kept properly drained. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures.
- D. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- E. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- F. Shop Fabrication and Assembly
 1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on approved shop drawings. Provide camber in structural members where indicated.

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2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

G. Connections

1. Shop connections shall be welded or high strength bolted. Field Connections shall be bolted with high strength bolts in friction-type connections conforming to ASTM Designation A325, except where welded connections or other connections are indicated.
2. Combinations of bolts and welds in the same connections are not permitted, unless otherwise shown on the drawings.
3. Where structural joints are made using high strength bolts, hardened washers and nuts tightened to a high tension; the materials, methods of installation and tension control, type of wrenches to be used, and inspection methods shall conform to ASTM Designation A325 as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation. Each bolt shall have a hardened washer under the nut.
4. The high strength bolts used shall have a suitable identifying mark placed on top of the head before leaving the factory.
5. Tightening of nuts shall be done with properly calibrated pneumatic wrenches. The minimum bolt tension for the size of the bolt used shall be in accordance with tables listed in the above referenced Standards. Each wrench shall be checked for accuracy at least once daily for actual conditions of application.
6. Bolts that have been completely tightened shall be marked with identifying symbols.
7. The Contractor shall have a properly calibrated torque gauge on hand, and when requested by the Architect, shall provide a check on any bolt at any time until final acceptance of the work by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes, including pitting, seam markers, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding or by welding and grinding prior to cleaning, treating, and application of surface finishes.
- B. Structural Steel Shapes, Plates, and Bars: ASTM A36
- C. Steel Pipe: ASTM A53, Types E or S, Grade B.

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- D. Anchor bolts shall conform to ASTM A307 with size and shape as indicated on the drawings.
- E. Column Base Plates: ASTM A36
- F. Arc Welding Electrodes shall conform to the AWS Code as Revised. All electric current require shall be furnished by Contractor.
- G. Paint for Shop Painting Structural Steel and Field Touch-up shall be manufacturer's standard primer.
- H. All items exposed to weather, such as shelf angles and items as noted on the drawings, shall be zinc coated in accordance with the provisions of ASTM Designation A123 as revised to date.

2.2 FABRICATION

- A. General: Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the approved shop drawings.
- B. Bearing surfaces shall be planed to true beds, and abutting surfaces shall be closely fitted. All columns and bearing stiffeners shall be milled to give full bearings.
- C. Bolt holes shall be drilled or punched in accordance with AISC Specifications, subject to the provisions specified herein. Holes shall be accurately centered and shall register true upon erection. Poor matching of holes shall be cause for a rejection. Small errors may be repaired by drilling or reaming.
- D. Contact surfaces shall be thoroughly cleaned before assembly. Assembled parts shall be brought into close contact. Drift pins shall be used only for aligning members and shall not be used in a manner which will damage metal or enlarge or distort holes. Members requiring accurate alignment shall be provided with slotted holes and/or washers for truing up the steel as required. All finished members shall be true to line and free from twists, bends, and open joints.
- E. Welding shall be performed by operators qualified in accordance with the American Welding Society "Standard Qualification Procedure" to perform the type of work required. Such qualification test shall have been passed within the preceding 12-month period. Shop drawings shall indicate the size, length, spacing, and type of all welds. Comply with AWS Code for procedures, appearance and quality of welds, and for methods used in correcting welding work.
- F. Holes for Other Work - Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on approved shop drawings.
- G. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

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- H. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. Provide one shop coat of paint as specified under Article "Materials" to all steel except for members receiving galvanizing or as specified hereafter.
- B. Paint shall be delivered to the shop in original sealed containers which shall be clearly marked with the manufacturer's name and the identifying brand number or name. The paint shall be used as prepared by the manufacturer without thinning or other admixtures.
- C. Surface Preparation: After inspection and before shipping, clean steelwork to be painted complying with Steel Structures Painting Council (SSPC) SP-2 "Hand Tool Cleaning," or SSPC SP-3 "Power Tool Cleaning."
- D. Do not paint contact surfaces which are to be welded or high-strength bolted. No paint shall be applied within 3" of any high strength bolt holes.
- E. Do not paint any zinc-coated items.
- F. Paint shall be applied under dry and dust-free conditions and unless otherwise allowed by the Architect, shall not be applied when the temperature is below 45 deg. F. Painting shall be done in workmanlike manner so as to produce an even dry film of uniform thickness of 2 mil. Edges, corners, crevices, and joints shall receive special attention so that they are thoroughly cleaned and they receive an adequate thickness of paint.

PART 3 - EXECUTION

3.1 ERECTION

- A. General: Installer must examine the areas and conditions under which structural steel work is to be installed, and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Codes: Comply with the AISC Specifications and Code of Standard Practice, and as herein specified. Maintain work in a safe and stable condition during erection.
- C. Anchor Bolts: Steel installer shall furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Steel installer shall furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Contractor shall set anchor bolts and other insert anchors required.
- D. Field Assembly: Set structural members to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

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- E. Temporary Shoring and Bracing: Provide as required, with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy line to achieve proper alignment of the structures as erection proceeds. Coordinate locations of temporary bracing with the Contractor.
- F. Splice members only where indicated.
- G. Do not enlarge unfair holes in members by burning or by the use of drift pins. Ream or drill holes that must be enlarged to admit bolts.
- H. Do not use gas cutting torches in the field for correcting fabrication errors in the structural framing.
- I. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraided areas of the shop paint, and paint all exposed areas with the same materials as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.2 QUALITY CONTROL

- A. The Contractor shall notify the Architect in writing five days in advance of the starting of fabrication and of erection of the structural steel.
- B. The Owner and his agents shall have free access and the Contractor shall provide same, to all points where materials for this project are being fabricated and/or erected, and all materials, equipment and workmanship shall be subject to inspection, tests and approval by the Owner's agents or laboratories. They shall have full authority to reject all material and work that fails to conform in every respect to these specifications.
- C. Contractor will engage in independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- D. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements and specifically state any deviations therefrom.
- E. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specific requirement.
- F. Shop inspection will include periodic inspection at the place of fabrication and identification of tested material, checking of fabrication for compliance with approved shop drawing and these Specifications, and inspection of shop painting, as well as the following:
 - 1. Examination of all steel for straightness and alignment.
 - 2. Examination of all fabricated pieces and checking of same with erection plans and detail drawings.

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3. Shop-Bolted Connections: Inspect in accordance with AISC Specifications. See paragraph entitled "High Strength Bolt Inspection" below.
 4. Shop Welding: Inspect and test during fabrication of structural steel assemblies as follows:
 - a. Check that welders are certified. Record type and locations of defects found in work. Record work required and performed to correct deficiencies or defects found.
 - b. Perform periodic visual inspections of random welds.
 - c. Perform the following:
 1. Ultrasonic Inspections: ASTM E164. 100% of first 400 butt welds or more until rejection rate is less than 5% and then 25% as long as rejection rate remains below 5%.
 2. Magnetic Particle Testing: ASTM E109. 25% of fillet welds with size larger than 3/8".
 5. Examination of surface preparation, painting/priming and galvanizing.
- G. Field inspection will include periodic inspection after delivery at site of material, fabrication, and shop painting, and work connected with erection and field painting of steel structure, as well as the following:
1. Proper erection of all pieces.
 2. Proper installation of bolts.
 3. Plumbness of structure.
 4. Condition of shop painting after erection and field touch-up painting.
 5. Field-Bolted Connections: Inspect in accordance with AISC specifications. See paragraph below titled "High-Strength Bolt Inspection."
 6. Field Welding: Inspect and test during erection of structural steel as follows:
 - a. Check that welders are certified. Record types and locations of defects found in work. Record work required and performed to correct deficiencies or defects found.
 - b. Perform periodic visual inspections of random welds.
 - c. Perform the following:
 1. Ultrasonic Inspection: All penetrating welds performed in the field shall be tested by ultrasonic testing.

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2. Magnetic Particle Testing: Perform as described above.
 3. High Strength Bolt Inspection: Perform inspection of installation of high-strength bolts to determine that selected installation procedures as prescribed in the Specification for structural joints using ASTM A325 or A490 bolts are properly used and that bolts are properly tightened and as follows:
 - a. All bolted connections shall be visually inspected.
 - b. At least two bolts of every connection between girders and columns and trusses and columns shall be checked.
 - c. All bolted connections that fail shall be corrected and all bolts in that connection shall be retested.
- H. Contractor shall correct deficiencies in structural steel work, which inspections and laboratory test reports have indicated to be not in compliance with requirements, perform additional tests, at Contractor's expense, as may be necessary to re-confirm any non-compliance of the original work, and as may be necessary to show compliance of corrected work.
- I. When required by Architect or Contractor's engaged Inspection Organization, Contractor shall make available to Inspector a calibrated torque wrench and calibrating device, as well as the manpower required to operate same, for the purpose of checking high-strength bolts. Adequate platforms and scaffolding shall be provided to ensure safe performance of this operation.
- J. Report Copies and Timing: Immediately after tests or inspection have been made, and in no case later than seven (7) days after tests of inspection have been made, the laboratory shall furnish copies of all test and inspection reports as follows:
1. One (1) copy to the Architect.
 2. One (1) copy to Contractor.
 3. One (1) copy to Master Consulting Engineers, Inc.
 4. One (1) copy to Owner.

END OF SECTION 05120

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SECTION 05300 - METAL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Section, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide metal decking as shown on the drawings, including basic layout and type of deck units required, and specified herein.
- B. Related Work Described Elsewhere
 - 1. Structural Steel - Section 05120.

1.3 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. Comply with provisions of the following codes and standards, except as otherwise shown or specified.
 - 2. AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
 - 3. AWS "Structural Welding Code."
 - 4. SDI "Design Manual for Floor Decks and Roof Decks."
 - 5. MRDTI "Specifications for Steel Roof Deck Construction" as adopted by the Metal Roof Deck Technical Institute.
- B. Qualifications of Field Welding
 - 1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure." Welding decking in place is subject to inspection and testing by a Testing Laboratory engaged by the Contractor.

Remove and replace work found to be defective and not complying with requirements.

1.4 PERFORMANCE REQUIREMENTS

- A. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading as shown in the Structural Drawings.
- B. Underwriter's Label: Provide metal deck units manufactured by a firm listed in the Underwriter's laboratories "Fire Resistance Director - Index of Manufacturers." Each required type deck unit shall bear the UL label and marking.

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1.5 SUBMITTALS

- A. Product Data: Submit four copies of manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.
- B. Shop Drawings: Submit detailed drawings showing size and location of floor and roof framing supports, layout and types of deck panels, deck finish and method, lengths and piece marks of deck units, fastening and anchorage details, and any openings to be cut in field. Deck units shall be marked to show sequence or erection. Detailed drawings shall also indicate closure pieces, fittings, sump pans, any special jointing, and other accessories necessary to provide a complete decking installation. Indicate welds by standard welding symbols adopted by The American Welding Society. Weld washers shall be used for all roof deck.

1.6 COORDINATION

- A. Contractor shall coordinate loading of deck units on the steel frame and erection sequence with Structural Steel Installer. Contractor shall coordinate the actual size and depth of sump pans.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Deck
- B. Roof Deck Units: Roof deck shall be 1-1/2"-22 gage and galvanized metal deck.
- C. Floor Deck Units: Floor deck shall be 9/16"-28 gage galvanized metal deck and 2"-20 gage galvanized metal deck. See drawings for specific location of application.
- D. Metal Cover Plates: Fabricate metal cover plates for end-abutting deck units of not less than 18 gage sheet steel. Form to match contour of deck units and approximately 6 inches wide.
- E. Metal Closure Strips: Fabricate metal closure strips, for openings between decking and other construction, of not less than 18-gage sheet steel. Form to provide tight-fitting closure at open ends of cells or flutes and sides of decking.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Installer must examine areas and conditions under which metal decking is to be installed and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until satisfactory conditions have been corrected in a manner acceptable to installer.

3.2 INSTALLATION

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- A. General: Install deck units and accessories in accordance with manufacturer's recommendations and approved shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Place deck units in straight alignment for entire length of run.
- D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- E. Coordinate and cooperate with structural steel installer in loading decking bundles to prevent overloading of structural members.
- F. Do not use floor deck units for storage or working platforms until permanently secured.
- G. End Closures: Tack weld or use machine screws at 3'-0" o.c. for fastening end closures.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, the appearance and quality of welds, and the methods used in correcting welding work.
- I. Side Laps: Steel roof deck and floor deck shall have nesting side laps of adjacent units attached by 3/4-inch diameter #12 screws or button punching at the center of each span or 30 inches o.c., whichever is a least dimension, unless noted otherwise on plans.
- J. Cutting and Fitting: Saw cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking as shown on the drawings.
- K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units.
- L. Closure Strips: Provide metal closure strips at all open perimeter ends, interior openings, uncovered ends and edges of roof and floor decking, and in the voids between decking and other construction. Weld into position to provide a complete decking installation.
- M. Touch-Up Painting: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on the top surface of roof deck units.
- N. Touch-up painted surfaces with the above specified paint applied in accordance with the manufacturer's instructions.

END OF SECTION 05300

SECTION 05400 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Bidding Requirements, Contractual Conditions, and General Requirements of Division 1 shall apply to all work hereunder.

1.2 WORK INCLUDED

- A. The intent of this Section provides for the furnishing and installation of structural steel studs as shown on Drawings and specified herein, including all materials, labor, equipment, accessories and incidental items necessary to complete the work.
- B. Work under this Section shall be coordinated with other trades to insure proper spacing and location of studs for application of other materials, windows, equipment, etc.

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Exterior load-bearing wall framing.
 - 2. Interior load-bearing wall framing.
 - 3. Exterior non-load-bearing wall framing.
 - 4. Ceiling joist framing.
- B. Related Sections include the following:
 - 1. Division 9 Section "Gypsum Board Assemblies".
 - 2. Division 9 Section "Portland Cement Plaster".

1.4 QUALITY ASSURANCE

- A. All structural properties and allowable weld loads shall conform with the AISI and AISC Specifications for the Design Light-Gauge of Cold-Formed Steel Structural Members, latest edition, as well as Standard Engineering Design Practices.
- B. Welding - In accordance with the Standard Code of Arc and Gas Welding in Building Construction and conform to American Welding Society (AWS) D.13, latest edition of Structural Welding Code - Sheet Steel.
- C. Materials shall be obtained in as much as possible from a single manufacturer.

1.5 REFERENCES

- A. American Iron and Steel Institute (AISI) - Design of Cold Formed Steel Structural Members, latest edition.
- B. American Welding Society, (AWS) D.1.3, latest edition, Structural Welding Code - Sheet Steel.
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM A446.
 - 2. ASTM A525.
 - 3. ASTM A568.
 - 4. ASTM A645.

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- D. American Institute of Steel Construction (AISC) - Manual of Steel Construction, latest edition.
- E. All Federal, State and Local Codes. Should conflict occur, the most stringent requirements shall prevail.

1.6 SUBMITTALS

- A. Shop Drawings - In accordance with Section 01340; furnish complete calculations, properties, loading, fabrication and erection drawings for approval prior to commencement of fabrication. Include descriptive literature containing product installation specifications and details, as well as current and valid welder's certificates. Indicate that calculations for wind loading are based on ASCE 7-02 Code, and shall be designed for the wind speed shown in the structural plan documents. The deflection shall be limited to L/600 for those areas with brick cladding, and L/360 for other finishes. Submit drawings and calculations for all framing required to support all surfaces and finishes indicated on the drawings.
- B. Product Data for products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
- C. Certification - Submit written certification from manufacturer that studs, components and accessories are compatible and suitable for intended application.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Upon delivery, all materials shall be protected from inclement weather. Store material off ground, covered where required to protect material from the elements, ventilated to prevent condensation and sloped to permit drainage.
- B. Handle materials to prevent damage. Any material damaged, rusted, bent, etc. shall be removed from the job site immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURER'S

- A. Subject to compliance with requirements, the following manufacturer's offer products that may be incorporated into the work:
 - 1. Unimast.
 - 2. Dale/Incor Industries.
 - 3. Dietrich Industries, Inc.
 - 4. Gold Bond Building Products.
- B. Other manufacturers offering similar products may be considered subject to complete data submittal and Architect approval prior to bidding in accordance with Division 1.

2.2 MATERIALS

- A. All framing members shall be formed from hot-dipped galvanized steel meeting the requirements of ASTM A653, with a minimum yield strength of 50 ksi for studs, and ASTM A653, with a minimum yield strength of 33 ksi for runner tracks. Materials shall comply with AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", Eight Edition.

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- B. Studs shall be "C" shaped of minimum 18 gauge galvanized, punched members. Channel shaped runner tracks shall be minimum 16 gauge galvanized, unpunched members, and as shown on the Drawings.
- C. Galvanizing shall conform to ASTM A525, G-60. All framing components shall be galvanized. Other components or accessories shall be galvanized or given a coat of rust-resistant paint, lead free.
- D. Bridging channels shall be 1-1/2" cold-rolled 16 gauge galvanized steel with a minimum yield point of 33,000 psi. Bridging channels shall be spaced vertically 4'-0" o.c. maximum.
- E. Miscellaneous clips, angles, splice plates, etc. shall be of minimum 16 gauge galvanized steel, located as shown or where required to complete the stud assembly.
- F. Welding is the preferred method of attachment, however, if screws are used, Type S-12, head type as required, shall be utilized. Follow manufacturer's recommendations for screw attachment, quantity, torque, etc.

2.3 FABRICATION

- A. Structural metal stud framing components may be prefabricated into panels prior to erection. Prefabricated panels must fit precisely into wall system. No splicing will be allowed at any time.
- B. All framing components shall be cut squarely, or on an angle, as required to fit squarely and accurately against abutting members. Members shall be held firmly in position until properly fastened.
- C. Attachments of similar components shall be done by welding. Dissimilar stud components shall be attached by welding, screw attaching, or bolting. Wire tying of framing components in structural applications shall not be permitted.
- D. Prefabricated panels shall be square and braced against racking. Lifting of prefabricated panels shall be done in a manner so as not to cause local distortion in any member.
- E. Tracks shall be continuous and welded to all vertical studs.
- F. Abrasions and welds shall be touched-up with approved galvanizing paint.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspection - Prior to installation, inspect work of all other trades. Verify that all such work is complete and accurate to the point where this installation may properly commence in strict accordance with framing Shop Drawings.
- B. Discrepancies
 - 1. Immediately notify Architect of all discrepancies.
 - 2. Do not proceed with installation in areas of discrepancies until such discrepancy has been fully resolved. Beginning installation indicates acceptance of conditions and responsibility for performance of complete specified system.

3.2 ERECTION

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- A. All studs and runner tracks shall be welded to horizontal steel angles, welded to steel structure or anchored to concrete slab as shown on Drawings. Provide diagonal stud braces as shown or otherwise required to resist lateral loads.
- B. Studs shall be seated squarely in the track with the stud web and flanges abutting the track web, plumbed or aligned and securely attached to the flanges or web of both the upper and lower tracks. Studs shall be plumb, aligned, and vertical to maximum 1/8" in 10'-0" any direction. Maximum deviation in any one (1) run shall be 3/8" total variation.
- C. Butt welds or splices shall be used at all butt joints in the track.
- D. Splices in axial loaded studs shall not be permitted.
- E. All welds shall be fully developed fillet plug, butt or seam type.
- F. Where studs abut back to back, they shall be secured together by bolting or welding at the point of attachment to horizontal steel angles.
- G. All connections shall be carefully examined. Defective, faulty or suspect conditions shall be corrected immediately.
- H. Temporary bracing, where required, shall be provided until erection is completed.
- I. Provide insulation equal to that specified elsewhere in all double jamb studs, double header members, or other areas which may be inaccessible to the insulation installer at time of installation.
- J. Isolate all studs and metal components from dissimilar materials that may cause adverse reactions.
- K. At door and window openings, unless otherwise specified, provide double studs at each side of opening and headers of 16 gauge runner track. At window sill, provide 16 gauge runner track.
- L. At all building expansion joints, discontinue runner track top and bottom and place stud each side of joint. At other material control joints, provide stud each side of joint as required.

3.3 WELDING RECOMMENDATIONS

- A. Arc welding is the most common method for joining framing components.
 - 1. Shielded metal arc welding (SMAW) is typically used for 18 gauge and heavier steel members. Good welds may be obtained with 3/32" or 1/8" diameter AWS Type E-6012, E-6013 or E-7014 rods. Equipment heat settings vary depending on material thickness. A 200 ampere "hot box" electric welder or gasoline generator welder is suitable.
 - 2. Gas metal arc welding (GMAW) is preferred for lighter 20 gauge members. Good welds may be obtained with AWS E-705-3, -5 or -6 wire electrode in .030" to .035" diameter using CO₂, Argon-oxygen, or Argon CO₂ gas shielding. A wire-feed welder with a capacity of 60-11- amperes at approximately 23 volts requiring 220-volt, 3 phase electric service is suggested for fast, uniform welding.
- B. Welding may be employed in the field, or in the shop when prefabricated panels are utilized.
- C. All welds and abrasions shall be touched-up with approved galvanizing paint after erection.

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- D. Welds and techniques shall be verified with steel stud manufacturer prior to fabrication or erection.

3.4 CLEANING

- A. Prior to installation of any track, thoroughly clean surface to receive track.
- B. During and after installation, remove discarded, scrap and excess materials, waste products, construction debris, etc. caused by steel stud erection process. Leave site clean and ready for next trade.
- C. After installation, and just prior to enclosing the stud system with sheathing or gypsum wallboard, inspect complete assembly for proper attachment, weld integrity, rigidity, etc. Remove, replace or repair any faulty conditions immediately. Any rust shall be removed and spot painted.

END OF SECTION 05410

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for operable partitions.
 - 2. Steel framing and supports for overhead doors.
 - 3. Steel framing and supports for countertops.
 - 4. Steel framing and supports for mechanical and electrical equipment.
 - 5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 6. Shelf angles.
 - 7. Miscellaneous steel trim including steel angle corner guards and steel edgings.
 - 8. Metal bollards.
 - 9. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- B. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Sections:
 - 1. Division 2 Section "Site Furnishings" for bicycle racks.
 - 2. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
 - 3. Division 4 Section "Unit Masonry Assemblies" for installing loose lintels, anchor bolts, and other items built into unit masonry.
 - 4. Division 5 Section "Structural Steel."
 - 5. Division 6 Sections for metal framing anchors and timber connectors.

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

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1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For the following:
 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 2. Paint products.
 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For qualified professional engineer.
- E. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- F. Welding certificates.
- G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

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- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- G. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface] [or] [with abrasive material metallically bonded to steel.
- H. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- I. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type, with G90 coating; 0.108-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B; [0.0966-inch minimum thickness; unfinished.
- K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

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- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- E. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
- F. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- G. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
- H. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.
- I. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 9 painting Sections.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

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- I. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

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- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
 - 3. Revise first paragraph below if tubing is used. Revise default weld size requirement, or delete
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize miscellaneous steel trim.
- D. Prime miscellaneous steel trim with zinc-rich primer.

2.10 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.

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1. Cap bollards with 1/4-inch-thick steel plate.
 2. Where bollards are indicated to receive controls for door operators, provide necessary cutouts for controls and holes for wire.
 3. Where bollards are indicated to receive light fixtures, provide necessary cutouts for fixtures and holes for wire.
- B. Fabricate bollards with 3/8-inch-thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- C. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch-thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
- D. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch wall-thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4 inch steel machine bolt.
- E. Prime bollards with zinc-rich primer.

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
1. Shop prime with primers specified in Division 9 painting Sections unless indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Items Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

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- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

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3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - 1. Do not fill removable bollards with concrete.
- B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
 - 1. Embed anchor bolts at least 4 inches in concrete.
- C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.
- D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- E. Anchor internal sleeves for removable bollards in concrete by inserting into pipe sleeves preset into concrete. Fill annular space around internal sleeves solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward internal sleeve.
- F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- G. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner will furnish padlocks.
- H. Fill bollards solidly with concrete, mounding top surface to shed water.

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1. Do not fill removable bollards with concrete.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

DIVISION 6 – WOOD AND PLASTIC

SECTION 06412 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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. Section Includes:
 - 1. Plastic-laminate-faced architectural cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.
- B. Related Requirements:
 - 1. Section 06100 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
 - 2. Section 06615 "Simulated Stone Countertops".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples for Verification:
 - 1. Plastic laminates, 8 by 10 inches color, pattern, and surface finish.
 - 2. Exposed cabinet hardware and accessories, one unit for each type.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

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1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 08712 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
- B. Grade: Custom.
- C. Type of Construction: Frameless.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. Reveal Dimension: 1/8 inch.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Basis-of-Design Products: Subject to compliance with requirements, provide the products indicated on the Drawings by Nevamar Decorative Surfaces, or comparable products by one of the following:
 - a. Abet Laminati, Inc.
 - b. Formica Corporation.
 - c. Lamin-Art, Inc.
 - d. Panolam Industries International, Inc.
 - e. Wilsonart International; Division of Premark International.
- G. Laminate Cladding for Exposed and Semiexposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGL (H-5).

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2. Postformed Surfaces: Grade HGP (HF-4).
 3. Vertical Surfaces: Grade VGP (VF-3).
 4. Edges: Grade VGS.
 5. Pattern Direction: As indicated.
- H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
1. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130 made with binder containing no urea formaldehyde.
 3. Softwood Plywood: DOC PS 1, medium-density overlay.
 4. Core Material at Bases and Countertops: Exterior-grade plywood.
- C. Cabinet Components:
1. Body Members – (ends, divisions, fixed shelves, bottoms, tops): Plywood.
 2. Face Frames, Rails, Toe Kicks, Cabinet Bases: Plywood or lumber.
 3. Adjustable Shelves: Plywood, lumber or medium density fiberboard.
 4. Backs: Plywood.
 5. Mounting or Hanger Strips: Plywood or lumber.
 6. Drawer Sides, Backs, and Subfronts: Plywood or lumber.
 7. Drawer Bottoms: Plywood.
 8. Drawer Fronts: Plywood or lumber.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08712 "Door Hardware (Descriptive Specification)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal 4 inches long, 5/16 inch in diameter.
- E. Catches: Roller catches, BHMA A156.9, B03071.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: BHMA A156.9, B04013; metal.
- H. Drawer Slides: BHMA A156.9.
1. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 2. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.
 3. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.

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4. For computer keyboard shelves, provide Grade 1HD-100.
5. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- I. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- J. Door Locks on all doors: BHMA A156.11, E07121.
- K. Drawer Locks on all drawers: BHMA A156.11, E07041.
- L. Door and Drawer Silencers: BHMA A156.16, L03011.
- M. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, with exposed edges seamed before tempering, 6 mm thick unless otherwise indicated.
- N. Tempered Float Glass for Cabinet Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering, 6 mm thick.
- O. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- P. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate cabinets to dimensions, profiles, and details indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- E. Install glass to comply with applicable requirements in Section 08800 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06412

DIVISION 7 – THERMAL AND
MOISTURE PROTECTION

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concealed building insulation.
 - 2. Foam-plastic board insulation.
 - 3. Spray polyurethane foam insulation.
 - 4. Vapor retarders.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from **ICC-ES**

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Foam-Plastic Insulation:
 - a. Dow Chemical Company
 - b. Owens Corning.
 2. Insulation at tilt-up concrete walls:
 - a. Basis of design: Owens Corning 701 to be applied at all concrete tilt-up concrete walls that enclose conditioned spaces.
 3. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Knauf Fiber Glass.
 - d. Owens Corning.

2.2 FOAM-PLASTIC INSULATION

- A. Molded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450 respectively, per ASTM E 84
1. Type I, 10 psi.

2.3 SPRAY POLYURETHANE FOAM INSULATION

- A. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent.
1. Basis-of-Design Product: ICYNENE LD-C-50 as manufactured by Icynene Inc.
 2. Subject to compliance, a comparable product, by one of the following manufacturers, that meets or exceeds the basis-of-design product performance criteria may submitted for consideration:
 - a. BaySystems NorthAmerica, LLC.
 - b. Demilec (USA) LLC.
 - c. Gaco Western Inc.
 - d. SWD Urethane Company.
 3. Minimum Density: 0.5 lbs./cu. ft.
 4. Thermal resistance (ASTM C518): 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F.
 5. Surface Burning Characteristics of (ASTM E84) @ 5" Thickness:
 - a. Flame Spread: ≤ 25
 - b. Smoke Development: ≤ 450

2.4 VAPOR RETARDERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Reinforced-Polyethylene Vapor Retarders:
 - a. Raven Industries, Inc.; DURA-SKRIM 6WW.
 - b. Reef Industries, Inc.; Griffolyn T-65.
- B. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.5 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.6 INSULATION FASTENERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Adhesively Attached, Spindle-Type Anchors:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Insulation-Retaining Washers:
 - a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
 - 3. Anchor Adhesives:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
 - 1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Ceiling plenums.
 - b. Attic spaces.
 - c. Where indicated.
- C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
 - 1. Air Space: 1 inch.
 - 2. Air Space: 2 inches.
 - 3. Air Space: 3 inches.
- D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install insulation that is undamaged, dry, and unsoiled.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
- F. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- G. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces.
- H. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- I. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation between furring members on interior surface of exterior concrete masonry walls receiving furred gypsum board by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

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1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.6 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.7 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07511 - BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Four Ply White Coated Mineral Surfaced Fiber Glass Built-Up Asphalt Roofing System.
 - 2. Cover Board.
 - 3. Roof Insulation.

1.3 DEFINITIONS

- A. Thermal Resistance (R-value) is the reciprocal of thermal conductance (C-value) which is the rate of heat flow through a material of the thickness indicated. Thermal resistance (R-value) is expressed by the temperature difference in degrees F between the two exposed faces required to cause 1 Btu to flow through 1 sq. ft. per hour at the mean temperature indicated.

1.4 SUBMITTALS

- A. General: Submit the following according to Supplementary General Provisions.
- B. Product data, including manufacturer's technical product information, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with requirements.
 - 1. For asphalt bitumen, provide a label on each container or certification with each load of bulk bitumen, indicating flash point (FP), softening point (SP), and equiviscous temperature (EVT).
- D. Manufacturer's Certification indicating that all bulk bituminous materials delivered to Project comply with required standards. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.
 - 1. Include continuous log showing time and temperature for each load of bulk bitumen, indicating date obtained from manufacturer, where held, and how transported prior to final heating and application on roof.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer (Roofer) to perform built-up asphalt roofing work who has specialized in installing built-up asphalt roofing systems similar to that required for this Project and who is acceptable to manufacturer of primary roofing materials.
 - 1. Installer Certification: Obtain written certification from manufacturer of built-up roofing system certifying that Installer is approved by manufacturer to install specified roofing system. Provide copy of certification for Architect prior to awarding roofing work.
 - 2. Installer's Field Supervision: Require Installer to maintain a full-time supervisor/foreman who is on job site during times that built-up asphalt roofing work is in progress and who is experienced in installing roofing systems similar to type and scope required for this Project.
- B. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet (felt), bitumen, composition flashings, and any vapor retarder, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products to use with roofing system specified.

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- C. Insurance Certification: Assist Owner in preparing and submitting roof installation acceptance certification as necessary in connection with fire and extended-coverage insurance on roofing and associated work.
- D. UL Listing: Provide built-up roofing system and component materials that have been tested for application and slopes indicated and that are listed by UL for Class A external fire exposure.
 - 1. Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service.
 - 2. Provide built-up roofing system that can be installed to comply with UL requirements for Fire Classified and Class 120 uplift resistance requirements.
- E. Fire Performance Characteristics: Provide insulation materials that are identical to materials whose fire performance characteristics, per requirements listed in Part 2 of this Section, have been determined from tests by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- F. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
- G. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- H. Preapplication Roofing Conference: Approximately 2 weeks prior to scheduled commencement of built-up roofing installation and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work—including mechanical work, Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with work performance, including Owner's insurers, test agencies, and governing authorities, where applicable.
 - 1. Review foreseeable methods and procedures related to roofing work, including, but not necessarily limited to, the following:
 - a. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.
 - b. Review structural loading limitations of steel deck and inspect deck for loss of flatness and for required mechanical fastening.
 - c. Review roofing system requirements: drawings, specifications, and other contract documents.
 - d. Review required submittals, both complete and incomplete.
 - e. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Review required inspection, testing, certifying, and material use accounting procedures.
 - g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing, if it is not a mandatory requirement.
 - 2. Record (Contractor) discussions of conference, including decisions and agreements or disagreements reached, and furnish a copy for each attendee. If substantial disagreements exist at the conclusion of the conference, determine how disagreements will be resolved and set a date for reconvening the conference.

1.6 PROJECT CONDITIONS

- A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements. Do not proceed with work if rain is forecasted for the duration of each days work.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle roofing materials to ensure dryness. Store in a dry, well-ventilated, weather-tight place. Unless protected from weather or other moisture sources, do not leave unused felts on the roof overnight or when roofing work is not in progress. Store rolls of felt and other sheet materials on end on pallets or another raised surface. Handle and store materials or equipment in a manner to avoid significant or permanent deck deflection.

1.8 WARRANTY

- A. Special Project Warranty: Submit two executed copies of industry standard 2-year water tightness Roofing Warranty on the form included at the end of this Section, covering work of this Section, including roofing membrane, composition flashing, roof insulation, any vapor retarders, and roofing accessories, signed and countersigned by Installer (Roofer) and Contractor. Warranty is for water tightness of complete installation including but not limited to all flashings, and coping.
- B. Manufacturer's Warranty: Submit executed copy of roofing manufacturer's standard NDL Warranty agreement, including flashing endorsement, signed by an authorized representative of built-up roofing system manufacturer, on form that was published with product literature as of date of Contract Documents.
- C. Warranty Period: 20 years from date of Substantial Completion.
- D. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- E. The following warranty exclusions are not acceptable: (1) Reference to wind speeds less than 74 MPH; and/or references to a Beaufort number scale, including descriptions of wind.

PART 2 - PRODUCTS

2.1 BUILT-UP ROOF MEMBRANE SYSTEM

- A. Basis-of-Design System: 4GIC CR Four-ply White-coated Mineral-surfaced Fiberglass Built-up Roofing System by Johns Manville Roofing Systems.
 - 1. Composition: Three (3) plies Johns Manville "GlasPly Premier" Felt and one (1) ply "GlasKap CR".
 - 2. Subject to compliance with requirements, a roofing system comparable to the Basis-of-Design system by one of the following built-up asphalt roofing system manufacturers may be provided.
 - a. Celotex Corp.
 - b. GAF Corp.
 - c. GS Roofing Products Co.
 - e. Owens-Corning Fiberglas Corp.
 - f. Tamko Roofing Products, Inc.

2.2 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 - 1. Provide insulation package with R value greater than "19".
 - 2. Install no boards thicker than one and one-half (1-1/2) inches thick. If insulation package required is thicker than 1-1/2", install in multiple layers.

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- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of one-quarter (1/4) inch per twelve (12) inches (1:48) unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.3. INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
- E. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- F. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- G. Wood Nailer Strips: Comply with requirements in Section 06100 "Rough Carpentry".
- H. Tapered Edge Strips: ASTM C 728, perlite insulation board.
- I. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.
 - 1. Basis-of-Design Products: Subject to compliance with requirements, provide Dens Deck by the Georgia-Pacific Corporation.

2.4 BITUMINOUS MATERIALS

- A. Asphalt Roofing Cement: ASTM D4586 (Asbestos Free).
- B. Asphalt Primer: ASTM D41, or other primer compatible with the application and as approved in writing by the modified bitumen membrane manufacturer.
- C. Asphalt Bitumen: ASTM D312, Type IV. Only virgin residual petroleum-process asphalt, which has not been modified by the addition of softening oils or other compounds to modify the softening point, and which has been accurately air-blown (oxidized) to establish the required softening point, shall be used.
- D. Modified Roof Cement: ASTM D 4586, Type II for vertical surfaces, Type I for horizontal surfaces, compatible with the modified bitumen roof membrane and as recommended by the modified bitumen membrane manufacturer.
- E. Fabric, Cotton, Bitumen Saturated: ASTM D-173, Local Supply.

2.5 SHEET METAL ACCESSORY MATERIALS

- A. Coordinate below with Section 07600, "Flashing and Sheet Metal."
- B. Stainless Steel: ASTM A 167, AISI type 302/304, No. 2D finish, temper as required for forming and performance; 0.015 inch thick (28 gage), unless indicated otherwise.
- C. Solder for Sheet Metal: Unless indicated otherwise or recommended by metal manufacturer, provide 50:50 tin/lead type (ASTM B 32) for tinning and soldering joints; use rosin flux.
 - 1. Solder stainless steel joints with 60:40 tin/lead type solder.

2.6 FASTENERS AND PLATES

- A. Provide coated, corrosion-resistant fasteners as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM AS 4470 and FM P7825c for Class I roof deck construction and the wind uplift resistance specified.

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1. For fastening of base sheet membranes or felts to wood materials, provide one piece composite fasteners with heads not less than 1-inch in diameter or 1-inch square with rounded or 45-degree tapered corners.
 2. Where required by product testing, provide minimum 11 gauge x 1-1/4-inch Galvalume (AZ55) coating, annual threaded cap nail fastener with oversized round 1-5/8-inch round head, designed for attachment to wood substrates (Mega Cap Nail, by Simplex Nails, Inc., or approved substitution).
- B. Masonry or Concrete Walls and Vertical Surfaces: Provide hardened steel nails or screws with flat heads, diamond shaped points, and mechanically deformed shanks not less than 1-inch long for securing felts, modified bitumen sheets, metal items, and accessories to masonry or concrete walls and vertical surfaces.
- C. Metal Plates: Provide flat corrosion-resistant round stress plates as recommended by the modified bitumen sheet manufacturer's printed instructions or product testing requirements; not less than 2-inches in diameter. Discs shall be formed to prevent dishing or cupping.

2.7 MISCELLANEOUS MATERIALS

- A. Wood Members, Units: Comply with requirements of Division 6 Section "Rough Carpentry" for nailers, blocking, shims, walkway units, and other wood members indicated as roofing system work. Provide wood pressure treated with waterborne preservatives for above-ground use (AWPB LP-2). Provide sufficient quantities of adequately sized members and sections for correct alignment, support and securing of roofing finishes and related components.
- B. Roof Traffic Pads (Walk Pads): Composed of homogenous core of asphalt, plasticizers and inert fillers, bonded by heat and pressure between two (2) saturated sheets of organic felt. The top surface shall be weather coated with embedded ceramic granules, white in color. The bottoms shall be plain (smooth). Provide minimum 1/2-in thick materials.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. APOC® 5040 Dek-Top® Walkway Pads, by Gardner Asphalt Corporation.
 - b. DynaTred™ Plus Roof Walkway, by Johns Manville.
 - c. WHITEWALK Roof Traffic Pads, by W.R. Meadows.
- C. Substrate Joint Tape: 6-inch- or 8-inch-wide, coated, glass-fiber joint tape.

2.8 FABRICATING SHEET METAL ACCESSORIES

- A. SMACNA and NRCA Details: Conform metal work with details shown and with applicable fabrication requirements of Architectural Sheet Metal Manual by SMACNA. Comply with installation details of NRCA Roofing and Waterproofing Manual.
- B. Prefabricate units as indicated or provide standard manufactured units complying with requirements; fabricate from sheet metal indicated.
- C. Provide 4-inch-wide flanges set in roofing cement for applying built-up asphalt roofing system membrane concealed by composition stripping.
- D. Fabricate work with flat-lock soldered joints and seams; except where joint movement is necessary, provide 1-inch-deep interlocking hooked flanges filled with mastic sealant.
- E. Fabricate gravel rings and aggregate divider strips with 1-inch-high standing leg of folded sheet metal, notched from top with 5/8-inch-deep V notches. Space notches 3 inches o.c. where strip intersects flow of water on roof, 6 inches o.c. elsewhere. Fabricate rings to sizes and shapes indicated (but not less than 36 inches square), and fabricate running strips (as shown) in maximum 4-foot lengths for butt-joint installation (with 1/4-inch gaps).
- F. Fabricate penetration sleeves with minimum 8-inch-high stack of diameter 1 inch larger than penetrating element. Counterflashing is specified as work of another section of these specifications.

PART 3 - EXECUTION

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3.1 INSPECTING SUBSTRATE

- A. The Installer shall examine the area of Work to determine that conditions are acceptable for the Work of this and subsequent Sections. Report unsatisfactory conditions to the Architect and Contractor immediately and confirm in writing any/all conditions detrimental to the proper and timely completion of this phase of the work. Do not proceed until unsatisfactory conditions are corrected. The execution of Work shall be construed as an acceptance of conditions by the Contractor.
- B. Check projections, curbs, and deck for inadequate anchorage, foreign material, moisture or unevenness that would prevent quality and execution of new roofing system.
- C. Ensure that the following conditions exist prior to application of the roofing materials:
 - 1. Drains, curbs, control joints, expansion joints, perimeter walls, roof penetrating components, and equipment supports are in place.
 - 2. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation. Joints in the substrate are sealed to prevent dripping of bitumen into building or down exterior walls.
 - 3. The plane of the substrate does not vary more than 1/4 inch within an area 10 by 10 feet when checked with a 10-foot straight edge placed anywhere on the substrate.
 - 4. Walls and vertical surfaces are constructed to receive counterflashing, and will permit mechanical fastening of the base flashing materials.
 - 5. Treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Embedded nailers are flush with deck surfaces. Surface-applied nailers are the same thickness as the roof insulation.
 - 6. Exposed nail heads in wood substrates are properly set. Warped, deteriorated and/or split boards, planks or sheets have been replaced. There are no cracks or end joints 1/4-inch in width or greater. Knot holes are covered with sheet metal and nailed in place. Wood decks are covered with rosin paper prior to base sheet or roof membrane application. Joints in plywood substrates are taped or otherwise sealed to prevent air leakage from the underside.

3.2 PREPARATION OF ROOF DECK

- A. The Contractor shall provide and install all curbing, expansion joints, and wood nailers at all edges, projections and openings, as indicated on the Drawings, where metal flanges or flashing are to be installed.
- B. Before installation of roofing or insulation materials, all deck surfaces must be sound, clean, smooth, dry and free of debris, loose material or defects which would have an adverse effect on the roofing or insulation or their performance. Remove all foreign matter that would interfere with proper installation of the built-up roofing system, flashing and accessories.
- C. Priming: All metal flanges, plywood, masonry and concrete surfaces which are to receive a mopping of asphalt or the application of torched materials shall be primed first with specified primer at a rate of approximately 3/4-gallon per 100 sq. ft. (or as per manufacturer's requirements). Where metal flanges of accessories and specialties are set on roofing membrane and are to receive a mopping of asphalt, prime top and bottom of metal flange surfaces with specified primer and set in a bed of roof cement. Allow the primer adequate time to dry.
- D. Sequencing: Coordinate work with all Sections so that work in this Section and the other Sections will be completely protected at the end of each day and before inclement weather.
- E. This Contractor shall be responsible to communicate with Owner's personnel to shut down all HVAC, intake air, make-up air or other mechanical systems, before the start of any roofing work that requires hot materials or materials that will produce any odor. This Contractor shall coordinate start-up after work stops and provide fresh air intake ventilation (circulation fans) as required to provide enough air exchanges before classes begin each day to purge all remaining fumes and/or odors.

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- F. Where required, add extenders to plumbing vent stacks to provide height of 8-inches (minimum) above roof membrane.
- G. Contractor shall install all necessary construction to provide a minimum of 8-inches between top of finished roofing and top of base flashing for ALL roof equipment, unless otherwise indicated.
- H. This Contractor shall provide sufficient slope to roof to provide drainage with no ponding areas. Acceptance of all roof substrates to provide a continuous slope, without ponding as per specifications and to comply with manufacturers of roofing products guarantees.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. The specified roofing and base flashing systems are indicated in Part 2 of this Section and shall be applied in accordance with the Manufacturer's instructions. These instructions shall be available at the job site at all times during construction.
- B. Manufacturer details shall be upgraded to be equal to those as specified herein. Manufacturer's specifications for various deck types and insulations shall be followed as long as they are in compliance with or greater than that specified herein and herewith.
- C. Follow Manufacturer's directives for installation of smooth and granulated modified membranes. Install so that there is no "built-up" of asphalt, ridging, mole runs, or fishmouths during the installation. Indications of ridging, mole runs, or fishmouths after installation will constitute grounds for rejection and requirement for removal and re-installation.
- D. Cooperation: Cooperate with inspection and test agency engaged or required to perform services in connection with roofing system installation.
- E. Protection: Protect other Work and adjacent surfaces from spillage of roofing materials. Installer is responsible for cleaning all asphalt drippage and/or stains caused by Work of this section. Verify and document presence of existing drippage or stains, otherwise execution of Work shall be construed as an acceptance of conditions by the Contractor.
- F. Substrate Joint Penetrations: Do not allow bitumen to penetrate substrate joints and enter building or damage insulation, vapor barriers or other construction. Seal openings around pipe penetrations with oakum and roof cement. Where a mopping is applied directly to a substrate, joints of substrate shall be taped.
- G. Hot bitumen shall not be applied under any condition that would cause foaming. Substrate shall be tested for excessive moisture by pouring (1) pint of steep asphalt at 400 degrees F. on the substrate, at the start of each day's work, and at the start of each roof area or plane. Substrate is too wet if test sample foams or is stripped easily (cleanly) after cooling.
- H. In addition to requirements of above paragraph, the roofing applicator shall do all testing and other examination of deck surface in manner as recommended by roofing materials manufacturer and in manner as recommended by manufacturer of roof deck materials. Responsibility for determination of moisture content of deck being suitable for application of roofing materials shall be solely that of this Section of these Specifications.
- I. Extend all plies of roofing felts continuous and uncut beneath scuppers. Mop strip plies into scupper.
- J. Membrane Preparation: Unroll modified bitumen membrane materials and allow to relax a minimum of (30) minutes prior to installation. Inspect for damage, pinholes, particles of foreign matter, undispersed raw material, factory splices, or other conditions that might affect serviceability. Edges of seams shall be straight and flat so that they may be sealed to one another without forming fish mouths or wrinkles. Discard damaged or defective materials.
- K. Traffic: Do not walk on new roofing or allow any equipment or stored materials to be placed on new roofing until it cools to ambient conditions. Such action will be cause for rejection.
- L. Asphalt Bitumen Heating:
 - 1. Use of kettles on the roof is strictly prohibited.

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2. Break up solid asphalt on a surface free of dirt and debris. Heat asphalt in kettle designed to prevent contact of flame with surfaces in contact with the asphalt. Kettles shall have visible working thermometer and thermostatic controls set to the temperature limits specified herein. Keep controls in working order and calibrated.
 3. Heat and apply bitumen in accordance with equiviscous temperature method ("EVT Method") as recommended by NRCA. Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (± 25 degrees F at point of application) more than one hour prior to time of application.
 4. Discard bitumen which has been held at temperature exceeding finished blowing temperature (FBT) for a period exceeding 3 hours.
 5. Determine flash point, finished blowing temperature and EVT of bitumen, either by information from bitumen producer or by suitable tests, and determine maximum fire-safe handling temperature and do not exceed that temperature in heating bitumen. In no case heat bitumen to a temperature higher than 25 degrees F below flash point.
 6. Have kettle attended constantly during heating process to ensure specified temperatures are maintained. Use immersion thermometer to check temperatures of the asphalt frequently. When temperatures exceed maximums specified, remove asphalt from the site. Do not permit cutting back, adulterating, or fluxing of asphalt. Contractor shall be responsible for maintaining quality control of asphalt temperatures.
- M. Cant Strips: Install specified cant strips over roof insulation in a continuous troweling of specified roof cement - miter all corners. Seal gaps between cants and vertical surfaces with roof cement to prevent bitumen drippage.

3.4 ROOF MEMBRANE INSTALLATION

A. Application Method:

1. Hot Asphalt Application of Modified Bitumen Membrane
 - a. Apply membranes immediately following application of hot asphalt. Apply hot asphalt within 6-feet of roll. Do not work ahead with asphalt.
 - b. For interply mopping, and for other moppings except as otherwise indicated, bitumen shall be applied at not less than 0.20 nor more than 0.25 pounds per sq. ft., with the average amounting to not less than 23 pounds per square (100 sq. ft.) per mopping for the completed roofing installation.
 - c. Asphalt shall be completely fluid, with mop temperatures within ± 25 degrees F of manufacturers recommended application temperatures, but not less than 400 degrees F, at the instant membrane comes into contact with asphalt.
 - d. Application of bitumen between layers shall be such as to provide full, continuous, uniform coverage and complete contact of hot asphalt with the sheet above and below.
 - e. As sheets are being rolled into hot asphalt, immediately and thoroughly apply uniform positive pressure by squeegee, roll, or broom to ensure full adhesion and lap seal, eliminate trapped air and to provide tight, smooth laminations. Avoid excessive extrusion of asphalt at lap areas. Control asphalt bleed out to approximately 1 inch (maximum). "Dry laps" & "fishmouths" will not be permitted.
2. Torch Applied (Heat Welded) Modified Bitumen Membrane Flashings
 - a. Base flashing membranes shall be torch applied.
 - b. Ensure substrate surfaces are warmed either naturally or by torch during the installation. Apply heat evenly to underside of roll membrane being installed and exposed side lap area of previously installed sheet. Provide for slight, uniform flow of bitumen in front of roll and full width of roll as the material is being rolled or set into place. Apply uniform positive pressure to ensure membrane is fully adhered and all laps are sealed.
 - c. Roll all lap areas with a weighted roller immediately after forming lap. Provide for visual bleed out of compound in lap areas. Avoid overheating the membrane or burning through to membrane reinforcement. Inspect and ensure all lap areas are fully sealed.

B. Application of Base Sheet:

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1. On nailable substrates, mechanically fasten the specified base sheet in conformance with specified wind resistance requirements and membrane manufacturer's printed instructions, and to include increased fastening frequency in corner and perimeter areas. Drive fasteners flush with no dishing or cupping of fastener plate. Drive fasteners at appropriate angle to insure proper thread engagement and specified holding strength. Fasteners that are improperly installed shall be removed or corrected.
 2. Where applicable, base sheet may be mechanically fastened in conjunction with insulation to the substrate, in accordance with membrane manufacturers printed instructions.
 3. Starting at the lowest point, apply the specified base sheet shingle fashion, running perpendicular to the slope, in a continuous operation. Apply sheets at right angles to the roof slope so that the direction of water flow is over and not against the laps so that plies of sheets extend from eave line on one side of the barrel-type roof and 18 inches over the center line of the crown of the roof. Apply sheets on the other side in the same manner, resulting in twice the normal amount of roofing sheets and asphalt at the crown.
 4. Apply sheets with side laps at a minimum of 4-inches, unless smaller side lap is recommended by the manufacturer's written application instructions. Provide end laps of not less than 6-inches and staggered a minimum of 36 inches.
 5. Unless otherwise indicated, extend base sheets approximately 2-inches above the top of cant strips at vertical surfaces. Trim base sheet to a neat fit around vent pipes, roof drains, and other projections through the roof. Application shall be free of ridges, wrinkles, and buckles.
- C. Application of Roofing Membranes
1. Start the installation of all membrane plies at the lowest point or at drains. Apply membrane layers perpendicular to slope of roof in shingle fashion to shed water, including application on areas of tapered insulation that change slope direction. Bucking or backwater laps are prohibited.
 2. Position and align roll prior to application. Application will not be accepted if at any point the flow of water is against the laps, unless otherwise approved by the Architect. Chalk lines where necessary to assure proper alignment and head lap widths of membrane plies. Do NOT install membranes where the laps are located in center of drain.
 3. Fully adhere membrane sheets to underlying substrate materials. Provide tight smooth laminations of each membrane layer without wrinkles, ridges, buckles, kinks, fishmouths, or voids. Ensure full membrane adhesion and full lap seals. Rework to seal any open laps prior to application of subsequent membrane layers. The completed membrane application shall be free of surface abrasions, air pockets, blisters, ridges, wrinkles, buckles, kinks, fishmouths, voids, or open seams.
 4. Steep Slope Requirements: On decks with a slope over 1/2-inch per foot, the roofing felts must be installed parallel to the incline. Nail the end laps of the specified cap sheet across the width of the sheet on 8-1/2 inch centers (minimum). All nails are to be mopped over and covered by the lap of the next sheet. For slopes from 1/2-inch to 2-inch per foot, a full-length sheet can be used. For slopes from 2-inch to 3-inch per foot, a half-length sheet shall be used.
- D. Ply Felt Application:
1. Starting at the lowest point, apply 3-ply of specified felts, shingle fashion, in full moppings of Type IV asphalt, running perpendicular to the slope with 3-inch side laps and 6-inch end laps. Stagger end laps minimum 36 inches.
- E. Cap Sheet Application:
1. Relax membranes prior to application.
 2. Underlying applied membrane shall be inspected and repaired free of damage, holes, puncture, gouges, abrasions, and any other defects, and free of moisture, loose materials, debris, sediments, dust, and any other conditions required by the membrane manufacturer prior to cap sheet installation.
 3. Do not apply cap sheet if rain has occurred within the previous 24 hours.
 4. Align cap membrane and apply over the smooth ply sheet, starting at the lowest point, apply specified cap sheet membrane laid shingle fashion, in full moppings of Type IV asphalt, with 3-inch side laps and 6 inch end laps. Cut at a 45-degree angle across selvage edge of cap membrane to be overlapped in end lap areas prior to applying overlapping cap membrane.

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5. Professional workmanship shall be required to keep roof's white cap sheet and flashing looking aesthetically pleasing upon completion of project. Minimize traffic on newly installed cap sheet membrane.
 6. Install the membrane to extend up the face of the cant and wall to a minimum height of 2-inches above top of cant.
- F. Application of Membrane Strip Flashing (Strip-in):
1. Set primed flanges of metal flashings in full bed of modified bituminous cement material and securely fasten through to attachment substrate.
 2. Prime all metal and install (2) layers of specified felt plies in full mopping of Type IV asphalt. Extend each additional stripping ply minimum 4 inches beyond edge of previous ply. Cut strip-in membranes into "targets" wherever possible.
 3. For edge fascia, verify length of metal edge fascia and precut membrane sheets so that all membrane laps fall directly over laps in metal. At no time shall the strip-in sheets be greater than 12-feet in length.
- G. Application of Base Flashing:
1. Apply two-ply modified bitumen strip flashing and sheet flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight.
 2. Apply membrane flashing in accordance with the roof membrane manufacturers printed instructions and as specified.
 3. Over the top of the cap sheet and smooth base flashing, install the specified base flashing membrane, not to exceed the width of the roll, torched per manufacturer's requirements. Extend flashing onto cap sheet 6-inches beyond the base of the cant and up the wall to the same height as the smooth base flashing membrane.
 - a. Press flashing into place to ensure full adhesion and avoid bridging. Ensure full lap seal in all lap areas.
 - b. Cut at a 45-degree angle across terminating end lap area of cap membrane prior to applying adjacent overlapping cap membrane.
 - c. All laps shall be a minimum of 4-inches.
 - d. When all base flashing membranes have been installed, mechanically attach the top edge of the system with a continuous metal term bar 8-inches on center, and 1-inch from top of membrane. Exposed top fasteners are not acceptable.
 - e. Do not contaminate vertical surfaces to receive sealant at counter flashing, and clean thoroughly where required.
- H. Set-On Accessories:
1. Where pipe or conduit blocking, supports and similar roof accessories are set on the membrane, adhere walkpad material to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane.
 2. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.
- I. Membrane Flashing at Roof Drain
1. Roof drains and metal flashings are specified in other Sections.
 2. Extend membrane sheets to edge of drain bowl opening at the roof drain deck flange in accordance with membrane manufacturer's printed application instructions. Securely clamp membrane sheets and metal roof drain flashing and strip flashing in the flashing clamping ring. Secure clamps so that sheets and metal flashing are free from wrinkles and folds. Trim stripping flush with inside of clamping ring.
- J. Lightning Protection
1. Lightning protection system components shall be flashed or attached to the roof membrane in a manner acceptable to the roof membrane manufacturer.
- K. Roof Walkpads

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1. Install new walkpads at roof access points, where specifically indicated for traffic areas on the Drawings, and around the perimeter of all mechanical units, in accordance with the modified bitumen sheet roofing manufacturer's printed instructions. Provide minimum 6-inch separation between adjacent walkpads to accommodate drainage. Provide an additional layer of cap sheet under precast concrete paver blocks to protect the roofing, if installed.
- L. Coating Application
 1. If required, apply surface coating materials to membrane and flashing in accordance with coating material manufacturer's recommendations.

3.5 FIELD QUALITY CONTROL

- A. PA/E will determine during course of roofing work whether to proceed with a sample cutting and testing program based upon judgment as to whether material quantities and workmanship used in the Work actually comply with the requirements.
- B. Cut and remove samples in compliance with ASTM D3617 as directed by the PA/E or testing agency.
- C. Provide the PA/E with the necessary assistance to take (1) test cut per each 5000 sq. ft. (50 squares) of installed roof membrane with or without cap sheet, at the option of the PA/E.
- D. If requested by PA/E or Owner, in presence of PA/E's and manufacturer's representative, cut a 4" by 42" cut at right angles to length of plies of felt in a position directed by PA/E. If method of anchorage is in question, a test cut 4'-0" x 4'-0" may be required.
- E. Allowable weight tolerance test cut components shall be +15%. Patching shall be appropriate hot patching technique.
- F. Repair cutouts immediately after removal of samples. Strip cap sheet, if any, back and place the same number of plies of felt and mopping with the first sheet overlapping the cutout area by at least 6-inches on all sides with each succeeding sheet overlapping the previous sheet by at least 4-inches on all sides. Then install cap sheet, if it was present before the test cut.
- G. Deficiencies: Where the test sample indicates a shortage in the required weights or count of plies, discontinuity of moppings, or other deficiencies in the Work, prepare an acceptable recommendation for additional or remedial work to compensate for the deficiencies.
- H. When notified by the Architect, proceed with additional or remedial work as required to compensate for the deficiencies.
- I. Roof Drain Test: After completing roofing but prior to Owner acceptance, perform the following test for watertightness. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at the same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect installation; repair or replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

3.6 PROTECTING ROOFING

- A. Upon completing roofing, including associated work, institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and prepare a written report with copies to Architect and Owner describing nature and extent of deterioration or damage found.
- B. Repair or replace, as required, deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to requirements of specified warranty.
- C. At the end of the day's work and when precipitation is imminent, protect applied modified bitumen roofing system from water intrusion.

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- D. Water Cutoffs: Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of modified bitumen roofing system in an effective manner. Seal off flutes in metal decking along the cutoff edge, when required. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.
- E. Temporary Flashing for Permanent Roofing: Provide temporary flashing at drains, curbs, walls and other penetrations and terminations of roofing sheets until permanent flashings can be applied. Remove temporary flashing before applying permanent flashing.
- F. Temporary Walkways, Runways, and Platforms: Do not permit storing, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

3.7 CLEANING

- A. This Contractor shall periodically, and upon completion of the roofing system, remove and dispose of all debris and residual products and clean all contamination from architectural surfaces visible to the public and from mechanical equipment installed on the roof at no additional cost to the Owner.
- B. Scuppers and downspouts shall be cleaned of debris, and drainage system shall be checked for proper, unobstructed and/or hindered functionality.

END OF SECTION 07511

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Formed low-slope roof flashing and trim.
- B. Related Sections:
 - 1. Division 3 Section "Cast-in-Place Concrete".
 - 2. Division 4 Section "Unit Masonry Assemblies"
 - 3. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 4. Division 7 Section "Built-Up Asphalt Roofing".

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement. All manufacturers shall meet ES-1 Wind Standards.
- B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
- C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

- A. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats and attachments to adjoining work.
 - 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.

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2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 1. Exposed Coil-Coated Finishes:
 - a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 1. Finish: No. 2D (dull, cold rolled).

2.2 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil thick polyethylene sheet complying with ASTM D 4397.

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- B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Slip Sheet: Rosin-sized paper, minimum 5-lb/100 sq. ft.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 - 4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal and other characteristics of item indicated. Shop fabricates items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

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- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with elastomeric sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Furnish with 6-inch-wide, joint cover plates.
 - 1. Joint Style: Butt, with 12-inch-wide, concealed backup plate.
 - 2. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.
 - 3. Basis-of-Design Products: Subject to compliance with requirements, provide "Performa Edge" roof perimeter edge system as manufactured by Innovative Metals Corporation, our comparable products by another manufacturer.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Coping Profile: SMACNA figure designation 3-4B.
 - 2. Joint Style: Butt, with 12-inch-wide, concealed backup plate.
 - 3. Fabricate from the following materials:
 - a. Aluminum: 0.040 inch thick.
 - 4. Chairs: 20 gauge spaced maximum 40 inches on center.
 - 5. Basis-of-Design Products: Subject to compliance with requirements, provide "ES-C Coping" as manufactured by Innovative Metals Corporation, our comparable products by another manufacturer.
- C. Base Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.040 inch thick.
- D. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- E. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- F. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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- D. Match the color and the performance characteristics of the finish on the metal low-sloped roofing flashing and trim installed on the Morgan Family Community Center building. This finish color with performance characteristics is listed below.
 - 1. Finish Color: "Solar White" "CoolR" by Phoenix Metals.
 - a) Initial Solar Reflectance: 0.68
 - b) Emissivity: 0.85
 - c) 3yr: 0.66
 - d) Solar Reflectance Index: 82

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- C. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- D. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.

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7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07920 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 1. Do not solder aluminum sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 24-inch centers.

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- D. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
 - 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
- E. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- F. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- G. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Reglets: Installation of reglets is specified in Division 3 Section "Tilt-Up Concrete".

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07900 - CAULKING AND SEALANTS (PAVING)

PART 1 – GENERAL

- 1.1 CONDITIONS OF THE CONTRACT AND DIVISION 1 – GENERAL REQUIREMENTS: Are hereby made a part of this section.
- 1.2 SCOPE: This section covers the furnishing of all labor, materials, services, equipment and appliances required in conjunction with the furnishing and application of gun-applied sealants for paving, unless specified otherwise in the contract documents.
- 1.3 RELATED WORK SPECIFIED ELSEWHERE:
 - A. Section 03310 – Cast-In-Place Concrete.
- 1.4 SUBMITTALS: Submit to the Architect/Engineer in conformance with the requirements of the CONDITIONS OF THE CONTRACT.
 - A. Manufacturer's Literature: Submit manufacturer's literature on each type of sealant proposed for use.
 - B. Color Samples of Gun-Applied Sealants: Submit manufacturer's chart of standard colors for color selection by the Architect/Engineer.
- 1.5 SPECIALTY SUBCONTRACTOR: Sealants shall be furnished and applied only by an applicator who can present positive proof of having successfully applied materials and used methods specified herein under comparable conditions over a period of at least five (5) years.

PART 2 – PRODUCTS

- 2.1 GUN-APPLIED SEALANTS:
 - A. Sealant for Horizontal Joints Subject to Foot Traffic: A two-part pourable polyurethane sealant, conforming to Interim Federal Specification TT-S-00227E and shall be Pecora Corporation's Urexpan NR200 or Tremco Manufacturing Company's THC/900 sealant, in gray color. Sonneborne paving joints sealer will be acceptable with prior approval.
 - B. Sealant for concrete parking lot paving shall be specified in Section 03310.
- 2.2 PRIMERS: As recommended by sealant manufacturers, and shall have been tested for staining and durability on samples of surfaces to be sealed.
- 2.3 BACKUP MATERIAL: Non-absorbent, non-staining, shall be as recommended by sealant manufacturers, and shall be compatible with sealants used.

PART 3 – EXECUTION

- 3.1 DIMENSIONS OF JOINTS:
 - A. Dimensions of Horizontal Paving Joints: Depth equal to joint width with a minimum depth of one-half (1/2") inch or as shown on the construction details.
- 3.2 SURFACE PREPARATION:
 - A. Concrete surfaces in contact with compounds shall be dry, sound, well brushed, and wiped dust free. Remove oil or grease with solvents. Wipe surfaces with clean rags.

Where surfaces have been treated, remove curing compounds, oils, or other such materials by wire brushing. Remove laitance and mortar from joint cavities. Use backup material in all joints and insert in joint cavities to required depths.

- B. All other surfaces, where required, shall be scraped with wire brush to remove scale, etc., or shall be cleaned of protective coatings where applicable.
- C. Backup: Install backup at required depths.

3.3 APPLICATION OF SEALANTS:

- A. Primers: Use on all surfaces to be sealed, as specified by compound manufacturers. Test primers for staining and durability on samples of actual surfaces to be sealed.
- B. Application: The ambient temperature shall be as recommended by sealant manufacturers when sealants are applied. Gun-apply compounds with nozzles of proper sizes to fit joints. Force into grooves with sufficient pressure to expel air and fill grooves solidly. Joints shall be free of wrinkles and tooled smooth.

- 3.4 CLEANING: Clean surfaces adjoining sealed joints of smears and other soiling resulting from sealing application. Clean up all debris caused by the work of this section, keeping the premises clean and neat at all times.

END OF SECTION 07900

SECTION 07920 – JOINT SEALANTS

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. Section Includes:
 - 1. Silicone joint sealants for glazing assemblies.
 - 2. Latex joint sealants for acoustical treatments.
- B. Related Sections:
 - 1. Section 04200 "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 - 2. Section 08800 "Glazing" for glazing sealants.
 - 3. Section 09250 "Gypsum Board" for sealing perimeter joints.
 - 4. Section 09310 "Ceramic Tile" for sealing tile joints.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Warranties: Sample of special warranties.

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1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

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- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS FOR GLAZING ASSEMBLIES

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - b. Sika Corporation, Construction Products Division; SikaSil-C990.
 - c. Tremco Incorporated; Spectrem 1.

2.3 ACOUSTICAL JOINT SEALANTS

- A. Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

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- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to

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comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- H. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at

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perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07920

DIVISION 8 – DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - END OF 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. Section includes hollow-metal work.
- B. Related Requirements:
 - 1. Section 08710 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Ingersoll-Rand Company. Subject to compliance with requirements, comparable products by one of the following manufacturer's may be submitted for consideration:
 - 1. Amweld International, LLC.
 - 2. Gensteel Doors Inc.
 - 3. Pioneer Industries, Inc.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 HOLLOW-METAL DOORS AND FRAMES

- A. Construct doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Hollow-Metal Doors and Frames: NAAMM-HMMA 860 at locations indicated on the drawings.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated on the Drawings.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053-inch, with A60 coating complying with ASTM A924.
 - 1) Hot dipped zinc-alloy-iron (galvannealed) coating.
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Core: Steel stiffened.
 - 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067-inch, with A60 coating complying with ASTM A924.
 - 1) Hot dipped zinc-alloy-iron (galvannealed) coating.
 - b. Construction: Full profile welded.
 - 4. Exposed Finish: Factory Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

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2.4 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- B. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber
 - 2. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
 - 3. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
 - 4. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
 - 5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

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4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Three anchors per jamb from 60 to 90 inches high.
 - 2) Four anchors per jamb from 90 to 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Four anchors per jamb from 60 to 90 inches high.
 - 2) Five anchors per jamb from 90 to 96 inches high.
 - c. Compression Type: Not less than two anchors in each frame.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 3. Provide loose stops and moldings on inside of hollow-metal work.
 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.7 ACCESSORIES

- A. Mullions: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install frames with removable stops located on secure side of opening.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 - 4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 - 5. In-Place Concrete Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

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- b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
- D. Glazing: Comply with installation requirements in Section 08800 "Glazing" and with hollow-metal manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08110

SECTION 081116 – ALUMINUM FLUSH DOORS AND FRAMES

PART 1 – GENERAL

1.1 Section Includes:

- A. Aluminum Flush Doors.
- B. Aluminum Door Frames.

1.2 Related Sections

- A. Section 042000 – Unit Masonry (frame installation).
- B. Section 079000 – Joint Sealers.
- C. Section 087100 – Door Hardware.

1.3 References

- A. Aluminum Association, Inc. (AA).
 - 1. AA 5005-H14 – Sheet Architectural.
 - 2. AA 6061-T6 – Heavy Duty Structures.
 - 3. AA 6063-T5 – Extrusions, Pipe, Architectural.
 - 4. AA DAF-45 – Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA).
 - 1. AAMA 609 – Anodized Architectural Finishes Cleaning and Maintenance.
 - 2. AAMA 611-98 – Anodized Architectural Standards.
 - 3. AAMA 701 – Pile Weather Strip.
- C. American Society for Testing Materials (ASTM).
 - 1. A 123 – Zinc (Hot-Dip Galvanized) Coatings.
 - 2. C 728-97 – Insulation Board, Mineral Aggregate.
 - 3. E 330-97el – Structural Performance of Exterior Doors.

1.4 Testing and Performance Requirements

- A. Structural Test Unit: Minimum size of 3-feet by 7-feet shall be evaluated compliant with ASTM E 330 testing method.
- B. Test Procedures and Performances:
 - 1. With door closed and locked, test unit in accordance with ASTM E 330 at static air pressure difference of 90.0 pounds per square foot positive pressure and 90.0 pounds per square foot negative pressure with 155 miles per hour wind load.
 - 2. At conclusion of test there shall be no permanent damage to fasteners, hardware parts, support arms or actuating mechanism, nor any other damage that would cause the door to be inoperable.

1.5 Submittals

- A. Submit under provisions of Section 013000.
- B. Product Data: Manufacturer's descriptive literature for each type door and frame: include the following information:
 - 1. Fabrication methods.

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2. Finishing.
3. Hardware preparation.
4. Accessories.

C. Shop Drawings: Indicate the following:

1. Elevations and details of each door and frame type.
2. Schedule of doors and frames.
3. Conditions at openings with various wall thicknesses and materials.
4. Location and installation requirements for hardware.
5. Thicknesses of materials, joints.
6. Connections and trim.

D. Samples: Two sets of color chips representing specified colors and finishes.

E. Verification Samples:

1. Submit samples of each type, consisting of aluminum door corner construction, minimum 6-inch by 6-inch legs.
2. Where color or texture variations are anticipated, such as anodized finishes, include two or more units in each set of samples indicating extreme limits of variations.

F. Hardware Templates: Provide finish hardware mounting details.

G. Manufacturer's Installation Instructions: Printed installation instructions for each product, including product storage requirements.

H. Operations and Maintenance Data: Printed instructions for each product.

1.6 Quality Assurance

A. Manufacturer Qualifications: Company specializing in manufacturing aluminum door and frame systems of the type required for this project, with minimum ten continuous years documented experience.

B. Product Qualifications: Wind-load test certification conforming to ASTM E 330 on samples of previous products shall be provided for the type of door to be used.

C. Installer's Qualifications: Workmen skilled in handling aluminum door and frame systems of the type required for this project.

D. Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project, including instruction to installation personnel.

1.7 Delivery, Storage and Handling

A. Deliver doors and frames palletized, wrapped or individually crated. Doors shall be side protected with surrounding grooved 2-inch by 4-inch wood frame and covered with 275-pound test corrugated cardboard.

B. Inspect delivered doors and frames for damage; unload and store with minimum handling. Repair minor damage if refinished items are equal in all respects to new work; otherwise, remove damaged items and replace with new.

C. Store products of this section under cover in manufacturer's unopened packaging until installation.

1. Place units on minimum 4-inch wood blocking.
2. Avoid non-vented plastic or canvas covers.
3. Remove packaging immediately if packaging becomes wet.
4. Provide 0.25-inch air spaces between stacked doors.

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1.8 Project Conditions

A. Field Measurements: Take field measurements of areas to receive aluminum frames; note discrepancies on submitted shop drawings.

1.9 Scheduling

A. Ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule.

B. Ensure that templates and/or actual hardware requested by manufacturer are available in time for fabrication without affecting construction progress schedule.

1.10 Warranty

A. Manufacturer: Ten-year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing.

B. Installer: Warrant installation procedures and performance for five years against defects due to workmanship and materials handling.

PART 2 – PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Manufacturer: Model: Series 100BE
Cline Aluminum Doors, Inc.
112 – 32nd Avenue West, Bradenton, Florida 34205-8907
Telephone: (800) 648-6736, (941) 746-4104, Fax: (941) 746-5153
Website: www.clinedoors.com, Email: inquire@clinedoors.com

B. Requests for substitution will be considered in accordance with provisions of Section 016000.

2.2 Components

A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish.

B. Aluminum Door Components: Minimum 5-ply composite laminated construction to include:

1. Facing: One-piece 0.040-inch smooth 5005-H14 stretcher-leveled aluminum alloy.
2. Substrate: One-piece oil-tempered hardboard backer.
3. Core: Organic materials shall be used to form a marine grade honeycomb core with high compression strength of 94.8 psi (ASTM C365), and internal aluminum hardware backup tube.
4. Hardware Backup: The hardware backup tube shall be a minimum of 4.25-inches in width, 1.375-inches in depth with a wall thickness of 0.0125-inches. Contiguous for the full perimeter of the door to allow for all specified and non-specified hardware reinforcement.
5. Hardware Prep: Basic to include mortise lock edge prep or cylindrical lock prep; and pairs prepped for flush bolts, if required.
6. Bonding Agent: Environmentally friendly adhesive with strength buildup of 350 pounds per square inch.
7. Perimeter Door Trim: Wall thickness of 0.050-inch minimum in 6063-T5 extruded aluminum alloy with special beveled edge cap design and integral weather stripping on lock stile.
8. Replaceable Door Trim: Mechanically fastened to the hardware backup tube, allowing for replacement in the field, if damaged.
9. Trim Finish: To have minimum of a Class I anodized finish.
10. Weather stripping: Replaceable wool pile with nylon fabric, polypropylene backing meeting

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AAMA 701 standards. Applied weather stripping is not acceptable.

11. Materials: Only nonferrous, non-rusting members shall be acceptable, including tie rods, screws and reinforcement plates.

12. Regulations: All components and agents to meet EPA standards.

C. Aluminum Frames:

1. Frame Components: Extruded channel 6063-T5 aluminum alloy, minimum wall thickness 0.125-inch; cut corners square and joinery shall be mechanical with no exposed fasteners.

2. Profile: Open Back with Applied Stop (OBS), 1.75-inch by 6-inch.

3. Hinge and Strike Mounting Plates: Extruded aluminum alloy bar stock, 0.1875-inch thick mounted in a concealed integral channel with no exposed fasteners.

4. Replaceable Weather stripping: AAMA 701, wool pile with nylon fabric, polypropylene backing, at head and jambs.

5. Door Stop: No screw-on stops acceptable.

2.3 Finish

A. Finish: Clear anodic coating; AA-M12C22A31 Class II mechanical finish, non-specular, with chemical medium-matte etch, minimum thickness 0.4-mil.

2.4 Fabrication

A. General: Receive hardware if required by manufacturer.

B. Aluminum Flush Door Construction: Of type, size and design indicated:

1. Minimum Thickness: 1.75-inches, 5-ply composite laminate system.

2. Door Size: Sizes shown are nominal; provide standard clearances as follows:

a. Hinge and Lock Stiles: 0.125-inch.

b. Between Meeting Stiles: 0.25-inch.

c. At Top Rails: 0.125-inch.

d. Between Door Bottom and Threshold: 0.125-inch.

2.5 Accessories

A. Fasteners: Aluminum, nonmagnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.

1. Do not use exposed fasteners.

B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, nonferrous stainless steel.

C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil thickness per coat.

PART 3 – EXECUTION

3.1 Examination

A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

B. Verify that frames installed by other trades for installation of doors of this section are in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

3.2 Preparation

A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions;

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do not damage sight-exposed finishes.

B. Separate dissimilar metals to prevent electrolytic action between metals.

3.3 Installation

A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors.

B. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

1. Seal metal-to-metal joints between framing members using good quality elastomeric sealant.

C. Where aluminum surfaces contact with metals other than stainless steel, zinc or small areas of white bronze, protect from direct contact by one or more of the following methods.

1. Paint dissimilar metal with one coat of heavy-bodied bituminous paint.

2. Apply good quality elastomeric sealant between aluminum and dissimilar metal.

3. Paint dissimilar metal with one coat of primer and one coat of paint recommended for aluminum surface applications.

4. Use non-absorptive tape or gasket in permanently dry locations.

D. Hang doors with required clearances as follows:

1. Hinge and Lock Stiles: 0.125 inch.

2. Between Meeting Stiles: 0.250 inch.

3. At Top Rails: 0.125 inch.

4. Between Door Bottom and Threshold: 0.125 inch.

E. Adjust doors and hardware to operate properly.

F. Install hardware for doors of this section.

G. Installation of door hardware is specified in Section 087100.

3.4 Cleaning

A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609.

B. Do not use abrasive, caustic or acid cleaning agents.

3.5 Protection

A. Protect products of this section from damage caused by subsequent construction until substantial completion.

B. Repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations.

C. Replace damaged or defective products that cannot be repaired to Architect's acceptance.

END OF SECTION 08116

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 WOOD DOORS, NON-RATED AND FIRE-RATED

- A. Solid-core doors with plastic laminate faces
- B. Glazed

1.2 RELATED SECTIONS

- A. Division 6 - Rough Carpentry
- B. Division 6 – Interior Architectural Woodwork
- C. Division 6 – Steel Doors and Frames
- D. Division 8 – Door Hardware
- E. Division 8 – Glazing

1.3 REFERENCES AND REGULATORY REQUIREMENTS

- A. ASTM E152-81a - Standard Methods of Fire Tests of Door Assemblies.
- B. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 1995 Edition.
- C. UL 10B - Fire Tests of Door Assemblies, 9th Edition.
- D. UBC 43-2 - Fire Tests of Door Assemblies.
- E. NFPA 80 - Fire Doors and Windows.
- F. Quality Standards:
 - 1. NWWDA Industry Standard I.S. 1-A-97 (National Wood Window and Door Association).
 - 2. AWI Quality Standards 7th Edition, Version 1.0 1997.
 - 3. ANSI A115. W Series, Wood Door Hardware Standards. (American National Standard Institute)
- G. Labeling Agencies
 - 1. Intertek Testing Services-Warnock Hersey (ITS-WH)

1.4 DOOR DESCRIPTION

- A. Interior Doors (Non-rated)
 - 1. DPC-1, 5 Ply Particle Board Core Door, 1-3/4" (44mm)
- B. Interior Doors (Rated)
 - 1. DFM-90, 90 Minute Mineral Core Door, 1-3/4" (44mm), rated by ITS/WH

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts, special beveling, blocking for hardware in mineral core doors, identify cutouts.
- C. Product Data: Indicate door core materials, thickness, construction, plastic laminate, cut and matching requirements, factory machining and factory finishing criteria.
- D. Construction Samples: Submit one or more of manufacturer's standard samples demonstrating door construction.

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- E. Finish Samples: Rotary white birch, 6 inches square, for each color, texture, and pattern selected.
- F. Manufacturer's Full Lifetime Warranty

1.6 QUALITY ASSURANCE

- A. Meet or exceed NWWDA I.S.1-A Premium Grade and/or AWI Version 7 Custom Grade.

1.7 DELIVERY, STORAGE, AND HANDLING, AND SITE CONDITIONS

- A. Deliver, store, protect and handle products under provisions of NWWDA, AWI and manufacturer's instructions.
- B. Accept doors on site in manufacturer's standard packaging. Inspect for damage upon receipt.
- C. Do not store in damp or wet areas or in areas where light might cause oxidization.
- D. HVAC systems should be operating and balanced prior to arrival of doors. Acceptable humidity shall be no less than 25% nor greater than 55%.
- E. Break seal on packages while at site to permit ventilation.

1.8 COORDINATION

- A. Coordinate work under provisions of Section 01620.
- B. Coordinate the work with door opening construction, doorframe and door hardware installation with a pre-installation conference.

1.9 WARRANTY

- A. Provide manufacturer's warranty to the following term:
 - 1. Interior Solid Core Doors: "Full Life of Original Installation" including re-hang and refinish if door(s) do not comply with Warranty tolerance standards.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Algoma
- B. Eggers
- C. Weyerhaeuser Company

2.2 WORKMANSHIP

- A. Comply with NWWDA/AWI workmanship for veneer faces, vertical edges, crossbands, horizontal edges and dimensional tolerances.

2.3 MATERIALS

- A. Door Construction Grade
 - 1. Except as may be otherwise shown on the drawings, fabricate the work of this section to NWWDA "Premium Grade"/AWI "Custom Grade".
- B. Doors for Transparent Finish: Comply with the following requirements:
 - 1. Grade: Custom, with Grade A faces.
 - 2. Faces: Rotary white birch stained veneer with a consistent appearance, both in grain and in color, suitable for transparent sealed finish. Color to match architect's sample.

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3. Doors shall be Pre-Machined and Pre-Finished (transparent sealed finish and stained) at the Factory.

B. Doors In Pairs Or Sets

1. Specify per project requirements. Door schedule shall reflect pairs and sets by door numbers.
2. The Colors, Patterns, and Finishes shall match.

2.4 FABRICATION

A. Door Core Construction

1. Non-rated: ANSI A208. 1-LD-2 Particleboard.
2. 45, 60 or 90 minute Fire-Rated: Mineral Core.
3. Bond stiles and rails to core, abrasive sand core assembly to achieve uniform thickness.

B. Vertical Edges (Stiles)

1. Non-rated
 - a. Edges to match face veneer. (May include veneer banding and structural composite lumber backers or inner-plies).
2. 45, 60, 90 Minute Rated Pairs
 - a. Mineral core door stiles to be veneer banded to match faces veneer over manufacturer's edge for improved screw holding. (Metal edges required).
3. Mineral Core
 - a. Mineral core door stiles to be veneer banded to match faces veneer over manufacturer's edge for improved screw holding.

C. Horizontal Edges (Rails)

1. Mill option structural composite lumber or hardwood lumber.

D. Adhesives

1. Facing Adhesive: Type 1 - Waterproof.

E. Inner-blocking For Mineral Core Fire Doors

1. Supply inner-blocking for all surface applied hardware, Through bolts not accepted.

F. Machining For Rated Doors

1. Factory fit and machine doors for frame and finish hardware in accordance with hardware and NFPA 80 requirements and dimensions. Do not machine for surface hardware. Apply appropriate fire labels.

2.5 ACCESSORIES

A. Glazing Stops

1. Non-Rated:
 - a. Wood, of the same species/compatible with door species, with mitered corners.
2. Fire-Rated:
 - a. Metal Vision Frames.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify substrate opening conditions.
- B. Verify that opening sizes and tolerances are acceptable and ready to receive this work.
- C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

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3.2 INSTALLATION

- A. Install fire-rated and non-rated doors in accordance with NFPA 80, manufacturers' instructions and fire rated labeling requirements.
- B. Trim non-rated door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to a maximum 3/4 inch (19 mm).
- D. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- E. Pilot drill screw and bolt holes using templates provided by hardware manufacturer. (Use threaded throughbolts for half surface hinges).
- F. Coordinate installation of doors with installation of frames and hardware.
- G. Coordinate installation of glass and glazing.
- H. Install door louvers and light kits plumb and level.
- I. Reseal or refinish any doors that required site alteration.

3.3 WARRANTY TOLERANCES

- A. Conform to NWWDA standards and testing methods for warp, cup, bow and telegraphing.

3.4 ADJUSTING

- A. Adjust work under provisions Division 1.
- B. Adjust doors for smooth and balanced door movement.

3.5 DOOR AND FRAME COMPONENTS SCHEDULES

- A. Refer to door and frame schedule on drawings.

END OF SECTION 08211

SECTION 08220 – FRP DOORS AND FRTM FRAMES

PART 1 - END OF 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. Section includes, flush, louvered, and glazed fiberglass reinforced plastic (FRP) doors and fiberglass resin transfer molded (FRTM) door frames.
- B. Related Requirements:
 - 1. Section 08710 "Door Hardware" for door hardware.

1.3 QUALITY ASSURANCE

Test certification by an independent and accredited laboratory is required for the properties listed in this Quality Assurance section. Reports shall be made available upon request for each of the standards and certifications described below.

- A. Reference Standards
 - 1. Door Properties
 - a) Standard test method for steady state thermal transmission properties by means of the heat flow meter apparatus.
 - b) Successfully completed 1,000,000 cycles test in accordance with:
 - AAMA 920-03 – Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems.
 - ANSI A250.4-2001 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.
 - NWWDA TM-7 Test Method to Determine the Physical Endurance of Wood Doors and Associated Hardware Under Accelerated Operating Conditions.
 - c) Florida Building Code
 - SFBC PA 201 Impact Procedures for Large Missile Impact
 - SFBC PA 202 Uniform Static Load on Building Components
 - SFBC PA 203 Products Subjected to Cycle Wind Pressure
 - SFBC 3603.2 Forced Entry Test
 - ASTM E 1886 Impact and Cycling, Large Missile Impact
 - ASTM E 1996 Specifications for Performance of Exterior Doors
 - ASTM C 518 Heat Transfer
 - ASTM D 1761 Mechanical Fasteners
 - 2. Laminate Properties:
 - Door face plate is a minimum of 0.125 inch thick fiberglass reinforced plastic molded into one continuous sheet starting with a 25 mil resin-rich gelcoat layer resin integrally molded with multiple layers of 1.5 oz. sq ft fiberglass mat and one layer of 18 oz per square yard fiberglass woven roving saturated with special resin. Door plate weight shall not be less than 0.97 lbs per square foot at a ratio of 30/70 glass resin.
 - Laminated plate by itself evaluated in accordance with Florida Building Code TAS 201 Large Missile Impact Test as per ASTM-1996-05b, Standard Specification for Performance of Exterior Windows, Curtain Wall, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes. The missile (a 2 x 4 with a weight of 9 lbs shot from a cannon at a velocity of 50 ft/sec) did not penetrate the door face plate.
 - a) ASTM D 638 Tensile Strength Properties of Plastic
 - b) ASTM D 790 Flexural Strength Properties of Plastic
 - c) ASTM D 2583 Indention Hardness of Plastics
 - d) ASTM D 256 Izod Pendulum Impact Resistance

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- e) ASTM D 792 Density/Specific Gravity Of Plastics
 - f) ASTM D 1761 Mechanical Properties of Fasteners
 - g) ASTM E 84 Surface Burning Characteristics of Materials
 - h) ASTM G 155 Xenon Light Exposure of Non Metallic Materials
 - i) ASTM D 635 Method For Rate of Burning
 - j) ASTM D 2843 Smoke Density
 - k) ASTM D 1929 SELF IGNITION TEMPERATURE PROPERTIES
 - L) SFBC PA 201 IMPACT PROCEDURES FOR LARGE MISSILE IMPACT
3. Core Properties:
- a) ASTM C 177 Thermal Properties of Materials
 - b) ASTM D 1622 Density and Specific Gravity
 - c) ASTM E 84 Surface Burning Characteristics of Materials
 - d) WDMA TM-10 and TM-5 Firestop ASTM E 152 U.L 10(b)
 - e) ASTM E90-04- Sound Transmission Loss
 - f) ASTM E413-04- Classification for Rating Sound Insulation
 - g) ASTM E1332-90- Standard Classification for Determination of Outdoor-Indoor Transmission Class
 - h) ASTM E2235-04- Standard Test for Determination of Decay Rates for Use in Sound Insulation Methods.
- B. Qualifications
- 1. Manufacturer Qualifications: A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein with a minimum of 30 years documented experience and with a record of successful in-service performance for the applications as required for this project.
 - 2. Installer Qualifications: An experienced installer who has completed fiberglass door and frame installations similar in material, design, and extent to those indicated and whose work has resulted in construction with a record of successful in-service performance.
 - 3. Source limitations: Obtain fiberglass reinforced plastic doors and resin transfer molded fiberglass frames through one source fabricated from a single manufacturer, including fire rated fiberglass frames. This ensures complete uniformity of physical properties and consistency in the resin chemistry tailored for this application.
 - 4. Source limitations: Hardware and accessories for all FRP doors as specified in Section 08710 shall be provided and installed by the fiberglass door and frame manufacturer.
 - 5. Source Limitations: Glass for windows in doors shall be furnished and installed by door and frame manufacturer in accordance with related section, Division 8, Glazing.

1.4 SUBMITTALS

- A. Product Technical Data Including:
- 1. Acknowledgment that products submitted meet requirements of standards referenced.
 - 2. Manufacturer shall provide certificate of compliance with current local and federal regulations as it applies to the manufacturing process.
 - 3. Manufacturer's installation instructions.
 - 4. Schedule of doors and frames indicating the specific reference numbers used on the owner's project documents, noting door type, frame type, size, handing and applicable hardware.
 - 5. Details of core and edge construction. including factory construction specifications.
 - 6. Certification of manufacturer's qualifications.
- B. Submittal Drawings for Customer Approval Shall be Submitted Prior to Manufacture and Will Include the Following Information and Formatting:
- 1. Summary door schedule indicating the specific reference numbers as used on owner's drawings, with columns noting door type, frame type, size, handing, accessories and hardware.
 - 2. A drawing depicting front and rear door elevations showing hardware with bill of material for each door.
 - 3. Drawing showing dimensional location of each hardware item and size of each door.

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4. Individual part drawing and specifications for each hardware item and FRP part or product.
 5. Construction and mounting detail for each frame type.
- C. Samples:
1. Provide one complete manufactured door sample which represents all aspects of the typical manufacturing process, including molded in gelcoat color and face plate construction. One edge should expose the interior of the door depicting the unique u-shaped continuous piece stile and rail, hardware reinforcement and core material.
- D. Operation and Maintenance Manual
1. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use condition.
 2. Include one set of final as built drawings with the same requirements as mentioned in Section B above.
 3. Include certificate of warranty for door and frame listing specific door registration numbers.
 4. Include hardware data sheets and hardware manufacturer's warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Each door and frame shall be delivered individually crated for protection from damage in cardboard containers, clearly marked with project information, door location, specific reference number as shown on drawings, and shipping information. Each crate shall contain all fasteners necessary for installation as well as complete installation instructions.
1. Doors shall be stored in the original container on edge, out of inclement weather for protection against the elements.
 2. Handle doors pursuant to the manufacturer's recommendations as posted on outside of crate.

1.6 WARRANTY

- A. Warranty all fiberglass doors and frames for a period of 25 years against failure due to corrosion. Additionally, warranty all fiberglass doors and frames on materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.
- B. On site assistance available.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements provide products manufactured by Chem-Pruf Door Co., Ltd., P.O. Box 4560 Brownsville, Texas 78523 Phone: 1-800-444-6924-7943, Fax: 956-544-7943, Website: www.chem-pruf.com
- B. Substitutions may be considered provided manufacturer can comply with the specifications as written herein and said products are manufactured in the United States of America. Requests for substitution must be submitted in writing no less than 10 days prior to bid date. Substitution request to include a physical sample and written documentation that product will meet the specific manufacturing methods as highlighted below.

2.2 FRP DOORS

- A. Doors shall be made of fiberglass reinforced plastic (FRP) using Class 1 premium resin with no fillers that is specifically tailored to resist chemicals and contaminants typically found in environment for which these specifications are written. Doors shall be 1 ¾ inch thick and of flush construction, having no seams or cracks. For consistency in the resin chemistry tailored for this application and to maintain the same physical properties throughout the structure, all fiberglass components including face plates, stiles and rails and frames must be fabricated by the same

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manufacturer. Components obtained through various outside sources for plant assembly will not be accepted.

- B. Door Plates shall be 0.125 inch thick minimum, molded in one continuous piece, starting with 25 mil gelcoat of the color specified, integrally molded with multiple layers of 1.5 ounces per square foot fiberglass mat and one layer of 18 ounce per square yard fiberglass woven roving. Each layer shall be individually laminated with resin as mentioned above. Door plate weight shall not be less than 0.97 lbs per square foot at a ratio of 30/70 glass to resin. Plate alone to withstand Large Missile Impact per FBC TAS 201. Face plates manufactured using the pultrusion process does not allow for a smooth molded gelcoat finish, the use of woven roving for adequate plate thickness, strength and weight, or the appropriate glass to resin ratio and will not meet the quality standards of this project.
- C. Stiles and Rails shall be constructed starting from the outside toward the inside, with a matrix of at least three layers of 1.5 ounce per square foot of fiberglass mat. The stile and rail shall be molded in one continuous piece to a U-shaped configuration and to the exact dimensions of the door. In this manner there will be no miter joints and disparate materials used to form the one-piece stile and rail.
- D. Core material shall be Polypropylene plastic honeycomb core with a non woven polyester veil for unparalleled plate bonding, 180 PSI typical compression range unless otherwise requested.
- E. Internal Reinforcement shall be #2 SPF of sufficient amount to adequately support required hardware and function of same.
- F. Finish of door frame shall be identical with 25 mil resin-rich gelcoat of the specified color integrally molded in at time of manufacture resulting in a smooth gloss surface that is dense and non-porous. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Only the highest quality gelcoat will be used to ensure enduring color and physical properties. Paint and/or post application of gelcoat results in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
 - 1. Provide custom color: Match stucco wall color.
- G. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. Fiberglass retainers, which hold the glazing in place, shall be resin transfer molded with a profile that drains away from glazing. The window retainer must match the color and finish of the door plates with 25 mil of resin-rich gelcoat integrally molded in at time of manufacture. Mechanical fasteners shall not be used to attach retainers. Glass, as specified herein, shall be furnished and installed by door and frame manufacturer. In order to maintain uniform appearance, product longevity and the corrosion resistance this application requires, window retainers fabricated from Metal, PVC or Vinyl will not be accepted.
- H. Louver openings shall be completely sealed so that the interior of the door is not exposed to the environment. Louvers are to be solid fiberglass "V" Vanes and shall match the color and finish of the door plates.
 - 1. Provide stainless steel bug screen.

2.3 FRTM FRAMES

- A. Frames (rated and non-rated) shall be fiberglass and manufactured using the resin transfer method creating one solid piece (no voids) with complete uniformity in color and size. Beginning with a minimum 25 mil gelcoat layer molded in and a minimum of two layers of continuous strand fiberglass mat saturated with resin, the frame will be of one-piece construction with molded stop. All frame profiles shall have a core material of 2 psf polyurethane foam. Metal frames or pultruded fiberglass frames will not be accepted.
- B. Finish of frame shall be identical to the door with 25 mil resin-rich gelcoat of the specified color integrally molded in at time of manufacture. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Only the highest quality gelcoat will be used to ensure enduring color and physical properties. Paint and/or post application of gelcoat result in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
- C. Jamb/Header connection shall be mitered for tight fit.
- D. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware. Reinforcing material shall be a dense matrix of cloth glass fibers and premium resin with a minimum hinge screw holding value of 1000 lbs per screw. All reinforcing materials shall be completely encapsulated. Documented strength of frame screw holding value after third insert must be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.
- E. Mortises for hardware shall be accurately machined by CNC to hold dimensions to +/- 0.010 inch in all three axis.
- F. Hinge pockets shall be accurately machined by CNC to facilitate heavy duty hinges at all hinge locations, using shims when standard weight hinges are used.

2.4 HARDWARE

- A. See Section 08710
- B. The special nature of this material requires that all related hardware as specified must be furnished and installed by the door frame manufacturer to maintain product quality and function as well as to ensure sufficient support/reinforcement, precision tooling and proper sealing methods are provided.

PART 3 – EXECUTION

3.1 INSTALLATION CONDITIONS

- A. Verification of Conditions
 - 1. Verify openings are correctly prepared to receive doors and frames.
 - 2. Verify openings are correct size and depth in accordance with submittal drawings.
- B. Installer's Examination
 - 1. Door installer shall examine conditions under which construction activities of this section are to be performed and submit a written report to general contractor if conditions are unacceptable.
 - 2. General Contractor shall submit two copies of the installer's report to the architect within 24 hours of receipt.
 - 3. Installer shall not proceed with installation until all unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Doors shall be delivered at job site individually crated. Each crate to be clearly marked with the specific opening information for quick and easy identification.
- B. All single doors to be shipped completely assembled in the frame with hardware installed. Double doors to be prehung at the factory to ensure a proper fit and that hardware functions properly, then disassembled for shipping purposes.
- C. Install door opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
- D. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
- E. Site tolerances: Maintain plumb and level tolerance specified in manufacturer's printed installation instructions.
- F. Fire labeled doors, frames and any associated hardware must be installed by qualified professional installers in strict accordance with manufacturer's instructions and the latest revision of NFPA 80.

3.3 ADJUSTING

- A. Adjust doors in accordance with the door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instruction.

3.4 CLEANING

- A. Clean surfaces of door opening assemblies and exposed door hardware in accordance with respective manufacturer's maintenance instructions.

3.5 PROTECTION OF INSTALLED PRODUCTS

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END OF SECTION 08220

SECTION 08411 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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:
 - 1. Exterior aluminum-framed entrances and storefronts.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 2. Dimensional tolerances of building frame and other adjacent construction.
 - 3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Seismic Loads: As indicated on Drawings.
- D. Deflection of Framing Members:
 - 1. Deflection Normal to Wall Plane: Limited to [edge of glass in a direction perpendicular to glass plane shall not exceed $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to $3/4$ inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or $1/8$ inch, whichever is smaller.
- E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

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- F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to [ASTM E 1886 and testing information in ASTM E 1996 or AAMA 506.
 - 1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.
 - 2. Small-Missile Impact: For aluminum-framed systems located more than 30 feet above grade.
- G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft..
- H. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Interior Ambient-Air Temperature: 75 deg F.
- J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
- K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

1.4 ACTION SUBMITTALS

- A. Product Data: For each system indicated.
- B. Substitutions: Whenever substitute products are to be considered, supporting technical data, samples and test reports must be submitted ten (10) working days prior to bid date in order to make valid comparison.
- C. Shop Drawings: Include plans, elevations, sections, details of installation and attachments to other Work.
 - 1. Prepare data based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
 - 2. For entrance systems, include hardware schedule and locations.
 - 3. Provide drawings sealed by an Engineer licensed by the authority having jurisdiction.
- D. Samples: For each exposed finish and for each color required.
- E. Closeout Submittals:
 - 1. Warranty: Submit warranty documents specified herein.
 - 2. Project Record Documents: Submit project record documents for installed materials in accordance with Division 1 Project Closeout (Project Record Documents) Section.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- C. Welding certificates.

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- D. Preconstruction Test Reports: For sealant.
- E. Florida Product Approval or Miami-Dade Notice of Acceptance (NOA): Provide a Florida Product Approval, issued by the Florida Department of Business and Professional Regulation, or a Miami-Dade Notice of Acceptance (NOA), issued by the Miami-Dade County Government, certifying that testing, approved and monitored by these agencies, has sufficiently demonstrated that the exterior aluminum-framed entrance and storefront system assemblies and the exterior aluminum-framed horizontal sliding window assemblies as designed and manufactured, will withstand the wind pressures and wind-borne missile impact forces in compliance with all code and jurisdictional requirements for the project location when installed according to the manufacturer's specifications and instructions including those instructions that may be provided with the Florida Product Approval or NOA documents.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- G. Source quality-control reports.
- H. Field quality-control reports.
- I. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

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1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace systems that fail in materials and workmanship within five (5) years from date of Substantial Completion. Failure includes, but is not limited to the following:
 - 1. Structural failures including, but not limited to, excessive deflection.
 - 2. Adhesive or cohesive sealant failures.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Failure of operating components to function normally.
 - 5. Water leakage through fixed glazing and frame areas.

PART 2 - PRODUCTS

2.1 EXTERIOR STOREFRONT FRAMING

- A. Provide the same exterior storefront framing product installed on the North Port Youth Community Center building, matching in appearance, finish, color, and performance characteristics. This product is listed in the paragraph below.
- B. Product: Provide Series IR-500 Flush Glazed Aluminum Storefront System manufactured by the Kawneer Company, Inc.
- C. Substitutions: Subject to compliance with requirements and approval of the substitution product by the Architect, the Contractor may provide a comparable product, matching the product installed on the Morgan Family Community Center building, in appearance, finish, color, and performance characteristics, by one of the following manufacturers:
 - 1. EFCO Corporation.
 - 2. YKK AP America

2.2 ENTRANCE DOOR SYSTEMS

- A. Provide the same aluminum-framed entrance door product installed on the Morgan Family Community Center building, matching, in appearance, finish, color, and performance characteristics. This product is listed in the paragraph below.
- B. Product: Provide Series 350 IR aluminum-framed entrance doors manufactured by the Kawneer Company, Inc.
- C. Substitutions: Subject to compliance with requirements and approval of the substitution product by the Architect, the Contractor may provide a comparable product, matching the product installed on the Morgan Family Community Center building, in appearance, finish, color, and performance characteristics, by one of the following manufacturers:
 - 1. EFCO Corporation.
 - 2. YKK AP America.

2.3 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.
 - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
- B. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
 - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 - 2. Exterior Hinges: Stainless steel, with stainless-steel pin.
 - 3. Quantities:

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- a. For doors more than 87 and up to 120 inches high, provide 4 hinges per leaf.
- C. Cylinders: As specified in Section 08710 "Door Hardware."
 - 1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".
- D. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- E. Operating Trim: BHMA A156.6.
- F. Closers: Manufacturer's standard SM.
- G. Concealed Overhead Holders: BHMA A156.8, Grade 1.
- H. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- I. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- J. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- K. Silencers: BHMA A156.16, Grade 1.
- L. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- M. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.4 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209 (ASTM B 209M), 3003-H14 Aluminum Alloy, 0.080" (1.95 mm) minimum thickness.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B429.
 - 4. Structural Profiles: ASTM B308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.5 ACCESSORIES

- A. Manufacturer's Standard Accessories:
 - 1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners.
 - 2. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer, Glazing gaskets in accordance with ASTM 864.
 - 3. 0.050 Aluminum Sill Flashing End Dams featuring 3 point attachment.

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2.6 RELATED MATERIALS (Specified in Other Sections)

- A. Glass: Refer to Division 8 Glazing Section for glass materials.
- B. Hardware: Refer to Division 8 Door Hardware.

2.7 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
 - 1. Hardware: Drill and cut template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.
 - 2. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.

2.8 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Match the color and gloss of the finish on the exterior aluminum storefront framing installed on the Morgan Family Community Center building.
 - a) Color: Black.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate metal surfaces in contact with incompatible metal or corrosive substrates, including wood, by painting contact surfaces with bituminous paint or primer or by applying sealant or tape recommended by manufacturer.
- B. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- C. Install glazing to comply with requirements of Division 8 Section "Glazing."
 - 1. Mechanically fasten glazing in place until structural sealant is cured.
 - 2. Install secondary sealant (weatherseal) to produce weatherproof joints.
 - 3. Remove excess sealant before sealant has cured.
- D. Install sealants at system perimeter to comply with requirements of Division 7 Section "Joint Sealants."
- E. Install framing components true in alignment with established lines and grades to the following tolerances:
 - 1. Variation from Plane: Limit to 1/8 inch in 12 feet over total length.
 - 2. Alignment: For surfaces abutting in line, limit offset to 1/16 inch. For surfaces meeting at corners, limit offset to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.
- F. Bed windowsill and door thresholds in a full bed of sealant.

3.2 FIELD QUALITY CONTROL

- A. Water Spray Test: After completing installation of each area, test system for water penetration according to AAMA 501.2.
 - 1. Repair or remove and replace Work that fails or is damaged by testing; repair or replace to comply with requirements.

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3.3 ADJUSTING AND CLEANING

- A. Adjusting: Adjust swing doors for operation in accordance with manufacturer's recommendations.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect the installed product's finish surfaces from damage during construction.

END OF SECTION 08411

SECTION 08511 – ALUMINUM WINDOWS

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. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
 - 1. Section 08411 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
 - 1. Exposed Finishes: 2 by 4 inches.
 - 2. Exposed Hardware: Full-size units.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.

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- c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
2. Warranty Period:
- a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.
 - c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Series 8400TL Impact Resistant Horizontal Slider manufactured by the Kawneer Company, Inc., or comparable product by one of the following:
- 1. EFCO Corporation; a Pella company.
 - 2. Traco Windows and Doors, Inc.
- B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
- 1. Window Certification: AMMA certified with label attached to each window.
- B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F.
- C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40.
- D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.
- F. Sound Transmission Class (STC): Rated for not less than 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
- G. Outside-Inside Transmission Class (OITC): Rated for not less than 22 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
- H. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
- 1. Horizontal sliding.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials

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- and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
2. Frames compatible with the Aluminum-Framed Storefront system frames specified in Section 08411, Aluminum-Framed Entrances and Storefronts.
- C. Insulating Laminated Glass Units: ASTM E 2190 and ASTM 1172.
1. Basis-of-Design Manufacturer: Rochester Insulated Glass, Inc. (RIG).
 - a. OB Exterior Glass Ply: 1/4-inch Solarban #2.
 - b. Clear Low-E Coating on #2 surface.
 - c. Interlayer: 100HP PVB.
 - d. IB Glass Ply: 1/4-inch clear.
 - e. Interspace: Air, 1/2-inch.
 - f. IB Glass Ply: 1/4-inch clear.
- D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.
- F. Horizontal-Sliding Window Hardware:
1. Sill Cap/Track: Manufacturer's standard of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks.
 3. Roller Assemblies: Low-friction design.
- G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

- A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.
- B. Column Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- C. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- D. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- E. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

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- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish (Three-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coatings; Organic Coating: manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Match Aluminum Storefront Frame Finish. See Section 08411.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

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3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 - 2. Test Reports: Prepared according to AAMA 502.
- C. Remove and replace noncomplying windows and retest as specified above.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08511

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SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Work covered by this Section of Specifications consist of furnishing and delivering to the job site for fitting and installation, all Finish Hardware complete, in accordance with this Section and applicable Drawings and subject to terms and conditions of the Contract. It is intended that the following list of hardware will cover all Finish Hardware to complete the project. Omissions and/or discrepancies shall be brought to the Architect's attention during the bidding period. Hardware for labeled openings shall meet U.L. requirements whether specified or not.

1.3 ITEMS SPECIFIED IN OTHER SECTIONS

- A. Division 6 Section "Interior Architectural Woodwork" for Plastic-Laminate Cabinets.

1.4 SUPPLIER

- A. Finish hardware shall be furnished by one approved by the Architect as having appropriate technical knowledge and experience to correctly interpret Drawings and Specifications. Supplier shall be prepared at all times during progress of installation to promptly provide competent and efficient Architectural Hardware Consultant (AHC) to provide its complete installation in order that all items shall be installed in the best manner and function properly. This will necessitate a job visit prior to final inspection. Supplier shall be bonafide distributor of all materials furnished.

1.5 DELIVERY

- A. All items of Finish Hardware shall be delivered to the project site, or as otherwise specified or required, and shall be checked in for completeness and familiarization with the Contractor. All items of Finish Hardware shall be packaged, numbered, and labeled to identify each opening for which it is intended and to correspond with item numbers on the approved Hardware Schedule.

1.6 TEMPLATES

- A. All Finish Hardware to be installed on or in metal doors and/or frames shall be manufactured to template. Template machine screws shall be furnished for all such materials. This supplier shall furnish Hardware Schedule as approved by the Architect and all the necessary template transmittals to metal door and frame fabricators or other suppliers requiring the same, for their coordination and use, as well as providing templates to wood door manufacturer or others for their use.

1.7 SCHEDULES

- A. Submit complete typewritten Hardware Schedule in triplicate to the Architect for approval. After approval, provide required number of copies of approved Hardware Schedule for distribution. No factory order shall be placed for materials until the Architect has given approval.
- B. One current copy of catalogue cut shall be submitted with the Hardware Schedule for each item of hardware listed in the schedule.

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- C. Each item in the schedule shall be identified on the first page of the Schedule by the manufacture's name.

1.8 RESPONSIBILITY

- A. It shall be the supplier's responsibility to furnish hardware in accordance with the intent of this Specification. Whereby virtue of Architectural design or by function a change is necessary, hardware of equal design and quality shall be furnished upon written approval of Architect.

1.9 LOCATIONS

- A. Hardware location dimensions shall be as follows - distance from finish floor to centerline of:
- | | |
|---------------------|---|
| Door Knob | 38" |
| Door Pull | 42" |
| Deadlock | 48" |
| Exit Bolt Cross Bar | 38" |
| Push Plate | 42" |
| Butt Hinges | Bottom Hinge – finish floor to bottom of hinges 10". Top Hinge – head rabbet to top of hinge 5".
Center Hinge – equi-distance between top and bottom hinges. |

1.10 180 DEGREE OPENINGS

- A. Other than those doors that are restricted to less than 180 degrees opening by building or by overhead holders or stops, all butts and/or closer arms shall be of sufficient size to allow full 180 degrees opening of doors.

1.11 WARRANTY

- A. Upon Certificate of Substantial Completion the installer will guarantee all labor and defective material which they have provided for the specified project. This has been done in accordance with the specifications and plans. All repairs of work done that may prove to be defective in its workmanship within a period of (1) one year, after substantial completion.

PART 2 - PRODUCTS

2.1 FINISHES

- | | |
|----------------------------------|-------------|
| A. Butts – Exterior | US32D |
| B. Butts - Interior: | US26D |
| C. Locks: | US32D |
| D. Push, Pull and Kick Plates: | US32D |
| E. Closers: | ALUM |
| F. Panic Devices: | US26D |
| G. Door Stops and Miscellaneous: | US32D/US26D |

2.2 BUTTS

- A. Doors 1-3/4" thick – Minimum 4 Ω " high
- B. Doors 1-3/8" thick – Minimum 3 Ω " high
- C. Each door shall not have less than three (3) hinges. Labeled doors 8'-0" and higher shall have four (4) hinges whether specified under items or not.
- D. All butts used with door closers shall be ball bearing. All exterior doors shall have ball bearing butts, except as otherwise specified.

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2.3 LOCKSETS

- A. Shall be one of the following manufacturers or approved equal and shall be furnished in the function as specified in the hardware sets:

<u>MANUFACTURER</u>	<u>SERIES</u>	<u>DESIGN</u>
SCHLAGE	L	SPARTA

2.4 CLOSERS

- A. Closers shall be one of the following manufacturer and shall be furnished in the manufacturer's recommended printed size for specified condition unless otherwise noted in the Hardware Schedule. Closers shall be full rack and pinion complete with back check. Springs shall be motor clock type. Furnish flush mount transom brackets where no transom bar exists. Furnish parallel arm where required. All closers to meet ADA codes.

<u>MANUFACTURER</u>	<u>SERIES</u>
LCN	4040XP

2.5 FIRE EXIT DEVICES

- A. Fire exit devices shall be of the following manufacturer or approved equal and shall be furnished in the function as specified in the hardware sets. Furnish reinforced cross bars for all devices on doors 3' -2" and wider.

<u>MANUFACTURER</u>	<u>SERIES</u>
VON DUPRIN	99

2.6 DOOR TRIM

- A. All push plates, pulls, pull plates; kick and/or armor plates shall be any of one of the following manufacturers products or approved equal in catalogue number as set forth herein:

<u>MANUFACTURER</u> :	<u>PUSH PLATE</u>	-	<u>PULL PLATE</u>	-	<u>KICK PLATE</u>
ROCKWOOD	70		110 X 70		12 X 2 LDW

2.7 SILENCERS

- A. All interior metal door frames Shall have door silencers type 33 or 34, three (3) per single door; two (2) per pair of doors.

2.8 DOOR HOLDERS

- A. Holders shall be one of the following manufacturers or approved equal and shall be furnished in the manufacturer's recommended size for the specified condition unless otherwise noted in the hardware sets. All holders shall be automatic with adjustable holding force. Furnish flush mount transom brackets where no transom bar exists.

<u>MANUFACTURER</u>	<u>TYPE</u>
GLYNN JOHNSON	GJ450 SERIES

2.9 DOOR STOPS

- A. All stops shall be one of the following manufacturers or approved equal.

<u>MANUFACTURER</u>	<u>SERIES</u>
ROCKWOOD	440/409

2.10 KEYING

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- A. All locks shall be keyed per instructions of the Owner. Submit a proposed

Keying Schedule for approval. REMOVABLE CORES PER OWNER. Schlage C145 key way per owners instruction. Supply Bitting list with project.

2.11 FASTENINGS

- A. All screws shall be of matching finish to their product and shall be the manufacturer's standards for that item.
- B. Sex Bolts: Door closers, door holders and exit devices installed on wood doors shall be attached by means of the bolts and sex nuts.

2.12 KEY CABINET

- A. Furnish a key cabinet complete with accessories to accommodate all keys, plus 100 % for future expansion. (1 per building)

MANUFACTURER
TELKEE

MODEL NUMBER
AWC250S

- B. Prepare and furnish the Owner with complete index of keys, as directed by the Architect. Tag and file all keys in cabinet located as directed by the Architect. All index cards shall be filled in by typewriter.

2.13 KEY LOCK BOX

- A. Exterior mounted for fire department access, designed for storage of two keys with tamper switches to connect to intrusion detection system.
- B. Provide product approved by the Authority Having Jurisdiction. Mount at location approved by the Architect and the Authority Having Jurisdiction.
- C. Manufacturers:
1. ALBOY Security. Inc.
 2. Knox Company (KNX)
 3. Supra Products

2.14 RAIN DRIP

- A. Provide rain drip at all exterior hollow metal doors.

END OF SECTION 08710

SECTION 08800 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes:
 - 1. Transparent glass glazing for general and special purpose applications including; coated, float, heat-strengthened, impact resistant, low emissivity, laminated and tempered glass.
 - 2. Work Results: Manufacture, handle, deliver and install glazing systems as shown on the architectural drawings or as otherwise specified and in accordance with the requirements of the contract documents.
- C. Related Sections:
 - 1. Division 8 Section “Steel Doors and Frames”.
 - 2. Division 8 Section “Flush Wood Doors”.
 - 3. Division 8 Section “Aluminum-Framed Entrances and Storefronts”.

1.2 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. AAMA American Architectural Manufacturers Association
 - 2. ANSI American National Standards Institute
 - 3. ASTM Formerly the American Society for Testing and Materials
 - 4. CPSC Consumer Products Safety Commission
 - 5. FT Fully Tempered
 - 6. GANA Glass Association of North America
 - 7. HS Heat-strengthened
 - 8. ICC International Code Council
 - 9. LBNL Lawrence Berkeley National Laboratories
 - 10. Low-E Low emissivity
 - 11. LSG Light to Solar Gain
 - 12. NFRC National Fenestration Rating Council
 - 13. SHGC Solar Heat Gain Coefficient
 - 14. SC Shading Coefficient
 - 15. USGBC The U.S. Green Building Council
 - 16. VLT Visible Light Transmittance
- B. Reference Standards:
 - 1. ASTM C 1036 Standard Specification for Flat Glass
 - 2. ASTM C 1048 Standard Specification for Heat-treated Flat Glass – Kind HS, Kind FT Coated and Uncoated
 - 3. ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass
 - 4. ASTM E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings
 - 5. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings
 - 6. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials
 - 7. FBC 2007 Florida Building Code - Building
- C. Definitions:
 - 1. Deterioration of Coated Glass: Defects developing from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking and other indications of deterioration in metallic coating.

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2. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delaminating material obstructing vision through glass and blemishes exceeding those allowed by referenced laminated glass standards.
3. Manufacturer: A firm that produces primary glass or fabricated glass products as defined in referenced glazing publications.
4. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036
5. Fully Tempered Glass: Glass that has been heat-treated using horizontal (roller hearth) method and complies with ASTM C 1048, Type I, Class I (clear).

1.3 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Shop Drawings: Show details of each type of glazing system in conjunction with the framing system indicating type of glass, sizes, shapes, glazing material and quantity. Show details indicating glazing material, glazing thickness, bite on the glass and glass edge clearance.
- C. Samples: Submit 12-inch long samples of each type of glass indicated except for clear monolithic glass products, and 12-inch long samples of each color required, except black, for each type of sealant or gasket exposed to view.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Qualification Data: For installers.
- G. Product Certificates: For glass and glazing products, from manufacturer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulated laminated glass, glazing sealants and glazing gaskets.
 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- I. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
- J. Warranties:
 - a. Provide a written 5-year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.
 - b. Provide a written 10-year warranty from date of manufacture for sputter coated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
 - c. Provide a written 5-year warranty from date of manufacture for fully tempered glass that has been Heat Soaked. Warrants that heat soaked tempered glass will not break spontaneously as a result of Nickel Sulfide (NS) inclusions at a rate exceeding 0.5% (5/1000) for a period of five years from date of manufacture.

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1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain laminated glass and tempered glass from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations listed under Article 1.2, References, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
- H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 SITE CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide glass products, listed in this section, manufactured by Rochester Insulated Glass, Inc. (RIG), or comparable products, meeting or exceeding the performance requirements of the products listed in this section, by one of the following manufacturers:

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1. Guardian
2. Oldcastle BuildingEnvelope
3. Southwall Technologies
4. Sully North America
4. Viracon

- B. Product Options: Obtain glass and glazing materials from one source for each product indicated. Coatings and finished assemblies, such as laminated units, to be manufactured by the same fabricator in order to have a common source of warranty.

2.2 GLASS PRODUCTS, GENERAL

- A. All products shall comply with ASTM standards.
- B. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- C. Provide glazing systems capable of withstanding normal thermal movements, wind loads and impact loads, without failure, including loss due to defective manufacture, fabrication and installation, deterioration of glazing materials, and other defects in construction.

2.3 PERFORMANCE

- A. Glass Strength: Analysis shall comply with ASTM E 1300 Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat-treated) required to meet or exceed the following criteria based on project loads and in-service conditions.
1. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following criteria based on project loads and in-service conditions.
 - a. 8 breaks per 1000 for glass installed vertically or not 15 degrees or more from the vertical plane and under wind action.
 2. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1" (25mm).
- B. Thermal and Optical Performance: Provide glass products with performance properties specified in Article 2.7, Product Schedule. Performance properties to be manufacturer's published data as determined according to the following procedures;
1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 5.2 computer program.
 2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
 3. Solar optical properties: NFRC 300.

2.4 FABRICATION

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Float Glass:
1. Shall comply with ASTM C1036 Standard Specification for Float Glass, Type 1, Class 1 (clear) and Quality q3.
 2. ASTM C 1048 Heat Treated Float Glass, Kind FT (remove ASTM Standard C 1048 if annealed glass), Condition A (uncoated).
 - a. Heat Treated Float Glass to be horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
 - b. Maximum peak to valley rollerwave 0.003" (0.08mm) in the central area and 0.008" (0.20mm) within 10.5" (267mm) of the leading and trailing edge.

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- c. Maximum bow and warp 1/32" per lineal foot (0.79mm).
 - d. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
- C. Laminated Glass:
 - 1. Shall comply with ASTM 1172 Standard Specification for Laminated Architectural Flat Glass.
 - 2. Windborne-Debris-Impact Resistance: Provide exterior laminated glazing that passes basic protection testing requirements in ASTM E 1996 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the on the Project.
 - a. Large-Missile Test: For all exterior glazing regardless of height above grade.
 - 3. All laminated architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
 - 4. Laminated Glass products to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.
- D. Coated Vision Glass:
 - 1. Shall comply with ASTM C 1376 Standard for Pyrolytic and Vacuum Deposition Coatings on Glass.
 - 2. Coated products to be magnetically sputtered vacuum deposition (MSVD).

2.5 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 PRODUCT – LAMINATED GLASS

- A. Transparent (Tinted) Coated (Low-E) Laminated Glass (Exterior locations. See plans.):
 - 1. Basis-of-Design Product: 9/16-inch Laminated Coated Glass as manufactured by Rochester Insulated Glass, Inc. (RIG).
 - a. OB Exterior Glass Ply: 1/4-inch Solarban #2.
 - b. Clear Low-E Coating on #2 Surface.
 - c. Interlayer: 100HP PVB
 - d. IB Glass Ply: 1/4-inch Clear.
 - 2. Performance Requirements
 - a. Visible Light Transmittance: 72%
 - b. Summer U-Value: 0.93
 - c. Shading Coefficient: 0.52
 - d. Solar Heat Gain Coefficient: 0.45
- B. Translucent Coated (Low-E) Laminated Glass (Exterior locations. See plans.):
 - 1. Basis-of-Design Product: 9/16-inch Laminated Coated Glass as manufactured by Rochester Insulated Glass, Inc. (RIG).
 - e. OB Exterior Glass Ply: 1/4-inch Clear.
 - f. Clear Low-E Coating on #2 Surface.
 - g. Interlayer: 100HP PVB Hurricane White Translucent.
 - h. IB Glass Ply: 1/4-inch Clear.
 - 2. Performance Requirements
 - e. Visible Light Transmittance: 81%
 - f. Summer U-Value: 0.93
 - g. Shading Coefficient: 0.52
 - h. Solar Heat Gain Coefficient: 0.65

2.8 PRODUCT – TEMPERED GLASS

- A. Transparent (Clear) Monolithic Uncoated Heat Treated (Fully Tempered) Glass (Interior locations. See Plans.):
 - 1. Basis-of-Design Product: 1/4" (6mm) overall panel thickness, Monolithic Uncoated Heat treated Glass as manufactured by Rochester Insulated Glass, Inc. (RIG).
 - a. Glass Ply: 1/4" (6mm), Clear, FT.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave

3.3 INSTALLATION

- A. Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials including those in the GANA Glazing Manual except where more stringent requirements are indicated.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- M. Prevent glass from contact with contaminating substances that result from construction operations such as weld splatter, fire-safing or plastering. If substances do come into contact with the glass, remove substances immediately as recommended in writing by the glass manufacturer.

3.4 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

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- C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

DIVISION 9 – FINISHES

SECTION 09250 - GYPSUM BOARD

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. Section Includes:
 - 1. Exterior gypsum board for ceilings.
- B. Related Requirements:
 - 1. Section 09111 "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 EXTERIOR GYPSUM BOARD FOR CEILINGS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Gypsum.

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- b. CertainTeed Corp.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. USG Corporation.
2. Core: 5/8 inch, Type X.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
- 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.
 - f. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
 - 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
- 1. Interior Gypsum Board: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
- 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

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1. Laminating adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Vapor Retarder: As specified in Section 07210 "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install panels with face side out. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.

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3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
 2. Fasten with corrosion-resistant screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
 3. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
- E. Aluminum Trim: Install in locations indicated on Drawings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.
 3. Level 3: Ceilings receiving spray-applied, hand-trowelled acoustical finish.
 4. Level 4: At all panel surfaces exposed to view.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

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3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250

SECTION 09310 – CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceramic wall tile.
- B. Related Sections:
 - 1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- C. References:
 - 1. American National Standards Institute (ANSI):
 - a. A108 Standard Specifications for the Installation of Ceramic Tile.
 - b. A118.3 Standard Specifications for Chemical Resistant, Water Cleanable Tile- Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
 - c. A118.6 Standard Specifications for Ceramic Tile Grouts.
 - d. A118.7 Standard Specifications for Polymer Modified Cement Grouts.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified.
- C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
 - 1. Locate precisely each joint and crack in tile substrates by measuring, record measurements on shop drawings, and coordinate them with tile joint locations, in consultation with Architect.
- D. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.
- E. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.
- F. Product Data: Submit product data, including manufacturer's SPEC-DATA® sheet.
- G. Samples: Submit 3 inch (76 mm) long samples of specified grout in selected color(s).
- H. Warranty: Manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

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- B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Joint sealants.
 - 2. Cementitious backer units.
 - 3. Metal edge strips.
- D. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings".

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Porcelain Ceramic Wall Tile:
 - a. Daltile, Inc.
 - 2. Latex-Emulsion-Based Latex-Portland Cement Mortars:
 - a. American Olean Tile Co., Inc.
 - b. Boiardi Products Corp.
 - c. Bostik Construction Products Div.
 - d. Custom Building Products
 - e. C-Cure Chemical Co.
 - f. DAP Inc. Div.; USG Corp.
 - g. L & M Mfg. Inc.

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- h. Laticrete International Inc.
 - i. Mapei Corp.
 - j. Southern Grouts & Mortars, Inc.
 - k. Summitville Tiles, Inc.
 - l. Syracuse Adhesives Co.
4. Urethane based grouts
- a. StarQuartz Industries.

2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
 - 1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. Provide selections made by Architect from manufacturer's full range of standard colors, textures, and patterns for products of type indicated.
 - 2. Provide tile trim and accessories that match finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

2.3 TILE PRODUCTS

- A. Ceramic Wall Tile: Provide flat tile complying with the following requirements:
 - 1. Composition: Ceramic. Basis of Design: Daltile Whisper Green Random Mosaic Blend SA51
 - 2. Nominal Facial Dimensions: 11-3/4" x 12-1/2" sheet
 - 3. Nominal Thickness: 5/16 inch.
 - 4. Face: Plain with cushion edges.
 - 5. Grout: Basis of Design: StarQuartz Industries
- B. Ceramic Wall Tile: Provide flat tile complying with the following requirements:
 - 1. Composition: Ceramic. Basis of Design: Daltile Matte Pearl White 0799661P4
 - 2. Nominal Facial Dimensions: 6" x 6"
 - 3. Nominal Thickness: 5/16 inch.
 - 5. Grout: Basis of Design: StarQuartz Industries
- C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
 - 1. Size: 3 inches by 12 inches.
 - 2. Shapes: As follows, selected from manufacturer's standard shapes:
 - a) Base for Thin-set Installations: Bullnose base, 3 inches high by 12 inches long.

2.4 SETTING MATERIALS

- A. Latex-Portland Cement Mortar: ANSI A118.4, composition as follows:

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1. Latex additive (water emulsion) of type described below, serving as replacement for part or all of gauging water, combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer.
 - a) Latex Type: Manufacturer's standard.

2.5 GROUTING MATERIALS

- A. Urethane Based Grout:
 1. Physical Properties:
 - a. Water Cleanability (ASTM A118.3): Pass
 - b. Initial Set (ASTM A118.3): > 2 hours
 - c. Service Strength (ASTM A118.3): Pass
 - d. Vertical Joint Sag (ASTM A118.3): Pass
 - e. Linear Shrinkage (ASTM A118.3, ASTM A118.7): 0.06%
 - f. Stain Resistance (ASTM A118.3): Pass
 - g. Compressive Strength (ASTM A118.3, A118.7): 4200 psi (29 MPa)
 - h. Chemical Resistance (ASTM A118.3): Pass
 - i. Water Absorption (ASTM A118.6, A118.7): < 1%

2.6 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

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- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align 1/16" joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealers."
- G. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts (urethane grouts), comply with ANSI A118.3.

3.4 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove urethane grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09310

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Resilient (Vinyl) wall base.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each type of base indicated, in manufacturer's standard-size Samples but not less than 12 inches long.

1.3 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive finishes during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient base or stair product installed.

PART 2 - PRODUCTS

2.1 RESILIENT WALL BASE

- A. Vinyl Base:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide products by Burke Mercer Flooring Products indicated on the Drawings or comparable products by one of the following:
 - a. Allstate Rubber Corp.; Stoler Industries.
 - b. Armstrong World Industries, Inc.
 - c. Flexco, Inc.
 - d. Johnsonite.
 - e. Musson, R. C. Rubber Co.
 - f. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
 - g. PRF USA, Inc.
 - h. Roppe Corporation, USA.
 - i. VPI, LLC; Floor Products Division.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

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- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of floor tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.
- G. Beginning of installation indicated acceptance of the substrate.

3.2 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Premolded Corners: Install premolded corners before installing straight pieces.

3.3 RESILIENT WALL BASE INSTALLATION LOCATIONS

- A. The following rooms receive resilient wall bases: Room 103, 114 and 118.

END OF SECTION 09653

SECTION 09671 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Decorative resinous flooring.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Substrate condition and preparation.

1.3 REFERENCES

- A. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
- B. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
- C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- D. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
- E. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- F. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- G. ASTM D2240 - Standard Test Method for Rubber Property Durometer Hardness.
- H. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- J. MIL-D-3134J - Deck Covering Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and quartz aggregate combinations.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) in color and quartz aggregate combination as selected by the Architect.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installation shall be made by an experienced factory trained contractor specializing in resinous floor types similar to that required for the Project.
 - 2. Installing contractor and installing supervisor shall be certified by the flooring manufacturer.
- B. Single-Source Responsibility: Obtain epoxy component of flooring materials, including primers, resins, hardening agents, and finish sealing coats, from a single manufacturer. Obtain ceramic-coated quartz aggregate from primary manufacturer of that product.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Lighting: Permanent lighting will be in place and working before installing decorative quartz epoxy flooring.

1.8 WARRANTY

- A. The warranty shall be a joint warranty issued by the manufacturer and installing contractor for a period of one year following the Owner's acceptance. The warranty shall cover the remedy of defects in material and workmanship.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the HSS DQB, 1/8 inch Decorative Quartz Broadcast Flooring System by Horizon Surface Systems as indicated on the Drawings.
- B. A product comparable to the Basis-of Design product may be provided pending approval by the Architect and the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Concrete Substrate Preparation.
 - 1. Clean surfaces thoroughly prior to installation.
 - 2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 3. Provide abrasive blast cleaning as final cleaning step.
 - 4. Joints: Fill and level control joints with recommended joint sealer.
 - 5. Concrete Substrates: Prepare according to ASTM F 710.
- D. The Contractor shall verify to the Owner and installer a minimum of 30 days prior to the scheduled resilient flooring installation the following substrate conditions.
- E. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- F. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- G. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- H. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with

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installation only after substrates pass testing.

1. Perform alkalinity testing. Proceed with installation only if maximum pH is below 10.0
 2. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sf (2.3 kg of water/92.9 sqm) in 24 hours.
 3. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- I. Contingency for High Moisture Readings: If at the time of testing the moisture readings are in excess of the specified limits the Contractor will initiate testing using the Petrographic core analysis to determine if the water/cement ratio and sufficient hydration has taken place. The Contractor is to verify the results to the Owner and installer.
- J. Moisture Remediation: Basic steps as follows.
1. Removal of all floor coverings, adhesives residue, curing compounds, parting compounds or other surface contaminants by mechanical means (shot blasting or other suitable methods).
 2. Identification and treatment of all cracks and joints, by the sealer manufacturer's approved methods.
 3. Application of the sealer. Sealer shall be designed and warranted for the purpose of controlling excessive concrete moisture vapor emission and the alkali character of the concrete.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coves Installation: Bond the precast cove units to the wall surface prior to flooring application. The resinous floor system shall be monolithic from floor, over cove and onto wall surface creating a seamless overlay.
- C. Substrate Strengthening Adhesive Installation: Apply evenly over prepared substrate per manufacturer's recommendation.
- D. Substrate Vapor Barrier Installation: Apply evenly over prepared substrate per manufacturer's recommendation. Membrane shall be tack-free prior to application of base coat.
- E. Pre-fill and EPC Regrade: Apply sand filled primer mixture in slurry or trowel consistency to substrate to fill, regrade, and level concrete substrate. The EPC application shall be smooth without ridges or indentations, providing drainage without low spots. The EPC shall be keyed at drains and door transitions to a minimum depth of 1/2 inch (13 mm) and minimum width of 2 inches (51 mm).
- F. Membrane Installation: Apply evenly over prepared substrate per manufacturer's recommendation. Membrane shall be tack-free prior to application of base coat.
- G. Pre-fill: Apply sand filled primer mixture in slurry or trowel consistency to substrate to fill, regrade, and level substrate.
- H. Broadcast First Base Coat: Apply base coat and broadcast aggregate to refusal. Remove excess aggregate after base coat has achieved tack free stage. Do not reuse aggregate.
- I. Broadcast Second Base Coat: Apply base coat and broadcast aggregate to refusal. Remove excess aggregate after base coat has achieved tack free stage. Do not reuse aggregate. Lightly sand base coat aggregate and leave dust free prior to top coating. For floors scheduled for aggressive anti-slip wearing surface do not sand prior to top coating.
- J. Slurry Base Coat: Apply pre-filled aggregate base coat and broadcast aggregate to refusal. Remove excess aggregate after base coat has achieved tack free stage. Lightly sand base coat aggregate and leave dust free prior to top coating. For floors scheduled for aggressive anti-slip wearing surface do not sand prior to top coating.
- K. Trowel Base Coat: Apply neat base coat polymer as a primer to fully wet the concrete surface

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with a minimum of 10 mils (0.25 mm) thickness. Apply pre-filled aggregate base coat over wet primer. Power and hand trowel to compact overlay. Allow overlay to become tack free before application of top coat.

- L. Top Coat: Provide top coat with surface profile achieved by the measured application of surface profiler aggregate. Minimum thickness of top coat shall be 20 mils (0.5 mm).

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09671

SECTION 09672 – RESINOUS FLOORING (Add Alternate One)

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Work described in this section includes surface preparation and installation of Silikal reactive resin industrial floor system.
- B. See drawings for locations and quantities.

1.2 RELATED WORK - SPECIFIED ELSEWHERE

- A. Division 3 - Cast-in-Place Concrete.
 - 1. See paragraphs in Article 1.8 for requirements for new concrete.
- B. Division 9 – Exterior and Interior Painting

1.3 SYSTEM DESCRIPTION

- A. The Silikal 62 SLF is a 4-6mm (3/16"-1/4") thick troweled surfacing composite of Silikal 100% reactive binder resin and Silikal Fillers with specified Silikal primer and topcoat.
- B. The Silikal coating system shall cure completely and be available to normal operations in no more than 90 minutes at Temperatures as low as 0 °C. after application of the final coat.
- C. The finished Silikal floor coating system shall be uniform in color combinations, texture, and appearance. All edges that terminate at walls, floor discontinuities, and other embedded items shall be sharp, uniform, and cosmetically acceptable with no thick or ragged edges. The Contractor shall work out an acceptable masking technique to ensure the acceptable finish of all edges.
- D. See other Article 3 paragraphs for number and thicknesses of each coat/layer in each system.
- E. All resins must be manufactured and tested under an ISO 9001 registered quality system and ISO 14001 ecology management system.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Acceptable manufacturer: Silikal GmbH, Germany.
- B. Applicator Qualifications:
 - 1. Pre-qualification requirements: Only approved applicators, licensed by Silikal shall be considered for qualification. In no case will Silikal permit the application of any of its materials by untrained, non-approved Contractor or personnel.
 - 2. Each approved applicator shall have been qualified by the Manufacturer as knowledgeable in all phases of surface preparation.
 - 3. Each approved applicator must have three (3) years experience of installing resinous flooring systems and submit a list of five projects/references as a prequalification requirement. At least one of the five projects/ references must be of equal size, quantity, and magnitude to this project as a prequalification requirement. Owner has the option to personally inspect the projects/references to accept or reject any of the Contractors prior to bid time as a prequalification requirement.
- C. Subcontractor Qualifications:
 - 1. The only approved and specified subcontractors for this resurfacing work shall be for shot-blast cleaning of the concrete substrate.

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- D. Acceptance Sample:
 - 1. Representative sample of the specified flooring system shall be submitted to the Owner prior to the bidding phase of the project. All bidders shall inspect the "acceptance sample" before submitting their bids.
 - 2. The installed flooring system shall be similar to the acceptance sample in thicknesses of respective filmlayers, color, texture, overall appearance and finish.
- E. Bond Testing:
 - 1. Surface preparation efforts shall be evaluated by conducting Bond Tests at the site prior to application of the flooring system(s).
 - 2. See Article 3.3, Paragraph B, or consult with Material Manufacturer for specific procedure.
- F. Pre-Job Meeting
 - 1. Owner requires a Pre-Job Meeting with representatives of Owner, Contractor/Applicator, and Material Manufacturer in attendance. The agenda shall include a review and clarification of this specification, application procedures, quality control, inspection and acceptance criteria, and production schedules. Applicator is not authorized to proceed until this meeting is held or waived by Owner.

1.5 REFERENCE STANDARDS

- A. ACI 308 - Standard Practice for Curing Concrete
- B. ACI 302.1R-80 - Guide for Concrete Floor and Slab Construction
- C. United States Department of Agriculture (USDA) and (Food and Drug Administration (FDA) authorization) for incidental contact with foodstuffs.

1.6 SUBMITTALS

- A. Acceptance Sample: As required by owner, one foot square (1 ft. by 1 ft.) sample of the specified acrylic flooring system applied to hardboard or similar backing for rigidity and ease of handling.
- B. Manufacturer's Literature: Descriptive data and specific recommendations for surface preparation, mixing, and application of materials.
- C. Manufacturer's Material Safety Data Sheets (MSDS) for each respective product to be used.
- D. Cleaning and Maintenance

1.7 DELIVERY, STORAGE, AND HANDLING

- A. All material shall be delivered in original Manufacturer's sealed containers with all pertinent labels intact and legible.
- B. Store materials in dry protected area between 25° and 80° Fahrenheit. Keep out of direct sunlight. Protect from open flame; keep all containers grounded.
- C. Follow all Manufacturer's specific label instructions and prudent safety practices for storage and handling.

1.8 PROJECT/SITE CONDITIONS

- A. Material, air, and surface temperatures shall be in the range of 32° to 85° Fahrenheit during application and cure, unless a special formulation is being used and Manufacturer has been consulted.
- B. Relative humidity in the specific location of the application shall be less than 85 percent and the surface temperature shall be at least 5 degrees above the dew point.
- C. Conditions required of new concrete to be coated.

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1. Concrete shall be moisture cured for a minimum of 7 days at 70° F. The concrete must be fully cured for a minimum of 28 days prior to application of the coating system pending moisture testing.
 2. Surface contaminants such as curing agents, membranes, or other bond breakers should not be used.
 3. Concrete shall have a "rubbed" finish; float or darby finish the concrete (a hard steel trowel is neither necessary nor desirable).
 4. Drains should be set to the concrete grade rather than raised to the finished grade of the topping.
- D. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing. Concrete R/H must be 85% or less as measured by protimeter. Readings greater than 5 by the Calcium Chloride method or 85% by protimeter, may require a preliminary treatment with Silikal RE40.
- E. Foodstuffs are the responsibility of the Owner and shall have been removed from the area of application by the Owner or his representatives.
- F. Vapor barriers and/or suitable means shall have been installed beneath grade slabs to prevent vapor transmission. Consult technical dept.

1.9 WARRANTY

- A. Silikal warrants that materials shipped to buyers are at the time of shipment substantially free from material defects and will perform substantially according to Silikal published literature if used strictly in accordance with Silikal's prescribed procedures and prior to expiration date.
- B. Silikal's liability with respect to this warranty is strictly limited to the value of the material purchased.
- C. Silikal has no responsibility for the application and processing of products and is under no circumstances liable to any third party whatsoever.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Silikal GmbH, Germany
- B. No substitutions allowed.

2.2 MATERIALS

- A. Silikal 62 SLF Self Leveling Flake Flooring
1. Moisture Vapor Treatment (if required)
Silikal RE40
 2. Saturating Primer/Silikal Coat:
Silikal R41 with Additive I
 3. Patching/Sloping (if required)
Silikal R17 Polymer Concrete
 4. Coving (if required):
Silikal HK20 with #10-#12 mesh dry silica sand.
 5. Topping:
Silikal R62 SL, consisting of Silikal R62 resin and Silikal Filler
 6. Topcoat(s):
Silikal R71re Colorless Silikal Topcoat Resin.
 7. Silikal Flakes for broadcasting: Color/s to be chosen by owner.
 8. Aluminium Oxide (if required)

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2.3 PRODUCT PERFORMANCE CRITERIA

- A. Silikal RE40
1. Percentage Reactive Resin100%
 - Percentage Solids100%
 2. Water Pressure Resistance (3 days at 72 psi)Passed
 3. Resistance to Diffusion Against H₂O0.3g/m² • day
 4. Tensile Bond Strength.....475 psi
- B. Silikal R41 With Additive I
1. Percentage Reactive Resin100%
 - Percentage Solids100%
 2. Water Absorption, Wt. % (ASTM D570):less than 0.6
 3. Tensile Strength, psi (ASTM D638):.....3,550 psi.
 4. Tensile Modulus, psi X 10 to the 5th (ASTM D638):2.1
 5. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):0.000035
 6. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm:1015
Surface Resistance, ohm:.....1012
 7. Water Vapor Transmission (DIN 53122), g/cm-hr-mm Hg X 10-9: 1.4
- C. Silikal R17 Polymer Concrete
1. Percentage of reactive resin100%
 2. Water Absorption, Wt. % (ASTM D570):0.02
 3. Tensile Strength, psi (ASTM D638):.....1,200 psi.
 4. Tensile Modulus, psi X 10 to the 5th (ASTM D638):.....1.2
 5. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696) psi x10-6:18
 6. Compressive Strength, psi (ASTM C39):.....7,800 psi.
(ASTM C109).....9,200 psi.
- D. Silikal R62 SL Topping
1. Percentage of reactive resin:100%
 - Percentage of solids:100%
 2. Water Absorption, Wt. % (ASTM D570):0.04
 3. Compressive Strength, psi (ASTM C109):6,000-8,000 psi.
(ASTM D695): 6,000 psi.
 4. Tensile Strength, psi (ASTM D638): 1,050 psi.
 5. Tensile Modulus, psi (ASTM D638):.....720,000 psi.
 6. Flexural Strength, psi (ASTM D790):3,500 psi.
 7. Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):0.000019
 8. Electrical Resistivity, (ASTM D257) Volume Resistance, ohm-cm:1014
 9. Chemical Resistance, ASTM D543:
Effect of weak acids:none
Effect of strong acids:.....slight
Effect of alkalis:.....none
Effect of salt solutions:.....none
Effect of oil, grease:.....none
Effect of sunlight (UV radiation):.....none
- E. Silikal R71re Colorless Topcoat Resin
1. Percentage Reactive Resin:.....100%
 - Percentage Solids:.....100%
 2. Water Absorption, Wt. % (ASTM D570):0.5
 3. Tensile Strength, psi (ASTM D638):.....3,555 psi.
 4. Tensile Modulus, psi (ASTM D638):.....210,000 psi.
 5. Coefficient of Thermal Expansion (ASTM D696) in./in./deg. F:.....0.000035
 6. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm:1015

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Surface Resistance, ohm:.....	1012
7. Water Vapor Transmission (DIN 53122) g/cm-hr-mm Hg X 10-9:.....	1.43
8. Chemical Resistance, ASTM D543:	
Effect of weak acids:.....	none
Effect of strong acids:	slight
Effect of alkalis:.....	none
Effect of salt solutions:.....	none
Effect of oil, grease:	none
Effect of sunlight (UV radiation):	none

2.4 PRODUCT INSTALLATION & APPLICATION CRITERIA

- A. All Silikal Material Systems Excepting Moisture Vapor Treatment:
 - 1. Pot Life at 68° F.:.....10-15 minutes
 - 2. Cure Time at 68° F.:.....60 minutes
 - 3. Recoat Time at 68° F.:.....60-90 minutes

2.5 MIXES

- A. Follow manufacturer's prescribed procedures and recommendations.

PART 3 – EXECUTION

3.1 PREWORK INSPECTION

- A. Examine all surfaces to be coated with Silikal material systems and report to the Owner and/or Engineer any conditions that will adversely affect the appearance or performance of these coating systems and that cannot be put into acceptable condition by the preparatory work specified in Article 3.3.
- B. Do not proceed with application until the surface is acceptable or authorization to proceed is given by the Engineer.
- C. In the event that Applicator has employed all acceptable methods of surface preparation and cannot remedy adverse conditions that would lead to failure of the installation, Applicator shall withdraw from the contract and Owner will be financially responsible only for preparation efforts.

3.2 GENERAL

- A. Material storage area must be selected and approved by Applicator and Owner or his representative.
- B. Owner will furnish electricity and water for use by Applicator.
- C. If existing ventilation is inadequate, Applicator will provide sufficient ventilation to allow complete air exchange every five (5) minutes.
- D. Owner shall provide means for disposal of construction waste.
- E. Applicator will protect adjacent surfaces not to be coated with masking and/or covers. Owner's equipment shall be protected from dust, cleaning solutions, and flooring materials.

3.3 PREPARATION

- A. Surface Preparation - General
 - 1. Concrete substrate must be clean and dry. Dislodge dirt, mortar spatter, paint overspray, and other dry surface accumulations and contamination by scraping, brushing, sweeping, vacuuming, and/or compressed air blowdown.
 - 2. New concrete: See Article 1.8, Paragraph C, for requirements.

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3. Surfaces that are heavily contaminated shall be cleaned with the appropriate degreaser, detergent, or other appropriate cleaner/surfactant followed by thoroughly rinsing with fresh water to remove the accumulation prior to mechanical cleaning efforts. Mechanical cleaning will not remove such deposits, but only drive them deeper.
 4. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing and no more than 85% R/H as measured by Protimeter
- B. Bond Testing
1. The applicator shall evaluate all surface preparation by conducting bond tests at strategic locations.
 2. Mix six (6) ounces of the primer to be used in the application with 5% by volume Silikal Powder Hardener. Add #10-#12 mesh, dry quartz sand until an easily trowelable mixture is obtained. Apply palmsized patties 1/8" to 1/4" thick.
 3. After one (1) hour at (68° F.), patties must be cured tack-free and cooled to ambient temperature of concrete. Remove patties with hammer and chisel and examine fracture/delamination plane. Concrete with fractured aggregate must be attached to the entire underside of the patty.
 4. If only laitance or a small amount of concrete is attached or if interface between patty and substrate is tacky, further substrate preparation is required.
 5. If further surface preparation is required, bond tests shall be conducted again when this has been completed.
 6. If no amount or kind of surface preparation produces satisfactory bond tests, the applicator shall report that to the Owner, Engineer, and Manufacturer.
- C. Mechanical Surface Preparation and Cleaning
1. All accessible concrete floor surfaces shall be mechanically blast cleaned using a mobile steel shot, dust recycling machine such as BLASTRAC®, or approved equivalent. All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a profile similar to 40 grit sandpaper and exposing the upper fascia of concrete aggregate.
 2. Floor areas inaccessible to the mobile blast cleaning machines shall be mechanically abraded to the same degree of cleanliness, soundness, and profile using vertical disc scarifiers, starwheel scarifiers, needle guns, scabblers, or other suitably effective equipment.
 3. After blasting, traces or accumulations of spent abrasive, laitance, removed toppings, and other debris shall be removed with brush or vacuum.
 4. Conduct Bond Tests to check adequacy of surface preparation. See Article 3.3, Paragraph B, (Bond Testing).
 5. Application of the respective specified material system(s) must be completed before any water or other contamination of the surface occurs.

3.4 INSTALLATION

- A. Application of Silikal 62 SLF flooring system consists of:
1. applying moisture vapor treatment (if required)
 2. applying the primer,
 3. applying coving (if required),
 4. performing patching and sloping with polymer concrete (if required),
 5. re-priming polymer concrete areas
 6. applying the topping, broadcasting the Silikal Flakes.
 7. applying the topcoat(s),
Time for curing (45 - 60 minutes) shall be allowed between each coat.
Thicknesses are specified below.
- B. Open only the containers of component materials to be use in each specific application as needed. Refer to Manufacturer's data sheets for pot-life/temperature relationship to

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determine size of batches to mix and mix ratios for each respective coat of the system.

- C. Measure, add, and mix the Silikal BP-Powder Hardener into the respective resin components in the proportions recommended by the Material Manufacturer. Pot life is short, so mix only as much material at a time as can be easily and efficiently applied.

3.5 MOISTURE VAPOR TREATMENT (IF REQUIRED)

- A. Mix moisture vapor treatment products as recommended by manufacturer.
- B. Pour out all resin onto the concrete surface and spread it with a squeegee. After a short operating time (appr. 10 minutes) the excess must be removed with the squeegee. The remaining resin can be rolled out with a lint free resin proof roller. **Resin films as well as the building of puddles have to be avoided!**

The waiting time between the coats depends on the absorbency of the substrate and is normally between one and three hours. Before applying the second coat if required, the impregnation of the first coat into the substrate should be evident.

- C. If required, repeat the above process. During application of the treatment take care that there is no film building at the surface. The surface texture has to be maintained after every step.

3.6 PRIME COAT

- A. Mix primer components according to manufacturer's instructions.
- B. Pour the mixture batches onto the floor surface and use a 9" or 18" wide, 1/2" - 3/4" thick-napped, solvent resistant paint roller to roll out the material at a rate of 100 sq. ft./ gal. to form a uniform, continuous film, ensuring that all crevices, cracks, other surface discontinuities have been saturated and coated. Use a paint brush to reach areas inaccessible to the roller. Work quickly and deliberately; the pot life is short (10 -15 minutes). Do not leave any "puddles"; roll out any such accumulations.
- C. Allow the primer coat to cure.
- D. If any of the concrete has absorbed all of the primer or if the concrete still has a dry look, reprime these areas before applying the next layer.

3.7 COVING

- A. Surface Preparation
 - 1. If concrete walls are to be painted prior to installation of cove base, the bottom portion of the walls shall remain uncoated to the height of the cove base to insure a proper bond to the concrete wall.
 - 2. If walls are constructed of a non-compatible material or if a coating exists, a backer board of 1/2" cement board cut to the desired height of the cove base needs to be installed. The top of the backer board should be cut at a 45° angle to create a "beveled" edge.
 - 3. If a backer board needs to be installed it shall be fastened using a high grade construction adhesive as well as counter sunk screws or concrete masonry anchors.
- B. System Description
 - 1. Cove base shall be installed according to manufacturer's recommendations and shall be:
 - a) Application area requires prime coat according to Article 3.7.
 - b) Trowel-On Cove Base consisting of a trowel applied radius/base mix with a termination strip installed at the top of the base.
 - 2. Cove base will receive a broadcast and top coat consistent with flooring system.

3.8 PATCHING/SLOPING (IF REQUIRED)

- A. Mix polymer concrete components as recommended by the Material Manufacturer.
- B. Use mixture to repair any damaged concrete, or to slope any areas as needed.

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- C. Once cured, material must be re-primed before next layer is applied.

3.9 TOPPING

- A. Size the batches, and mix according to Manufacturer's instructions. The entire batch should be poured and spread at once, i.e., do not let material set in pail.
- B. Spread the topping material with a gauge rake set to a depth of 3/16". Lightly trowel to a uniform thickness of 3/16" as necessary.
- C. If necessary, roll with a porcupine roller to release trapped air.
- D. Broadcast Silikal flakes into the fresh material before it begins to cure. Broadcast by hand, or use a backpack type blower or sand blast pot to achieve an even broadcast. The flakes must 'rain' down and not be thrown into the wet base coat.
- E. Allow the topping to cure.
- F. Remove excess flakes by sweeping, "blow-down", and/or vacuuming.

3.10 TOP COAT

- A. Apply with clean rollers at a rate of 80 - 90 sq. ft./gal. in the same way as the Silikal Primer was applied as described in this section.
- B. (If Required) Broadcast aluminium oxide, or other suitable material into wet topcoat resin; size and rate as determined by owner.
- C. Allow topcoat to cure. Floors without aluminium oxide broadcast may be lightly sanded if required. Vacuum all dust, paying particular attention to edges and corners.

3.11 SECOND TOP COAT

- A. Apply with clean rollers at a rate of 100 - 125 sq. ft./gal. in the same way as the Silikal Primer was applied as described in this section.
- B. Allow topcoat to cure.

3.12 FIELD QUALITY CONTROL/INSPECTION

- A. Applicator shall request acceptance of surface preparation from the Engineer before application of the prime/seal coat.
- B. Applicator shall request acceptance of the prime coat from the Engineer before application of subsequent specified materials.

3.13 CLEANING

- A. Applicator shall remove any material spatters and other material that is not where it should be. Remove masking and covers taking care not to contaminate surrounding area.
- B. Applicator shall repair any damage that should arise from either the application or clean-up effort.

3.14 COATING SCHEDULE

- A. Moisture vapor treatment shall be Silikal RE40 application rate shall be approximately 220 sq. ft. per gallon (approx. 7 mils)
- B. Primer shall be Silikal R41 with Additive I Application rate shall be approx. 100 sq.ft. per gallon (approx. 16 mils).
- C. Patching/Sloping material shall be R17
- D. Flexible membrane shall be Silikal RV368 applied with a gauge rake set at 1/16" for a rate of

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- 40 sq. ft. per batch.
- E. Coving shall be Silikal HK 20 per manufacturer's recommendations.
 - F. Body coat shall be Silikal R62 SL, applied with a gauge rake set at 1/8" for a rate of 40 sq. ft. per batch. Flakes to be broadcast into the uncured topping. Broadcast the flakes at the rate of 0.15 – 0.25 pounds per sq. ft.
 - G. Clear topcoat shall be Silikal R71re ; apply at the rate of 80 - 90 sq. ft. per gallon for the first coat and 90 - 120 sq. ft. per gallon for the second application.

END OF SECTION 09672

SECTION 09831 – SPRAY-APPLIED, HAND-TROWELLED ACOUSTICAL FINISH

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. Section includes spray-applied, hand-trowelled acoustical finish.

1.3 DEFINITIONS

- A. NRC: Noise reduction coefficient.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details and material descriptions.
- B. Samples for Initial Selection: Acoustical finish manufacturer's full range of colors and finishes.
- C. Samples for Verification: For the following products:
 - 1. Provide product on 6-inch square base of the actual substrate.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Manufacturer's ISO 9001:2000 Certification.
- B. Test Reports indicating compliance with the following:
 - 1. NRC values per ASTM C-423 conducted by a NVLAP certified testing laboratory:
 - a. NRC = .65.
 - 2. Class 1 Fire Rating per ASTM E-84.
- C. Manufacturer's written certification that the materials contain no asbestos, fiberglass or other man-made mineral fibers.
- D. Installer's license provided by the Manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For spray-applied, hand-trowelled acoustical finish to include in maintenance manuals. Include manufacturer's written cleaning and stain-removal recommendations.

1.8 QUALITY ASSURANCE

- A. Manufacturer must be ISO 9001:2000 Certified.
- B. Installation applicator must be trained and certified by the Manufacturer.
- C. Mockups: Build mockups to verify selection made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.
 - 1. Apply a 100 square foot representative sample on the actual substrate of typical ceiling area as directed by Architect. Include intersection of wall and ceiling, corners, and perimeters.

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2. Prepare the mockup using the same tools and techniques to be used for actual application.
3. **Do not start the actual application until the Architect has approved the mockup.**
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in original, unopened containers bearing the name of the Manufacturer and product identification.
- C. Store materials dry, off ground and under cover.
- D. Protect liquid adhesive, sealers & additives from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. The air temperature in the room must be a minimum of 60 degrees F and maintained until the material has cured.
- C. Provide ventilation to ensure proper curing.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace acoustic finish that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Acoustical performance.
 - b. Deterioration of finish.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "SonaKrete" acoustical finish and "SonaPrep" substrate treatment manufactured by the International Cellulose Corporation. or a comparable product subject to approval by the Architect.
- B. Source Limitations: Obtain product from single source from single manufacturer.

2.2 MATERIALS

- A. Acoustical Finish:
 1. Spray-applied, hand-trowelled Class 1 Fire Rated acoustical finish system made from post-industrial paper.
 2. Color: Field paint per acoustical finish system manufacturer's recommendations. Paint color selected by the Architect.
- B. Substrate Treatment:
 1. Manufacturer's recommended treatment for gypsum board substrates applied prior to the acoustical finish application.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the substrate and report unsatisfactory conditions in writing. Do not proceed until unsatisfactory conditions are corrected.
- B. Gypsum board substrates require a minimum Level 3 finish, treated with the acoustical finish manufacturer's recommended treatment for gypsum board prior to acoustical finish application.

3.2 PREPARATION

- A. Provide masking, drop cloths or satisfactory coverings for materials and surfaces that are not to receive the acoustic finish.
- B. Coordinate the installation of the acoustic finish with the work of other trades.

3.3 APPLICATION

- A. Install to a thickness to achieve an NRC of .65.
- B. Install the acoustic finish according to the manufacturer's written instructions.
- C. After achieving the required thickness and while still wet, float the material to match the approved mockup.
- D. Cure the material with continuous natural or mechanical ventilation.

3.4 PROTECTION

- A. Protect the finished installation under provisions of Division 1.

END OF SECTION 09831

SECTION 09910 - PAINTING

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. Section includes surface preparation and the application of paint systems on the following exterior and interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Portland cement plaster (stucco).
 - 4. Steel.
 - 5. Galvanized Metal
 - 6. Gypsum board.
- B. Related Requirements:
 - 1. Section 05120 "Structural Steel" for shop priming of metal substrates with primers specified in this Section.
- C. Paint exposed surfaces, except where the Drawings or the Paint Schedules indicate that the surface or material is not to be painted or is to remain natural. If the Drawings or the Paint Schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not the Drawings or Schedules indicate colors. If the Drawings or Schedules do not indicate color or finish, the Architect will select from standard available colors and finishes.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and ironwork, and primed metal surfaces of mechanical and electrical equipment.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork and casework.
 - b. Acoustical ceiling panels.
 - c. Aluminum storefront frames.
 - d. Door hardware.
 - e. Toilet compartments.
 - f. Fire extinguisher cabinets.
 - g. Fire extinguishers.
 - h. Toilet and bath accessories.
 - i. Roller shades.
 - j. Appliances.
 - k. Finished mechanical and electrical equipment.
 - l. Fire sprinkler heads.
 - m. Light fixtures.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Pipe spaces.
 - e. Duct shafts.

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3. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
4. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: Manufacturer's color charts, showing the full range of colors available for each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 1. Submit Samples on rigid backing, 8 inches square.
 2. Ferrous Metal: Provide two 4-inch square samples of the finish on the same type of metal to be painted.
 3. Step coats on Samples to show each coat required for system.
 4. Label each coat of each Sample.
 5. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2 of this section, with the proposed product highlighted.
 3. VOC content.
- E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

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1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. At the conclusion of the project and as part of Project Closeout, submit a summary list of all paint products used on the project. List manufacturer, paint name, paint color, specific paint mix and location where additional quantities may be purchased.
- B. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Heat Reflective Textured Coatings: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Manufacturer's Qualifications: Not less than 10 years successful experience in supplying materials of the types equivalent to those required for this project.
 - 2. Coats: The number of coats specified is the minimum acceptable. If full coverage is not obtained with the specified number of coats, apply such additional coats as necessary to produce the required finish.
 - 3. Employ coats and undercoats for full finishes pursuant to the paint manufacturer's instructions.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 4. Regulatory Agency Requirements:
 - a. Comply with state and local regulations governing use of paint materials.
 - b. Comply with OSHA guidelines for protective clothing, glasses, gloves, and respirators as required for project conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in the manufacturer's original, unopened packages and containers bearing the manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).

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3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the products listed on the Drawings and in other Part 2 articles for the paint category indicated, or comparable products, unless no substitutions allowed.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

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1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethyhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Napthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.
- E. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Colors: Match colors indicated by reference to manufacturer's color designations.
- G. Colors: As selected by Architect from manufacturer's full range.
- 2.3 BLOCK FILLERS**
- A. Block Filler, Latex, Interior/Exterior: MPI #4.
 - B. Block Filler, Epoxy: MPI #116.
- 2.4 PRIMERS/SEALERS**
- A. Primer, Alkali Resistant, Water Based: MPI #3.
 - B. Primer Sealer, Latex, Interior: MPI #50.
- 2.5 METAL PRIMERS**
- A. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
 - B. Primer, Galvanized: As recommended in writing by topcoat manufacturer.
- 2.6 WATER-BASED PAINTS**
- A. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.

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2.7 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: MPI #99.

2.8 EPOXY COATINGS

- A. Epoxy, High-Build, Low Gloss: MPI #108.
 - 1. Tnemec Series 66 Hi-Build Epoxoline. No substitutions.
- B. Epoxy Deck Coating (Slip-Resistant): MPI #82.

2.9 POLYURETHANE COATINGS

- A. Polyurethane, Two-Component, Pigmented, Gloss (Gloss Level 6): MPI #72.
 - 1. Tnemec Series 1070 Fluoronar. No substitutions.

2.10 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 2. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 3. Testing agency will perform tests for compliance with product requirements.
 - 4. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Portland Cement Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

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3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
 - 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
 - 2. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 3. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 - 4. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions:
 - 1. Maintain containers used in mixing and applying paint in clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

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3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 5. Paint entire exposed surface of window frames and sashes.
 6. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 7. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touch up painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause the undercoat to lift or lose adhesion.
- C. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.
- D. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- E. Prime Coats: Before applying finish coats, apply a prime coat of material as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in the first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- F. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- G. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- H. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- I. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

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- g. Tanks that do not have factory-applied final finishes.
- h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
- i. Other items as directed by Architect.

3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied.
 - 1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of materials delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.
 - 2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative material analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.
 - l. Color retention.
 - m. Alkali and mildew resistance.
- B. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE – (Includes all non-conditioned interior air spaces.)

- A. Concrete Substrates:
 - 1. Water-Based Clear Sealer System:
 - a. Prime Coat: Sealer, water based, for concrete floors, MPI #99.
 - b. Intermediate Coat: Sealer, water based, for concrete floors, MPI #99.
 - c. Topcoat: Sealer, water based, for concrete floors, MPI #99.
- B. CMU Substrates:

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1. Latex System:
 - a. Prime Coat: Block filler, latex,, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
- C. Steel Substrates (See Article 3.8, High-Performance Coating Schedule, for exposed structural steel members):
 1. Quick-Drying Enamel System:
 - a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
 - b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
 - c. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7), MPI #96.
- D. Galvanized-Metal Substrates:
 1. Latex System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, gloss (Gloss Level 6), MPI #119.
- E. Portland Cement Plaster (Stucco) Substrates:
 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
- F. Exterior Gypsum Board Substrates:
 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior flat (Gloss Level 5), MPI #11.

3.7 INTERIOR PAINTING SCHEDULE – (Includes all conditioned air spaces)

- A. Concrete Substrates, Nontraffic Surfaces:
 1. Latex System:
 - a. Intermediate Coat: Latex, interior, matching topcoat.
 - b. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
- B. Concrete Substrates, Traffic Surfaces (See Article 3.8, High-Performance Coating Schedule, for concrete substrates requiring high-performance coatings):
 1. Concrete Stain System:
 - a. First Coat: Stain, interior, for concrete floors, MPI #58.
 - b. Topcoat: Stain, interior, for concrete floors, MPI #58.
 2. Water-Based Clear Sealer System:
 - a. First Coat: Sealer, water based, for concrete floors, MPI #99.
 - b. Topcoat: Sealer, water based, for concrete floors, MPI #99.
- C. CMU Substrates (See Article 3.8, High-Performance Coating Schedule, for CMU substrates requiring high-performance coatings):
 1. Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

3.8 HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates (Exposed Structural Steel Members):
 1. Pigmented Polyurethane over High-Build Epoxy System:

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- a. Prime Coat: Primer, epoxy, as recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: Epoxy, high-build, low gloss, MPI #108.
 - c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
- B. Galvanized-Metal Substrates (Exposed Structural Galvanized-Steel Members):
 - 1. Pigmented Polyurethane System:
 - a. Prime Coat: Primer, epoxy, as recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
 - c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
- C. CMU Substrates (Men's Locker Room 105; Women's Locker Room 112; Unisex Toilet Rooms 107, 108, 109, 110, 111, and 113; Mechanical 106; and, Janitor Closet Room 114):
 - 1. Epoxy System:
 - a. Block Filler: Block filler, epoxy, MPI #116.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.
- D. Concrete Substrates (Floor Slabs in Unisex Toilet Rooms 107, 108, 109, 110, 111, and 113 and, Janitor Closet Room 114):
 - 1. Epoxy System:
 - a. Prime Coat: Epoxy, gloss, MPI #77.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.

END OF SECTION 09910

DIVISION 10 – SPECIALTIES

SECTION 10155 - TOILET COMPARTMENTS

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. Section Includes:
 - 1. Solid-polymer components configured as toilet compartment enclosures, urinal screens, and shower compartment enclosures.
- B. Related Sections:
 - 1. Section 06100 "Rough Carpentry" for blocking.
 - 2. Section 10801 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
 - 2. Show locations of reinforcements for compartment-mounted grab bars.
 - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for units, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of compartment and screen, from manufacturer.
- B. Warranty: Manufacturer's standard.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For compartments and screens to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and

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Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments, urinal screens, and shower compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Castings: ASTM A 743/A 743M.
- B. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 SOLID-POLYMER UNITS

- A. Basis-of-Design Products: Toilet compartment manufacturer is to be the same manufacturer as lockers and benches (Section 10505). Subject to compliance with requirements, provide Overhead-Braced Polymer Compartments by Scranton Products, or comparable products by one of the following manufacturers:
 - 1. Bradley Corporation; Mills Partitions.
 - 2. National Toilet Partitions
- B. Toilet-Enclosure Style: Overhead-braced
- C. Urinal-Screen Style: Wall hung, 48-inches high by 24-inches deep. Mount bottom of screen 21 inches above finished floor.
- D. Door, Panel, Screen, and Pilaster Construction:
 - 1. Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 2. Door and panel height: 55 inches, mounted at 14 inches above finished floor.
 - 3. Pilaster height: 81-1/2 inches.
 - 4. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 5. Heat-Sink Strip: Manufacturer's standard continuous, extruded aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 - 6. Color and Pattern: One color and pattern as selected by Architect from manufacturer's full range.
 - 7. Pilaster Mounting System: 1/4-inch by 1-inch stainless steel mounting bar attached to the pilaster, having 3/8-inch zinc plated steel lag bolts. Secure each mounting bar to the building structure with 3/8-inch zinc plated studs. Floor mounting concealed with shoe having an internal cross section conforming to the pilaster.
 - 8. Overhead brace pilasters with an extruded anti-grip aluminum headrail.
- E. Pilaster Shoes: Manufacturer's standard design; stainless steel.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.

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3. Latch and Keeper: Manufacturer's standard latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Anchorages and Fasteners: Continuous heavy duty stainless steel wall brackets mounted with stainless steel vandal-resistant screws. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.
- C. Headrail: Heavy-duty anodized extruded aluminum (6063-T5 alloy), anti-grip profile, attached to top of the pilaster with stainless steel, tamper-resistant screws. Attach headrail to adjacent wall construction with headrail bracket.
- D. Headrail Brackets: Die cast aluminum alloy attached to adjacent wall construction with 2-1/2-inch stainless steel, tamper-resistant screws and plastic anchors.

2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine areas to receive toilet compartments, urinal screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that may affect installation of compartments and screens. Report any discrepancies to the Architect.
- B. Take complete and accurate measurements of toilet compartment, urinal screen, and shower compartment locations.
- C. Start of work constitutes acceptance of work.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise

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indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace level when doors are in closed position. Mount all doors and panels 14-inches above finished floor.

- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.
- D. No evidence of cutting, drilling and/or patching shall be visible on the finished work.
- E. Clean finished surfaces after installation so as to be free of imperfections.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

3.4 WARRANTY

- A. Manufacturer's standard warranty: Guarantees plastic components against breakage, corrosion and delamination for 15 years from date of receipt by the customer. If materials are found to be defective during that period for the reasons listed above, the materials will be replaced by the manufacturer free of charge. No credits or allowances will be issued for any labor expenses relating to replacement of components covered under the warranty plan. All such expenses are to be borne by the buyer.

END OF SECTION 10155

SECTION 10213 - FIXED LOUVERS

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. Section Includes:
 - 1. Fixed, extruded-aluminum louvers.
- B. Related Requirements:
 - 1. Section 08110 "Steel Doors and Frames" for louvers in hollow-metal doors.
 - 2. Section 08220 "FRP Doors and FRTM Frames" for louvers in FRP doors.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. A Florida Product Approval, issued by the Florida Department of Business & Professional Regulation, or a Miami-Dade Notice of Acceptance (NOA), issued by the Miami-Dade County Government, certifying that testing, approved and monitored by these agencies, has sufficiently demonstrated that each louver assembly, as designed and manufactured, will withstand the wind pressures and wind-borne missile impact forces in compliance with all code and jurisdictional requirements for the project location when installed according to the manufacturer's specifications and instructions as well as those instructions that may be provided with the Florida Product Approval or NOA documents.

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1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Blade Louver:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Airolite Company, LLC (The).
 - b. Arrow United Industries; a division of Mestek, Inc.
 - c. Construction Specialties, Inc.
 - d. Ruskin Company; Tomkins PLC.
 - e. United Enertech.
 - f. Vent Products Co., Inc.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Insect screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

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1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 2. Finish: Same finish as louver frames to which louver screens are attached.
 3. Type: Rewirable frames with a driven spline or insert] [Non-rewirable, U-shaped frames.
- D. Louver Screening for Aluminum Louvers:
1. Insect Screening: Stainless steel, 18-by-18 mesh, 0.009-inch wire.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
1. Frame Type: Channel unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
- F. Provide subsills made of same material as louvers for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

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1. Color and Gloss: Match color (black) and gloss on the exterior aluminum storefront framing installed on the Morgan Family Community Center Building.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07920 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 10213

SECTION 10431 – SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of signs:
 - 1. Plaque signs for room signage
 - 2. Plaque signs for directional signage
 - 3. Pin Mounted Dimensional Characters
 - 4. Field-Applied Vinyl Character Signs
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Temporary Facilities" for temporary project identification signs.
 - 2. Division 15 Section "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
 - 3. Division 16 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
 - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
- D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
 - 1. Samples for initial selection of color, pattern, and texture:
 - a) 1/8-inch-thick Matte Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
 - b) Aluminum: For each form, finish, and color, on 6-inch-long sections of extrusions and squares of sheet at least 4 by 4 inches.

1.5 QUALITY ASSURANCE

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- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Manufacturers of Plaque Signs:
 - a. Best Manufacturing Company.
 - b. GC Graphic Communications.
 - c. Mohawk Sign Systems.
 - d. Southwell Company

2.2 MATERIALS

- A. For Directional Signs: Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
 - 1. Transparent Sheet: Where sheet material is indicated as "clear," provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested according to the requirements of ASTM D 1003.
 - 2. White Translucent Sheet: Where sheet material is indicated as "white," provide white translucent sheet of density required to produce uniform brightness and minimum halation effects.
 - 3. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- B. For Permanent Room Signage: 1/8-inch-thick, clear non-glare acrylic with eased edges.
- C. Fasteners: Combination sheet metal-wood screws, full threaded, pan head for mechanical mounting.
- D. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors.
- E. Colored Coatings for Acrylic Plastic Sheet: Use non-fading colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV stable.
- F. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.

2.3 PLAQUE SIGNS

- A. Plaque Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction. See Schedule on drawings for location and copy.

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1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
- B. Unframed Plaque Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
 - 1 Edge Condition: Square.
 - 2 Corner Condition: Square corners.
- C. Laminated Sign Plaques: Permanently laminate 1/8-inch acrylic face panels to backing sheets of material and thickness indicated using the manufacturer's standard process.
- D. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices. All signs, permanent room and directional, are to comply with American Disabilities Act Accessibility Guidelines. Lettering to be Helvetica Medium Caps.
- E. For Directional Signs: Subsurface Copy; Apply copy to the back face of clear acrylic sheet forming the panel face by process indicated to produce precisely formed opaque images free from rough edges.
 1. Use reverse silk-screen process to print copy; overspray the copy with an opaque background color coating.
- F. For Permanent Room Signs: Chemically weld letters onto sign face, raised 1/32-inch.
- G. Match the plaque signs in the Morgan Family Community Center Building in size, shape, and color of plaque and in the size, spacing, color, and font of the characters used in the signage copy.

2.4 DIMENSIONAL CHARACTERS

- A. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
 1. Character Material: Aluminum.
 2. Thickness: Match thickness of dimensional characters on the North Port Youth Community Center Building.
 3. Font: Match the font of the dimensional character on the North Port Youth Community Center Building.
 4. Finish: High-performance organic finish: 2-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Finish Color: Black. Match the finish color on the dimensional characters on the Morgan Family Community Center Building.
 5. Mounting: Pin mounted concealed studs, non-corroding for substrates encountered.
- B. Dimensional Character Sign Schedule:
 1. Sign Type: Building Name.
 - b. Sign Size: As indicated on drawings.
 - c. Character Size: 16".
 - d. Text/Message: See Signage Schedule this section.
 - e. Location: Building exterior as indicated on drawings.
 2. Sign Type: Building Address
 - a. Sign Size: As indicated on drawings.
 - b. Character Size: 6".
 - c. Text/Message: See Signage Schedule this section.
 - d. Location: Building exterior as indicated on drawings.

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3. Sign Type: Ticket Window Name
 - a. Sign Size: As indicated on drawings.
 - b. Character Size: 6".
 - c. Text/Message: See Signage Schedule this section.
 - d. Location: Building exterior as indicated on drawings.
4. Sign Type: Concessions Window Name
 - a. Sign Size: As indicated on drawings.
 - b. Character Size: 6".
 - c. Text/Message: See Signage Schedule this section.
 - d. Location: Building exterior as indicated on drawings.

2.5 FIELD-APPLIED, VINYL-CHARACTER SIGNS

- A. Field-Applied, Vinyl-Character Sign: Prespaced characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allen Markings International.
 - b. APCO Graphics, Inc.
 - c. ASI Sign Systems, Inc.
 - d. Best Sign Systems Inc.
 - e. Mohawk Sign Systems.
 - f. Nelson-Harkins Industries.
 - g. Seton Identification Products.
 2. Size: 6-inch characters.
 3. Substrate: Glass.
 4. Text and Font: As scheduled.

2.6 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide as selected by the Architect from the manufacturer's standards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Wall-Mounted Plaque Signs: Attach plaque signs to wall surfaces by mechanical means using exposed fasteners into wall or into inserts as required by construction of wall.
- C. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

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3.3 SIGNAGE SCHEDULE

INTERIOR ROOM IDENTIFICATION SIGNAGE – BATHHOUSE BUILDING

DOOR/ RM NO.	SIGNAGE COPY	REMARKS
101	Concessions	ADA Type
102	Supplies	ADA Type
103	Office	ADA Type. Vinyl characters on glass.
107	Office	ADA Type. Vinyl characters on glass.
109	First Aid	ADA Type. Vinyl characters on glass.
113	Mechanical Room	ADA Type
114	Janitor	ADA Type
116	Men's Locker Room	ADA Type
117	Women's Locker Room	ADA Type
118	Family Toilet / Shower	ADA Type
119	Family Toilet / Shower	ADA Type
120	Family Toilet	ADA Type
121	Family Toilet	ADA Type

INTERIOR INFORMATIONAL SIGNAGE – BATHHOUSE BUILDING

ROOM NO.	SIGNAGE COPY	LOCATION REMARKS
116	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
117	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
118	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
119	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
120	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
121	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.

INTERIOR ROOM IDENTIFICATION SIGNAGE – FILTRATION BUILDING

DOOR/ RM NO.	SIGNAGE COPY	REMARKS
101	Equipment	ADA Type
102	Equipment	ADA Type

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103	Equipment	ADA Type
104	Men	ADA Type
105	Women	ADA Type
106	Janitor	ADA Type
107	Family Toilet	ADA Type
108	Family Toilet & Shower	ADA Type
109	Family Toilet	ADA Type

INTERIOR INFORMATIONAL SIGNAGE – FILTRATION BUILDING

ROOM NO.	SIGNAGE COPY	LOCATION REMARKS
104	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
105	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
107	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
108	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.
109	ISA symbol (International Symbol of Accessibility)	Face of door. Outside. Self adhesive vinyl mounted white sign.

EXTERIOR SIGNS

BLDG	SIGNAGE COPY	LOCATION REMARKS
A	BUTLER PARK AQUATICS CENTER	See drawings for location. Pin mounted 16-inch characters, black finish.
A	6205-A	See drawings for location. Pin mounted 6-inch characters, black finish. Verify address. Change signage copy as required.
B	6205-B	See drawings for location. Pin mounted 6-inch characters, black finish. Verify address. Change signage copy as required.
A	TICKETS	See drawings for locations. Pin mounted 6-inch characters. Black finish.
A	CONCESSIONS	See drawings for location. Pin mounted 6-inch characters. Black finish.
A	FIRST AID	Door 116 (on glass). See drawings. Field-applied vinyl 6-inch characters. Black.

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A	WOMEN	See drawings for location. Pin mounted 6-inch characters. Black finish.
A	MEN	See drawings for location. Pin mounted 6-inch characters. Black finish.

END OF SECTION 10431

SECTION 10505 – SOLID PLASTIC LOCKERS AND BENCHES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wardrobe Lockers.
 - 2. Locker benches.
- B. Related Section:
 - 1. Division 03 Section – Cast-in-Place Concrete, for 6-inch high cast concrete pedestal bases for lockers.

1.3 SCOPE

- A. Work Includes: Furnishing all labor, material, equipment and supervision to provide lockers with sloping tops and related fillers and equipment as indicated on drawings and as specified herein.

1.4 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division Specifications sections:
 - 1. Product data and installation instructions for locker units.
 - 2. Color Samples on squares of same plastic to be used for fabrication of lockers.
 - 3. Shop Drawings that show lockers in dimensioned relation to adjacent surfaces. Show locker in detail, method of installation, fillers, trim, base, and accessories. Include locker numbering sequence information.
 - a) The locker numbering sequence shall be provided by the Owner and noted on the approved drawings returned to the locker contractor.
 - 4. Lock Combination Listings and Master Keys: Deliver directly to the Owner.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
 - a. Locks.
 - b. Identification plates.
 - c. Hooks.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for locker installation.
- B. Protect lockers from damage during delivery, handling storage and installation.

1.7 QUALITY ASSURANCE

- A. Uniformity: Provide lockers and benches that are standard products of single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings.

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- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Regulatory Requirements: Where lockers and benches are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate sizes and locations of concrete bases, framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that lockers can be supported and installed as indicated.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lockers or benches that fail in materials or workmanship, under normal conditions, for 25 years from the date of receipt by the customer. If materials are found to be defective during this period for reasons listed above, the materials will be replaced free of charge, excluding labor.

PART 2 – PRODUCTS

2.1 WARDROBE LOCKERS

- A. Basis-of-Design Product: Locker manufacturer is to be the same manufacturer as toilet compartments (Section 10155). Subject to compliance with requirements, provide Solid Plastic Tufftec lockers by Scranton Products or a comparable product by one of the following manufacturers:
 - 1. Bradley Corporation; Mills Partitions.
 - 2. National Toilet Partitions
- B. Configuration: Double Tier and Four-Tier.
- C. Size: 15-inch-wide by 15-inch-deep by 60-inch-high overall.
- D. Color: Selected by the Architect from manufacturer's full range of colors.
- E. Quantity: See Drawings.

2.2 LOCKER MATERIALS

- A. Construction
 - 1. Locker doors and frames shall be made from high impact, high density polyethylene (HDPE) formed under high pressure into solid plastic components 1/2 inch thick with homogeneous color throughout.
 - 2. Sides, tops, bottoms, backs, and shelves shall be made from high impact, high density, polyethylene (HDPE) formed under pressure into solid plastic components 3/8 inch thick with homogenous natural color throughout. Components shall have machined edges to accept assembly brackets and be prepared for dovetail connections. Outsides, insides, tops, bottoms, backs, dividers and shelves shall be natural in color.
 - 3. Provide end panels and filler panels of plastic material in color of locker unless noted otherwise as an accent color.
 - 4. Continuous latch shall be made from high impact HDPE plastic and capable of accepting various locking mechanisms. The spring-loaded latch shall be securely fastened to the

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- entire length of the door providing a quiet positive latching function.
5. Door hinge shall be made from heavy duty extruded aluminum with a powder coating in black or silver. Door hinge shall be full length assembled onto the door and front.
 6. Assembly profile shall be full height of the lockers. Profile shall be made from PVC plastic and snapfit assemble onto locker sides.
 7. Coat hooks shall be two-prong and made from high impact plastic. Hooks shall be mounted to bottom of the shelf or divider, one each per door opening.
 8. Locker Base: Install on 6-inch high continuous concrete base.
- B. Hardware
1. Padlock hasp.
 2. One top-mounted, two-pronged plastic coat hook (1, 2 and 3 tier only).
 3. Horizontal venting.
 4. Continuous hinge.
 5. Continuous security latch..
 6. Slope top.
 7. Built-In combination lock.
- C. Materials
1. Lockers shall be constructed from High Density Polyethylene (HDPE) resins. Material shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments.
 2. Plastic components shall resist deterioration and discoloration when subjected to any of the following: acetic acid 80%, acetone, ammonia 12%, ammonium phosphate, bleach 12%, borax, brine, caustic soda, chlorine water, citric acid, copper chloride, core oils, hydrochloric acid 40%, hydrogen peroxide 30%, isopropyl alcohol, lactic acid 25%, lime sulfur, nicotine, potassium bromide; soaps, sodium bicarbonate, trisodium phosphate, urea, urine and vinegar. (Testing in accordance with corrosion testing procedure established by the United States Plastic Corporation.)
 3. All HDPE components shall have a smooth "orange peel" finish. Locker doors and door frames shall be the same color.
 - a. Color: Selected by Architect from manufacturer's full range of colors

2.3 LOCKER FABRICATION, GENERAL

- A. Locker components shall be fabricated square and rigid with a finish free of scratches and chips.
- B. Solid plastic locker components shall snap together at profile connections or slide together at dovetail connections for easy assembly and shall provide a solid and secure anti-racking book case component construction for clean lines and precise reveals. Adjacent lockers shall share a common side panel. Locker units shall be manufactured for assembly in a group of no more than three adjacent lockers.

2.1 BENCHES

- A. Locker room bench tops shall be 1-1/2 inches (38 mm) thick with all edges rounded to a 1/4 inch (6 mm) radius. Standard bench top size is 16 inches (241 mm) wide by length not to exceed 96 inches (2438 mm) for one single piece.
- B. Plastic pedestals shall be 16-1/8 inches (410 mm) high, secured to the bench tops with stainless steel tamper resistant Torx head screws and secured to the floor using lead expansion shields with 2 inches (51 mm) stainless steel Phillips head machine bolts.
- C. Bench Top Color: Selected by Architect from manufacturer's full range of colors.
- D. Product: Provide benches by selected locker manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Lockers: Install lockers in accordance with manufacturers' instructions for plumb, level, rigid, and flush installations. See drawings for quantity and layout.
 - 1. Anchor locker units to wall studs through the locker back and to the concrete base using 1-1/2-inch pan head screws.
 - 2. Anchor single rows of lockers to walls near top and bottom of lockers and to floor.
 - 3. Anchor back-to-back metal lockers to floor.
 - 4. Install lockers on the 6-inch high concrete base, with hardware, and according to instructions, provided by the manufacturer.
- B. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, uniformly spaced, not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.
- B. Protect lockers and benches from damage, abuse, dust, dirt, stain, or paint. Do not permit use by construction personnel.
- C. Touch up marred finishes, but replace units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended by the locker and bench manufacturer.

END OF SECTION 10505

SECTION 10522 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.
- B. Related Sections:
 - 1. Division 10 Section "Signs" for directional signage to out-of-sight fire extinguishers and cabinets.
 - 2. Division 10 Section "Fire Extinguishers".

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
 - 2. Show location of knockouts for hose valves.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of fire protection cabinet indicated.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Size: 6 by 6 inches square.
- E. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.
- F. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire protection cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

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- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.6 SEQUENCING

- A. Apply decals on field-painted, fire protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 666, Type 304.
- B. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire End & Croker Corporation.
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
 - d. Larsen's Manufacturing Company.
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Moon-American.
 - g. Potter Roemer LLC.
 - h. Watrous Division, American Specialties, Inc.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Stainless-steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Tempered break glass.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 - 3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.

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4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Decals.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
6. Alarm: Manufacturer's standard alarm that actuates when fire protection cabinet door is opened and that is powered by batteries.

K. Finishes:

1. Stainless Steel: No. 4.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
 3. Prepare doors and frames to receive locks.
 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 1. Run grain of directional finishes with long dimension of each piece.
 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated.
 - 1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
 - 2. Provide inside latch and lock for break-glass panels.
 - 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply decals at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522

SECTION 10523 – FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
 - 1. Fire Extinguishers: Include rating and classification.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PORTABLE FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. Amerex Corporation.
 - 2. Ansul Incorporated.
 - 3. Badger Fire Protection.
 - 4. Buckeye Fire Equipment Company.
 - 5. Fire End & Croker Corporation.

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6. General Fire Extinguisher Corporation.
 7. JL Industries, Inc.
 8. Kidde Fynnetics.
 9. Larsen's Manufacturing Company.
 10. Modern Metal Products; Div. of Technico.
 11. Moon American.
 12. Potter Roemer; Div. of Smith Industries, Inc.
 13. Watrous; Div. of American Specialties, Inc.
- B. General: Provide fire extinguishers of type, size, and capacity for each indicated.
1. Valves: Manufacturer's standard.
 2. Handles and Levers: Manufacturer's standard
 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B
- C. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 4-A:60-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers in cabinets in locations and at mounting heights indicated.
- B. Identification: Apply decals at locations indicated.

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
- B. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.

END OF SECTION 10523

SECTION 10801 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Public-use washroom accessories.
 - 2. Warm-air hand and hair dryers.
 - 3. Childcare accessories.
 - 4. Mirrors.
 - 5. Underlavatory guards.
 - 6. Custodial accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: Bright polished stainless steel.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Products: Subject to compliance with requirements, provide the products manufactured by Bobrick Washroom Equipment, Inc. listed on the Drawings, or comparable products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation.
 - 4. General Accessory Manufacturing Co. (GAMCO).

2.3 WARM-AIR HAND AND HAIR DRYERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the warm air electric hand dryer and hair dryer units manufactured by Excel Dryer, Inc. indicated on the Drawings, or comparable products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Dryer, Inc.
 - 3. American Specialties, Inc.
 - 4. Bobrick Washroom Equipment, Inc.
 - 5. General Accessory Manufacturing Co. (GAMCO).
 - 6. World Dryer Corporation.
- B. Warm-Air Hand and Hair Dryers:
 - 1. ADA Compliance: Under absolutely no circumstances shall the dryer protrude more than 4 inches from the wall surface. Mount unit so that location and position of the activation controls comply with accessibility requirements.
 - 2. Operation – Hand Dryers: Automatically activated when hands are present.
 - 3. Operation – Hair Dryers: Push Button.
 - 4. Electrical Requirements: Verify the manufacturer's power and wiring requirements for each unit selected and approved for installation. Provide the power and wiring specifically required for each type and model of unit selected and approved for installation by the Architect and the Owner. Notify the Architect if information provided on the Drawings or elsewhere in the Technical Specifications Manual conflicts with the power and wiring requirements for the selected and approved units. Coordinate with the Electrical Subcontractor.

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2.4 CHILDCARE ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product manufactured by Bobrick Washroom Equipment, Inc. listed on the Drawings, or a comparable product by one of the following:
 - 1. American Infant Care Products Inc.
 - 2. American Specialties, Inc.
 - 3. Brocar Products, Inc.
 - 4. General Accessory Manufacturing Co. (GAMCO).
- B. Baby-Changing Station:
 - 1. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support a minimum of 250-lb static load when opened.
 - 2. Mounting: Surface mounted and recessed, with unit projecting not more than 4 inches from wall when closed. See drawings for type and location.
 - 3. Operation: By pneumatic shock-absorbing mechanism.
 - 4. Liner Dispenser: Built in.

2.5 MIRRORS

- A. Mirror Unit:
 - 1. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - 2. Size: See Toilet Accessories Schedule, this section.

2.6 UNDERLAVATORY GUARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Trubro, Inc., or comparable products by one of the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. TCI Products.
- B. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies, that prevent direct contact with and burns from piping, and allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded-plastic, white.

2.7 CUSTODIAL ACCESSORIES

- A. Basis-of-Design Products: Subject to compliance with requirements, provide the products manufactured by Bobrick Washroom Equipment, Inc. listed on the Drawings, or comparable products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation.
 - 4. General Accessory Manufacturing Co. (GAMCO).

2.8 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10801

DIVISION 12 – FURNISHINGS

SECTION 12494 - ROLLER SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes roller shades.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members and attachment to building structure.
 - 2. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
 - 3. Shade mounting assembly and attachment.
 - 4. Size and location of access to shade operator, and adjustable components.
 - 5. Minimum Drawing Scale: 1/4 inch = 1 foot.
- D. Samples for Initial Selection: For each colored component of each type of shade indicated.
 - 1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification:
 - 1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
 - 2. For the following products:
 - a. Shade Material: Not less than 12-inch- square section of fabric, from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.
 - b. Valance: Full-size unit, not less than 12 inches long.
- F. Window Treatment Schedule: For roller shades. Use same designations indicated on Drawings.
- G. Product Certificates: For each type of roller shade, signed by product manufacturer.
- H. Qualification Data: For Installer.
- I. Product Test Reports: For each type of roller shade.
- J. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of roller shade.
- K. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.

Butler Park Aquatics Center

2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.
4. Motorized shade operator.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 1. Flame-Resistance Ratings: Passes NFPA 701.
- D. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Rollers Shades: Before installation begins, for each size, color, texture, and pattern indicated, full-size units equal to 5 percent of amount installed, but not fewer than 2 units.

PART 2 - PRODUCTS

2.1 ROLLER SHADES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the Mecho/5 standard bracket, manual clutch drive, with ThermoVeil 0900 Series,, translucent weave shade cloth, as manufactured by MechoShade Systems, or a comparable product by one of the following manufacturers:
 1. Hunter Douglas, Inc.; Hunter Douglas Window Fashions Division.
 2. Levolor; Levolor-Kirsch Window Fashions; a Newell Rubbermaid Company.
 3. Lutron Shading Solutions by VIMCO.
 4. Nysan Shading Systems Ltd.
 5. Shade Techniques, Inc.
 6. Sol-R-Veil.
 7. Window Interiors.

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2.2 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, heavy duty metal chain (no plastic), and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- F. Finish: For metal components exposed to view, match aluminum storefront frame finish. See Section 08411 Aluminum-Framed Storefronts.
- G. Colors of Plastic Components Exposed to View: Selected by the Architect from the manufacturer's standard range of available colors.

2.3 SHADECLOTH

- A. Material: 5% Openness Factor, color to be selected by Architect from manufacturer's standard samples
- B. Description of Physical Properties: Shadecloths shall be woven of .010-inch or .018-inch opaque, extruded, vinyl-coated polyester yarn consisting of approximately 79-percent reinforced vinyl and 21-percent polyester core yarn. The shadecloth shall be tensioned in the finishing range prior to heat setting to keep the warp ends straight, minimize or eliminate weave distortion, and keep the shadecloth flat. The fabric shall be finished with heat and pressure and be dimensionally stable.
- C. Performance: As a "shadecloth", the material shall hang without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. The unguided shadeband shall roll true and straight, without shifting sideways more than +/- 1/8-inch in either direction due to warp distortion or weave design.
- D. Flame Retardance: Shadecloth shall be certified by an independent laboratory to pass the "Large or Small Scale Vertical Burn Requirements" of the National Fire Protection Association (NFPA 701-99) / FFA / California US Title 19 / The NY State Combustible Toxicity (LC50 22.5g) / Compliance with D.O.E. / The Crown Suppliers Specification FR7 using ignition sources 0, 5, and 7 as defined in BS 5852: Parts 1 and 2. – U.K.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12494

DIVISION 13 – SWIMMING POOL

SECTION 13150
SWIMMING POOLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

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

A. Introduction

- 1. Furnish all labor, materials, equipment and services necessary to construct the following: one (1) Competition Pool, one (1) Lazy River Pool, and one (1) Childrens Pool. This work shall include the structure(s) and installation of pool finishes as well as all products listed in Part 2 of Section 13150.

B. Work included in this section

- 1. It is the intent of this section to place the entire responsibility for the construction of the pool(s) (including the construction of the pool shell(s)) under one vested CONTRACTOR. Under this section the Swimming Pool Contractor will provide but is not necessarily limited to the following:
 - a. Provide all equipment and services required for erection and delivery onto the premises of any equipment or apparatus furnished. Remove equipment from premises when no longer required.
 - b. Grade and replace load bearing or high plasticity index soil, pump and dewater as necessary to keep excavations free from water during construction, and provide sub-surface drainage beneath the surge tank(s) as needed or required in the project geotechnical report. Reference Geotechnical Report
 - c. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for related excavations. Reference Division 2 - Site Work.
 - d. Provide all electrical conduit, wiring, junction boxes etc. to all low voltage pool equipment within pool filter/chemical rooms per Division 16- Electrical. (Low voltage is considered less than 110 V.)
 - e. Coordinate for all required bonding and grounding of the pool shell, fittings, and equipment.
 - f. Furnish and install all necessary piping and valving as shown on the drawings and specified herein.
 - g. Provide individually sized housekeeping pads for each pool pump.
 - h. Furnish and install the main drain hydrostatic relief system and a sight sump as shown on the drawings. Reference Division 2 - Site Work.

- i. Construct the cast in place or pneumatically applied concrete pool shell(s) and cast in place surge tank(s) as described in these specifications and detailed on the drawings, including reinforcement steel, inserts, fittings, main drain sumps and all embedded items (piping, anchors, etc.) for the pool(s). Reference Division 3 - Concrete and Structural. Before commencing the placement of concrete, verify electrical bonding of the pool embedded items and reinforcing steel. Also, coordinate and arrange any required electrical, plumbing and or building inspections. Provide any structure drainage around the pool as shown on the drawings. Backfill and compact fill around the pool structure, piping trenches and excavations required by this work. Reference Division 2 - Site Work.
 - j. Furnish and install a proprietary aggregate plaster finish in the pool(s) with a slip resistant surface with a vertical tile band. Furnish and install specialty tile for the gutter nosing handhold, wall targets, recessed steps, floor lane markings, depth markings and warning signs, construction joint installation bands, and all other tile installation within the pool structures. Reference Section 13154- Swimming Pool Tile - including the tolerance requirements for the concrete substrate.
 - k. Assemble and install the cleaning and maintenance equipment for the pool(s) as specified herein.
 - l. Provide for the storage of all pool related equipment, materials and systems. All items are the responsibility of the CONTRACTOR until accepted by owner.
 - m. Obtain final acceptance by jurisdictional health department(s).
 - n. Start, test, calibrate and adjust all mechanical equipment, electrical equipment, recirculation, chemical, and other supplied systems including deck, loose, maintenance, and safety equipment. Instruct the Owner's representative in the systems operation and maintenance as described herein.
 - o. Furnish and install the heating loop "T's" and valves on the main recirculation line for the Competition Pool. Refer to pool drawings for size and location.
- C. Related work specified in other sections
- 1. The following work related to the swimming pools shall be completed by other contractors.
 - a. Provide, erect and maintain all necessary barricades, signs, lights and flares for pool construction to protect workers and the public.
 - b. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for swimming pool related excavations. Reference Division 2 - Site Work.
 - c. Provide any required sub-surface drainage systems. Reference Geotechnical Report.
 - d. Provide housekeeping pads for floor mounted pool equipment.
 - e. Construct pump pit and backwash pit including reinforcement, inserts, wall sleeves, anchors, access hatches, and fittings. Reference Division 3 - Concrete.
 - f. Layout, excavate, remove from the construction site, replace and grade materials as required beyond the limits of excavation of the pool shell(s) to complete the work described in this section. Reference Division 2 - Site Work.

- g. Prior to concrete pours, verify electrical bonding of the pool embedded items. Coordinate and arrange any required electrical, plumbing and or building inspections to be performed on embedded items. Reference Division 16- Electrical.
 - h. Furnish and install sanitary sewer and storm drain connections. Reference Division 15 - Mechanical.
 - i. Coordinate layout and installation of all deck mounted anchors, sockets, and inserts for the pool(s) with Contractor.
 - j. Furnish and install deck finish beyond perimeter tile band. Reference Division 9 - Finishes.
 - k. Provide rules and regulations signage as required by code. Reference Division 1 - General Requirements.
 - l. Provide chlorine resistant caulking (sealant) and backer rod on pool decks. Reference Division 7 - Thermal and Moisture Protection.
- D. Related work specified in Plumbing section. Reference Division 15 - Mechanical. Work to be completed by other contractors.
- 1. Furnish and install deck drainage system on pool deck.
 - 2. Furnish and install sanitary sewer piping from the filter room including floor drains.
 - 3. Furnish and install water service to all hose bibbs, flush hydrant boxes and auto-fill bypass to air gap above fill funnel(s). Install the slow closing solenoid valve(s) in the bypass auto-fill piping.
 - 4. Install Plumbing Contractor supplied water meter on the fresh water supply line upstream of the manual fill valve and the slow closing solenoid valve.
- E. Related work specified in Mechanical section. Reference Division 15 – Mechanical. Work to be completed by other contractors.
- 1. Furnish and install air recirculation systems for pool related spaces.
- F. Related work specified in Electrical sections. Reference Division 16– Electrical. Work to be completed by other contractors.
- 1. Furnish and install power to the exhaust fans for the chemical rooms.
 - 2. Furnish and install motor starters, auxiliary contacts, magnetic relays and other electrical control devices necessary for the complete operation of the pool systems.
 - 3. Ground and bond all pool structures, fittings and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.
 - 4. Obtain permits, inspections, and approvals of all wiring including grounding and bonding of all metal components associated with the pool in accordance with Local, State and National Electrical Codes.
 - 5. Confirm all electrical conduits that penetrate the pool shell are watertight and installed per N.E.C. Article 680.

1.03 QUALITY ASSURANCE

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

1. If the Contractor has not received prior written approval for this project or has not been included in the pre-approved list of Contractors, they must submit a list of projects meeting the aforementioned qualifications, including contact information of the General Contractor shall be submitted for review and approval at least 10 days prior to bidding of the project. The Contractor must have completed at least five (5) public-use competition pools with individual water surface areas in excess of 10,000 square feet and a depth of 12'-6" or more within the past 10 years.
2. The Contractor must submit prior to the start of construction the name of the on-site project superintendent including their relevant experience. The Contractor's on-site Project Superintendent must have completed as least five (5) public-use competition and/or leisure pools with individual water surface areas in excess of 10,000 square feet and a depth of 12'-6" or more within the past 10 years. A list of projects meeting the aforementioned qualifications, including contact information of the General Contractor as well as Owner shall be included with the experience submittal. Project Superintendent must not change on the project unless written authorization has been provided by the Architect and Owner.
3. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligation of the contract and to complete the work described or if the bidder does not have the qualifications stated herein. Subject to compliance with item 2 above on this specification.
4. The following bidders have been pre-approved. All bidders shall meet the requirements listed above.

Acapulco Pools
Bernie Gall
1550 Victoria St. N.
Kitchener, Ontario N2B3EZ
Phone: 519 - 743-6357
Fax: 519-743-9698

The Pool Company, Inc.
Matt Ruzicka
3077 20th St E Suite D
Tacoma, WA 98424
Phone: 253-926-6875
Fax: 253-926-0590

Weller Pools
Jack Oren
1821 South Orange Blossom
Trail
P.O. Box 16008
Apopka, FL 32703
p) 407.880.8800
f) 407.884.7306

Sunbelt Pools
Rob Morgan
10555 Plano Rd.
Dallas, TX
p) 214-3431133
f) 214-343-1201

1.04 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

- A. The entire system shall be designed and installed to meet all national and local codes and be in compliance with applicable sections of the American National Standards Institute / National Spa and Pool Institute (ANSI /NSPI-1 2003) and the rules and regulations of USA Swimming (USA) and Federation Internationale De Natation Amateur (FINA).
- B. The system shall comply with all necessary approvals obtained by the Architect from local regulatory agencies governing the design and construction of public swimming pools.
- C. The Contractor shall give all necessary notices, obtain all permits and pay all government fees, and other costs in connection with his work; file all necessary drawings, prepare all documents and obtain all necessary approvals of governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work.
- D. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus or drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on drawings and/or specified.

1.05 COORDINATION AND CLARIFICATION

- A. Coordinate with other contractors or subcontractors all work relating to this section.
- B. The Contractor must establish with other contractors or subcontractors, having related work in this section, that all work necessary to complete the pool(s) as shown on the drawings and in the specifications is included in the base bid and alternates to the Owner.
- C. If in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, the Contractor shall notify the Architect through channels established by the specifications and request a clarification ten (10) days prior to the bid date.

1.06 ALTERNATES

- A. Review the description of the alternates in Division 1 and on the drawings for possible effect upon work in this section. Alternates related to the work in this section are described in this division and on the bid proposal form.
- B. Pool Alternates
 - 1. Add Alternate #1: Bowl Slide, Slide Pump & Strainer and pump VFD. Slide footings and piers and underground piping shall be base bid.
 - 2. Add Alternate #2: Geothermal heating for the Competition Pool. Pool cover as identified in Part 2.23 of this spec. section us also part of this alternate.
- C. Contractor shall submit his bid to the owner based on materials, equipment and methods as specified in this Section. No substitutions of material will be allowed.
- D. It is the intent of the contract documents to encourage competition. The base proposal must be on furnishing the construction methods and equipment as specified and detailed. Any proposed system substitution must have prior written approval by the Architect.
- E. If there is any deviation from the basis of design equipment it is the responsibility of the contractor to confirm that all engineering criteria are appropriate for the substituted equipment.
- F. All proposed substitutions of specified construction methods and equipment shall include a complete submittal as required by these specifications and drawings of appropriate scale

incorporating all required changes. The Contractor shall provide a list of at least ten (10) satisfactory installations comparable to this project that have been manufactured and installed under the manufacturer's current legal name. Submit a list of such projects with the name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect on the bid date.

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

1.07 SUBMITTALS

- A. All submittals shall be made in accordance with the requirements of Division 1 - General Requirements and in strict compliance with the following procedures and guidelines.
- B. Six (6) sets of shop drawings and engineering data shall be tabbed, indexed, referenced to the specifications, bound in 3 ring binders and submitted in two stages. Provide 8 1/2" x 11" cover sheet for each item submitted identifying item and product number. The first stage shall include all embedded items for the pool shell(s) (including piping diagrams) and the second stage shall be for all remaining items. Electronic submittals will be acceptable in lieu of the six (6) hard copies. All electronic submittals shall be organized, numbered, and submitted in the same format as the project specifications. Only complete sets will be reviewed.
 1. Engineering data covering all systems, equipment, structures and fabricated materials, which will become a permanent part of the work under this contract, shall be submitted for review. This data shall include drawings and descriptive information in sufficient detail and scale to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorage and supports required; performance characteristics; fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification, in writing, shall be provided indicating that all equipment will fit in the space allotted and as shown on the drawings.
 2. All submittals regardless of origin shall be stamped with the approval of the CONTRACTOR and identified with the name and number of this contract, CONTRACTOR'S name, and references to applicable specification paragraphs and contract drawings. Each submittal shall indicate the intended use of the item in the work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
 3. The submittals will not be accepted from anyone but the CONTRACTOR. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
 4. The CONTRACTOR'S stamp of approval is a representation that the CONTRACTOR accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, and that he has reviewed or coordinated each submittal with the requirements of the work and the contract documents.
 5. Each submittal shall include a statement prepared by the originator of the drawings and data, certifying compliance with the contract documents except for deviations, which are specifically identified.
 6. All deviations from the contract documents shall be identified on each submittal and shall be tabulated in the CONTRACTOR'S letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by the CONTRACTOR (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

7. The CONTRACTOR shall accept full responsibility for the completeness of each submission, and, in the case of a resubmission, shall verify that all exceptions previously noted have been taken into account. In the event that more than one resubmission is required because of failure of CONTRACTOR to respond to exceptions and rejections previously noted, CONTRACTOR shall make all further resubmissions in person at the consultant's office.
 8. Any need for more than one resubmission, or any other delay in obtaining review of submittals, will not entitle the CONTRACTOR to an extension of the contract time unless delay of the work is directly caused by a change in the work authorized by a change order.
 9. Review of drawings and data submitted by CONTRACTOR will cover only general conformity to the drawings and specifications, external connections and dimensions that affect the layout. Review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device or item shown. Review of submittals shall not relieve CONTRACTOR from responsibility for errors, omissions, or deviations, or responsibility for compliance with the contract documents.
 10. When the drawings and data are returned marked REJECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, the corrections shall be made as noted thereon and as instructed and six corrected copies (or one copy and one corrected reproducible copy) resubmitted.
 11. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal. All resubmittals shall be indexed, tabbed, referenced to the specifications and bound in a three-ring binder and submitted at one time.
 12. When corrected copies are resubmitted, the CONTRACTOR shall, in writing, direct specific attention to all revisions and shall list separately any revisions made other than those called for on previous submissions.
 13. When the drawings and data are returned marked NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED, no additional copies need to be furnished unless specifically requested to do so for record.
- C. Permits, Receipts and Test Reports
1. Furnish the Architect with copies of all permits and receipts for fee payments.
 2. Submit a sample format for each test report intended for use. Submit test reports required herein only on approved forms.
- D. Include complete product data indexed, tabbed, and referenced to specifications with 8 1/2" x 11" cover sheet covering:
1. Paragraph 2.01 – Overflow System
 2. Paragraph 2.02 – Pumping Equipment
 3. Paragraph 2.03 – Filtration Equipment
 4. Paragraph 2.04 – Recirculation Fittings
 5. Paragraph 2.05 – Piping Systems
 6. Paragraph 2.06 – Chemical Treatment Systems

7. Paragraph 2.07 – Chemistry Monitoring and Control Systems
 8. Paragraph 2.08 – Flow Meters
 9. Paragraph 2.09 – Water Level Controllers
 10. Paragraph 2.10 – Inserts and Anchor Sockets
 11. Paragraph 2.11 – Deck Equipment
 12. Paragraph 2.12 – Loose Equipment
 13. Paragraph 2.13 – Maintenance Equipment
 14. Paragraph 2.14 – Safety Equipment
 15. Paragraph 2.15 – Thermometers
 16. Paragraph 2.16 – Swimming Pool Finishes
 17. Paragraph 2.17 – Waterproofing
 18. Paragraph 2.18 – Sealants
 19. Paragraph 2.19 – Underwater Lights
 20. Paragraph 2.20 – Water Features and Support Equipment
 21. Paragraph 2.21 – Pool Concrete Coping
 22. Paragraph 2.22 – Moveable Bulkhead
 23. Paragraph 2.23 – Competition Pool Cover
 - E. Include engineering/construction drawings for the pool structure.
 1. Reference Division 3 - Concrete.
 - F. Include engineering construction drawings for all pool piping.
 - G. Reference Section 13153 – Swimming Pool Cementitious Finish
 - H. Reference Section 13154 – Swimming Pool Tile
 - I. Reference Section 13155 – Waterslides
- 1.08 OPERATION AND MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS
- A. Detailed operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The equipment supplier and/or CONTRACTOR shall prepare an operation and maintenance manual for all equipment. Parts lists and operating and maintenance instructions shall be furnished.
 - B. Each operation and maintenance manual shall include the following:

1. Equipment function and calibration, normal operating characteristics, and limiting conditions.
2. Assembly, installation, alignment, adjustment and checking instructions.
3. Operating instructions for start up, routine and normal operation, regulation and control, shut down and emergency conditions.
4. One (1) copy of all instructional videos.
5. Operating cycles shall be specifically described in outline format and in referenced detail. A wall-mounted color-coded piping flow diagram shall be provided in the pool equipment room. The diagram shall be engraved on laminated plastic with color-coded piping to match color of coding on piping, and including valves identified with number on tags. The minimum size shall be 11 inch x 17 inch.
6. Include manufacturer recommended maintenance schedule, parts lists, piping diagram (to agree with wall mounted diagram) and trouble-shooting information for all pool mechanical equipment.
7. Using reference to keyed valves and wall diagram, include specific written instructions for procedures to be followed for the following:
 - a. Emptying and refilling the pool(s) including de-watering during the period that the pool(s) will be empty;
 - b. Water level control adjustment and chemical control operation;
 - c. Normal surge tank operation and balancing;
 - d. Filter operation and backwashing; and
 - e. Super chlorination.
8. Lubrication and maintenance instructions.
9. Guide to "trouble-shooting".
10. Parts list and predicted life of parts subject to wear.
11. Outline, cross section, and assembly drawings; engineering data and wiring diagrams.
12. Test data and performance curves, where applicable.
13. Specific written instructions for procedure for emptying and refilling the pool(s) including de-watering during any period that the pool will be empty. Include furnishing and installing a yellow warning sign 8-1/2 in. x 11 in., to be mounted in the filter room, that reads:

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

Add another sign shall read:

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

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

- C. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by the CONTRACTOR.
- D. Manuals and other data shall be printed on heavy, first quality paper, 8-1/2 x 11 inch size with standard 3-hole punching and inserted in plastic covers. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practical, larger drawings shall be folded separately and placed in envelopes that are bound into the manuals. Each envelope shall bear suitable identification on the outside.
- E. Six (6) bound volumes of each manual shall be submitted. All parts lists and information shall be assembled in substantial manuals and permanent, three-ring or three-post binders. Material shall be assembled and bound in the same order as specified, and each volume shall have a table of contents and suitable index tabs.
- F. All material shall be marked with project identification. Non-applicable information shall be marked out or deleted.
- G. Shipment of equipment will not be considered complete until all required manuals and data have been received.

1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers and crates with all labels intact and legible.
- B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- C. Handle materials in a manner to prevent damage.
- D. Store all materials on clean raised platforms with weather protective coverings. Provide continuous protection of materials against damage or deterioration.
- E. Remove damaged materials from site.

1.10 WARRANTIES

- A. The CONTRACTOR warrants to the Owner and Architect that materials and equipment furnished under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted, and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements, including substitutions not properly approved and authorized may be considered defective. The CONTRACTOR'S warranty may exclude remedies for damage or defect caused by abuse, improper or insufficient maintenance, improper operations, modifications not executed by the CONTRACTOR or improper wear and tear under normal use. If required by the Architect, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment. All warranties shall be for a period of one year from the date of substantial completion or the owner begins using the pool unless otherwise specified.
- B. The CONTRACTOR shall agree to repair or replace any defective or non-complying work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

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

1. All pool deck equipment and accessories against defects in material, manufacturer and installation for a period of one (1) year.
2. Defects in material, manufacture or installation of the recirculating overflow system and interior coating of the trench for a period of one (1) year.
3. Defects in material, manufacture and installation of the filtration, backwash, chlorination, pH adjustments and cleaning systems, including controls for a period of one (1) year.
4. Defects in material or workmanship of the pool structure causing a loss of water for a period of three (3) years.
5. Defects in material, workmanship, and installation of the pool piping system for a period of three (3) years.
6. Defects in material, workmanship, and installation of the pool pumps for a period of one (1) year.
7. Manufacturer's minimum fifteen (15) year warranty on the filter tank and lining against defective materials or workmanship of the tank and components. (Additional warranty time may be purchased from the manufacturer.)
8. Manufacturer's minimum one (1) year warranty against defective materials, components and workmanship in the sanitizing feed system.
9. Manufacturer's minimum one (1) year warranty against defective materials, components and workmanship in the pH buffer feed system.

1.11 SYSTEM TRAINING

- A. A qualified representative of the CONTRACTOR performing work under this section shall put the equipment into operation and instruct the Owner's representatives in the operation of this equipment to the Owner's satisfaction immediately after project's substantial completion.
- B. The representative from the CONTRACTOR shall be either a CPO (Certified Pool Operator) or have an AFO (Aquatic Facility Operator) certification.
- C. Training periods shall consist of 32 hours of on-site training and scheduled as follows:
 1. 16 hours of initial training on the complete swimming pool system. The 16 hours of initial training is to be comprised of at least 4 hours of training on water chemistry analysis and adjustment. The water chemistry training will include in depth review of the use of the Langlier index and its computation.
 2. The initial 16 hours of training shall include information on the care, operation, adjustment, and maintenance of all items provided by the CONTRACTOR under the "Part 2 – Products" section of this specification.
 3. 16 hours of training after the Owner's staff has had experience operating the system. This time may be requested any time after the pool has been placed in operation within a period of one (1) year from the time the pool was accepted by the Owner. The additional training shall contain at least 2 hours of review of water chemistry.

4. The CONTRACTOR shall provide a project specific video recording instruction manual in addition to the training sessions. The video instructions shall be project specific and shall include information on the care, operation, adjustment, and maintenance of all items provided by the CONTRACTOR under the "Part 2 – Products" section of this specification. This video recording shall be done separate from the Owner training.
5. The CONTRACTOR shall include one (1) copy of all video recording instructions in each Operations and Maintenance Manual.

1.12 POOL FILL WATER QUALITY

- A. The Owner shall bear the cost of the water required for two (2) complete fillings of the pool (the initial water tightness test and the final filling). Removal of iron or copper (if in excess of .3 ppm) may be required for the final fill to avoid staining of the pool finish. Any subsequent fillings or partial fillings (more than 25%) of the pool shall be by the CONTRACTOR, at its own expense.
- B. The CONTRACTOR shall provide the necessary plant equipment so that the temperature of fill water will be within plus or minus 10 degrees of the ambient air and/or the pool structure at the time of filling. Extreme caution is urged if the temperature variance is greater than 10 degree F.
- C. The CONTRACTOR shall provide the necessary chemicals and to adjust and balance the water chemistry in the pools to the following levels:

pH	7.4 - 7.6
Calcium Hardness	200 - 400 PPM
Total Alkalinity (Sodium Hypochlorite)	80 - 120 PPM
Langelier saturation index	-0.3 - +0.3

1.13 START-UP CHEMICALS

- A. The CONTRACTOR shall maintain the chemical balance of the pool water (including the cost of all chemicals required) until the pool and mechanical system(s) are fully operational and accepted by the Architect and the Owner.
- B. Provide the Owner with sufficient quantities of the necessary chemicals to maintain the pool operation for a minimum of thirty (30) days from substantial completion or the owner begins using the pool.
- C. Chemicals to be provided to the Owner shall include those required by the chemical feed systems installed.

1.14 RECORD DRAWINGS

- A. Provide a complete set of record drawings of the entire pool system(s) including all sub-systems. All record drawings shall be prepared in accordance with the requirements of Section 01720 and shall be a complete, stand-alone set. The CONTRACTOR shall be permitted to obtain original documents and copy them for this purpose only. Furnish the record set on compact disk (AutoCAD Release 2004 or compatible software).

PART 2 - PRODUCTS

2.01 OVERFLOW SYSTEM

- A. It is the intent of the specifications that the perimeter overflow system and surface cleaning be maintained under all conditions of normal operation and that no water be discharged to waste except when cleaning the filters or emptying the pool.
- B. Concrete Perimeter Overflow System
 - 1. A perimeter overflow system consisting of a continuous concrete and tile overflow channel as detailed and shown on the drawings shall be installed on the pool(s). The bottom of the trough shall be level throughout.
 - 2. The walls and floor of the pool gutter shall be coated with epoxy paint. Refer to section 2.16. Areas not meeting the manufacturer's recommended thickness will be recoated without additional cost to the Owner.
 - 3. The grating shall be formed of molded white PVC sections. Modular, interlocking pieces of UV stabilized PVC grating. The top surface shall have a raised, diamond ridge design to create good friction, wet or dry and be 11/16" wide with an outside depth of 1.0" and a middle depth of 1-3/8" for extra strength. The space between pieces shall not exceed 3/8". Each piece of grate shall have a slotted hole at the ends for insertion of a stainless steel fastener clip and anchor screws every 5 feet and shall be easily removable. Grating surface bars shall run perpendicular to the pool wall and with the gap, provide at least 35% open space per foot for unrestricted water flow. The color of the grate shall be selected by the Architect. The width of the grating shall allow the insertion of the touchpad holding brackets between the grating and the gutter lip.
- C. Basis of Design: Grating shall be manufactured by Lawson Aquatics supplied by Neptune-Benson, DuraTech by Renosys, or approved equal
 - 1. and fasteners shall be 304L stainless steel.

2.02 PUMPING EQUIPMENT

- A. Any proposed substitutions shall include a mechanical drawing incorporating all required changes in layout, piping and valves. The cost of such changes shall be included in the price of the substitute. CONTRACTOR to confirm voltage prior to ordering pump. All motors shall be capable of continuously running without overloading at any point on the characteristic curve of the pump without overload or harm. CONTRACTOR shall confirm by 1/4 inch scale shop drawing that the pumps and filters to be provided will fit in the available space and can be removed for servicing.
 - 1. Pumps shall be certified by the National Sanitation Foundation (NSF) and bear the certification mark.
 - 2. Pump casing shall be cast iron fitted with a replaceable bronze case wear ring. Mechanical seals shall be provided specific for a clear, mildly chlorinated water application. Pump impeller shall be enclosed type of cast bronze, statically and dynamically balanced, and trimmed for the specified design conditions. If a VFD is to be used in conjunction with a pump, the impeller shall be trimmed to the maximum diameter based on the rated motor horse power. All bronze materials shall be suitable for use in a chlorinated environment. Suction and discharge flanges shall be provided and tapped for gauge connections. Provide steel or cast iron bases.
 - 3. If the pump is powered with a VFD, the impeller to be trimmed to a maximum diameter based on the most limiting condition of either the diameter of the maximum non-overloading rated motor horse power at the design point or a diameter resulting in 10% greater head than the specified head.
 - 4. Pump motor shall be totally enclosed, fan cooled (TEFC) of the horsepower and speed specified. A pump requiring larger horsepower shall not be acceptable.

5. Provide a hair and lint strainer, for each pump, of fiberglass or epoxy coated stainless steel construction with a clear observation top in the sizes (or pipe sizes) indicated on the drawings. Verify and coordinate pipe and pump suction sizes in the field. Provide a stainless steel basket with at least 4 times the free open area as the inlet pipe, and one spare basket with each strainer.
 - a. Basis of Design: As manufactured by MerMade Filter Inc., or Neptune/Benson Inc., or Fluidtrol Process Technologies, Inc.
6. Provide a fusion-bonded epoxy coating on all wetted parts to protect pump internals from corrosion, including pump volute interior and complete pump impeller. Sandblast to bare, white metal. Thickness shall be 8 to 12 mils (heavy film). Verify thickness by non-destructive testing. Coat parts as recommended by manufacturer, including preheating parts to 400 degrees and electrostatic deposition or fluidized bed technique. Provide primers if required to resist chlorinated water <10 ppm. Coating shall be Scotchkote 134 manufactured by Fusecote or approved equal.
7. Entire pumping unit shall be mounted on a base using cap screws to preserve the back pull-out feature of the pump. Pumps shall not be secured with floor studs. The pump base shall be coated with the same epoxy coating as the pump.
8. Entire pumping unit shall be mounted on a base using cap screws to preserve the back pull-out feature of the pump. Pumps shall not be secured with floor studs. The pump base shall be coated with the same epoxy coating as the pump. An OSHA approved guard shall protect coupling and exposed rotating components of the pump and motor where required.
9. Recirculating Pumps and Motors
 - a. Competition Pool Recirculation #1 (PP1)
 - 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 800 GPM against 71 ft. TDH with an efficiency of no less than 75% and a required net positive suction head (NPSHr) no greater than 12.00 ft. It shall be provided with a 20 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.
 - b. Competition Pool Recirculation #2 (PP2)
 - 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 800 GPM against 71 ft. TDH with an efficiency of no less than 75% and a required net positive suction head (NPSHr) no greater than 12.00 ft. It shall be provided with a 20 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.
 - c. Lazy River Pool Recirculation (PP3)
 - 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1250 GPM against 74 ft. TDH with an efficiency of no less than 77% and a required net

positive suction head (NPSHr) no greater than 10.00 ft. It shall be provided with a 30 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

d. Children's Pool Recirculation (PP11)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 310 GPM against 65 ft. TDH with an efficiency of no less than 73% and a required net positive suction head (NPSHr) no greater than 10 ft. It shall be provided with a 10 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

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

10. Other System Pumps and Motors

- a. Provide one (1) portable utility pump(s). The pump(s) shall be a 1 HP, 3600 RPM, 115/230 volt, 1 phase, 60 cycle unit capable of 60 GPM at 25 ft. TDH. Pump to be a Godwin GSP10 or approved equal.

11. Feature Pumps and Motors

a. Lazy River Propulsion Pump #1 (PP4)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,750 GPM against 40 ft. TDH with an efficiency of no less than 81% and a required net positive suction head (NPSHr) no greater than 15.00 ft. It shall be provided with a 25 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

b. Lazy River Propulsion Pump #2 (PP5)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,750 GPM against 40 ft. TDH with an efficiency of no less than 81% and a required net positive suction head (NPSHr) no greater than 14 ft. It shall be provided with a 25 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

c. Lazy River Propulsion Pump #3 (PP6)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight

centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,750 GPM against 40 ft. TDH with an efficiency of no less than 81% and a required net positive suction head (NPSHr) no greater than 14 ft. It shall be provided with a 25 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

d. Lazy River Feature Pump (PP7)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 470 GPM against 60 ft. TDH with an efficiency of no less than 83% and a required net positive suction head (NPSHr) no greater than 9 ft. It shall be provided with a 10 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

e. Bowl Slide Pump (PP8) - **Alternate AA#1**

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 450 GPM against 80 ft. TDH with an efficiency of no less than 79% and a required net positive suction head (NPSHr) no greater than 8 ft. It shall be provided with a 20 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements

f. Enclosed Flume Slide Pump (PP9)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 450 GPM against 50 ft. TDH with an efficiency of no less than 79% and a required net positive suction head (NPSHr) no greater than 8 ft. It shall be provided with a 10 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements

g. Open Flume Slide Pump (PP10)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 800 GPM against 50 ft. TDH with an efficiency of no less than 79% and a required net positive suction head (NPSHr) no greater than 10 ft. It shall be provided with a 15 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements

h. Children's Pool Feature Pump (PP12)

- 1) Furnish and install one (1) horizontally mounted centrifugal pump, as shown on the drawings and described in these specifications. Each pump is to be of a straight

centrifugal, end suction, bronze fitted, close coupled type, capable of pumping 1,200 GPM against 62 ft. TDH with an efficiency of no less than 79% and a required net positive suction head (NPSHr) no greater than 10 ft. It shall be provided with a 25 HP, 1750 RPM, 460 VAC, 3 phase, 60 cycle electrically driven motor meeting these specifications. The system design is based upon Paco. Pumps manufactured by ITT Marlow, Griswold, or Aurora shall all be considered, provided they meet the requirements.

B. Pump Gauges

1. Pressure gauges shall be installed on the discharge of the pumps.
2. Compound gauges shall be provided at the intake port of the pumps, after the hair and lint strainer.
3. Gauges shall be liquid filled, 316L stainless steel bourdon tube type with a minimum 2-1/2 inch diameter dial, high impact polypropylene or stainless steel case, corrosion resistant white scale with black divisions and numerals, 300 Series stainless steel heavy duty rotary bushed movement, , black enameled balanced Micrometer pointer.
4. Scale ranges shall be selected to indicate the normal system operating pressure of each system or location within the system. Pressure ranges shall be calibrated in psig (0-60 psi) and compound gauge shall be calibrated in inches of mercury (0-30 in Hg / 0-60 psi).
5. A stainless steel filter type pressure snubber shall be provided for each pressure gauge installed consisting of a 3/8 inch diameter by 1/8 inch thick micro metallic stainless steel filter and placed in the line just before the pressure gauge. Provide isolation brass valves or brass gauge cocks at each gauge for easy replacement and maintenance.
6. Gauges shall be as manufactured by Weksler Instrument Corporation or approved equal.

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

2.03 FILTRATION EQUIPMENT

- A. Base Bid – High Rate Sand Filtration Systems
- B. The filter system shall consist of high rate pressure sand filter tanks as shown on the drawings. Every aspect and component of the filter system must be certified by the National Sanitation Foundation (NSF) and bear the certification mark. The filter must have an engraved metal data plate permanently affixed on the face of the system that describes operational data and instructions and indicates start up date.
- C. It is the intent of these specifications to describe a filtration system complete in every respect with all accessory items and supplied and warranted by one manufacturer.
- D. Horizontally Oriented Fiberglass Tanks

1. The filter tanks shall be horizontally oriented single cell fiberglass tanks, minimum 42 inches in diameter. The filter system must be listed as approved by National Sanitation Foundation prior to bid date.
2. Filter tanks must incorporate all components and feature as described in this section.
3. Two (2) saddle style bases shall be provided for tank support. Systems that incorporate stacked tanks shall include similar bases and mounting saddles for the upper vessel. Tank supports and connections shall be seismic rated to support the filter tank(s) for the appropriate seismic zone where the project is located. Access to the tank shall be provided by a 14" x 18" manhole with two (2) curved yokes. Manhole seal shall be complete with a one piece 1/4" neoprene gasket and positioned so that internal pressure from the filter will augment the seal. No additional hardware or through bolts will be allowed.
4. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping. Connections shall be comprised of fiberglass flanges and schedule 80 PVC flanges.
5. All tank connections 2 inches and smaller shall be 150 lb. Type 316L stainless steel threaded full couplings. All tank connections 3 inches and larger shall be heavy steel bosses drilled and tapped both sides to receive standard flanged fittings or Sch. 40 Type 316L stainless steel nipples.
6. The discharge from the automatic air release valve shall be hard piped to waste. Each filter tank shall have a means of releasing air. Each coupling or orifice is to be provided with a slotted PVC sand retainer or stainless steel strainer. An automatic air release system shall be provided for each tank.
7. The drain system shall consist of a 3/4 inch 316L stainless steel coupling mounted at the lowest point in the bottom head. This drain shall be valved and piped to the nearest floor drain or backwash pit.

E. Filter Piping - Internal

1. The lower internal distribution system shall be a horizontal header/lateral arrangement. The header shall be Schedule 80 PVC construction, capped on one end and flanged or threaded at the other end for field connection. Lateral connections shall be spaced no more than 6 inches on centers, and shall be 1-1/2 inch FPT connections. All attachments to header shall be solvent welded and thermo-welded to insure integrity of connection.
2. Under drain system shall be factory installed and constructed of extra heavy Schedule 80 high impact PVC. Multiple PVC main headers to be tapped and threaded to receive laterals.
3. Laterals shall consist of 1-1/2 inch Schedule 80 PVC pipe with openings as required. Each lateral shall be fabricated complete with socket cap on one end and male adapter on the other end. Both fittings to be solvent welded to the slotted pipe. Laterals shall be designed and sized at the factory so as to be installed in the field and over the entire cross sections area of the filter.
4. The upper distributor shall consist of PVC piping Schedule 80 and/or deflector plate per manufacturer standard design.
5. Each filter shall be supplied with a pressure equalizing upper internal distribution system consisting of a horizontal header/lateral arrangement. The header piping shall be constructed of Schedule 80 PVC. The header/lateral piping and all connections shall be

designed and sized to provide uniform distribution and unrestricted flow during the filtration and backwash cycles.

6. Upper laterals shall be constructed of Schedule 80 PVC pipe with machine slotted openings or orifices. All machined slots or orifices shall be clean, de-burred and free of any obstructions that would not permit the free flow of water through the opening. Details of the lateral attachment to the header shall be submitted for review and approval.
7. The lower and upper distribution systems shall be properly supported and anchored. All hardware in wetted areas shall be Type 316L stainless steel or non-metallic. Tank interiors must be inspected prior to the media being placed in the filters.

F. Filter Piping - External (Face)

1. External face piping shall be Schedule 80 PVC pipe and fittings. Flanges shall be located so as to allow for easy dismantling of face piping. All fittings shall be solvent cemented.
2. Piping shall be drilled and tapped where necessary to accommodate gauge tubing connectors.
3. All valves 3" and larger shall be constructed with cast aluminum S12A alloy (as defined by ASTM B275) housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and 316L stainless steel shaft. Valves shall be rated for 150 psi bubble tight shutoff. Unless otherwise specified, all nuts and bolts shall be stainless steel with stainless steel washers to be used when secured to PVC flanges. Systems incorporating solenoid, pneumatic, pressure amplified, hydraulic or multi-directional valves shall not be acceptable.
4. Standard accessory items shall include sight glass rated for 50 psi with polycarbonate glass, remote mounted gauge panel with two 4½" diameter pressure gauges, ¼" petcocks, ¼" poly vent tubing with PVC compression adapters.

G. Backwash Control

1. The filter manifold face piping shall be designed to allow for one (1) filter tank to be backwashed at a time while the recirculation system is operating. A manual backwashing system shall be provided with the filter system.
2. Manual Backwash System
 - a. The manual backwash system shall be equipped with a face piping configuration such that the operator shall be manually control and operator both the time and sequencing of the backwash cycle. Valving on the filter face piping shall be a mechanical linkage device allowing the operator to simultaneously move two (2) valves at once. All mechanical linkage components shall be PVC or Type 316L Stainless Steel.

H. Automatic Air Relief Valve

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

I. Filter Media

1. Filter media shall be a carefully selected grade of hard uniformly graded silica material. Media shall be milled angular shaped particles of silica quartz. The filter sand shall have a particle size between 0.45 mm and 0.55 mm and have a uniformity coefficient not to exceed 1.53. Specific gravity shall not be less than 2.5 with a pH of 7.0.
2. All media (sand) shall be cleaned and free from any clay or limestone deposits. Bottom layer of support media shall be placed by hand to avoid damage to the under drain system and leveled before the addition of the upper layer of filter media.
3. All media shall be delivered after approval by the manufacturer of the filter and stored in 100 pound bags for ease of handling and elimination of possible contamination.
4. Media to be supplied by the filter manufacturer and approved by the filter manufacturer prior to shipping.

J. Filter Size

1. Fiberglass filters shall be the product of Paragon Aquatics / Stark, U.S. Filter, Neptune Benson, or Nemato provided they meet the specifications and layout. System design based upon Neptune Benson. Valves must be provided to backwash one filter at a time.
2. Filters have been sized based on a maximum allowable filtration rate of 13 GPM/SF:

	Units	Competition Pool	Lazy River Pool	Children's Pool
Volume	Gallons	526,507	221,496	18,133
Flow Rate	GPM	1,600	1,250	310
Filter Model		Four (4) 4896SHFFG	Two (2) 4884SHFFG	One (1) 4284SHFFG
Filter Size	Sq. Ft.	128.0	126.8	27.4
Turnover Rate	Hours	5.38	2.95	.97
Filtration Rate	GPM/Sq. Ft.	11.20	9.86	11.31

K. Warranty

1. The filter manufacturer shall guarantee the filters will maintain water clarity in the pool to the standards of the local and state health regulations under all maximum allowable conditions of pool use, if the filters are installed and operated in accordance with the manufacturer's printed instructions. The manufacturer must also provide the Owner with a separate, written fifteen (15) year warranty against structural failure due to manufacturing defects. (Additional warranty time may be purchased from the manufacturer.) Said warranty must describe in detail inclusions and exclusions. Provide the Architect with a sample copy of said warranty, prior to bid date, from all manufacturer's submitting a bid on this section of the specifications. Prorated warranties are not acceptable.

2.04 RECIRCULATION FITTINGS

- A. Main outlets (main drains) shall be concrete sumps with 12 gauge PVC frame and PVC grating and sized as shown on the plan. Grate openings shall not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.0 fps. The grate shall be PVC and fit closely and flush with top surface of frame, and secured to frame with vandal proof fasteners. All exposed edges of main outlets shall be rounded and smooth, free of burrs and sharp edges. All main drain covers shall comply with the Virginia Graeme Baker Act and ASME A112.19.8-2007.

- B. Furnish and install hydrostatic relief valves consisting of a 2" cyclac relief valve connected to a FPT commercial style Schedule 80 PVC collector tube. The collection tube shall have seepage holes, 3/8 inch in diameter, and shall be screwed securely to the valve body. The hydrostatic relief valve shall be designed to seal with minimum pressure and shall have a non-plugging, self-cleaning raised valve seat. Hydrostatic relief valve to be Hayward Number SP1056 with collector tube model Hayward Number SP1055, or approved equal.
- C. Concrete drop out boxes (converters) shall be concrete sumps with 12 gauge 316L stainless steel frame and PVC grating and sized as shown on the plans. Grate openings shall not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.0 fps. The grate shall be PVC and fit closely and flush with top surface of frame, and secured to frame with vandal proof fasteners. Provide no-leak seal flange at the midpoint of the boxes.
- D. Wall inlet fittings shall be Hayward Model SP-1421-E (1 inch opening) cyclac directional inlet mounted in Hayward Model SP-1022S or approved equal from Paddock, Sta-Rite, or Swimtime.
- E. Adjustable floor inlet fittings shall be provided each consisting of an ABS plastic body and adjusting top plate with a positive locking device. A spanner wrench shall be provided to facilitate flow adjustment. The inlet body shall be provided with a 2-inch cyclac solvent weld connection and internal NPT threads to facilitate line pressure testing. Floor inlet fittings shall be Sta-Rite No. 8417-0000-White or Sta-Rite No. 8417-0200-Black for floor inlets located on floor markings or approved equal.
- F. Valve box cover and frame for water features valving shall be Strongwell Quazite 17" X 30" PC-style gasketed precast polymer concrete cover with two vandal-proof bolts, part number PC1730GC00 and open bottom box, part number PC1730BA12, or approved equal. Quazite box and cover color by the Architect – standard color is concrete gray.
- G. Sight Sump and Water Surface Agitator valve box covers and frames that are not specified on the drawings or specifically identified as another size or material shall be Zurn model #ZANB-1461-14-VP, nickel bronze with polished scored top, vandal proof screws or approved equal. Refer to plans for sizes.
- H. Water surface agitators shall be as detailed on the plans and connected to the filtered water supply piping. Construction shall be machined or cast bronze/brass. Face plates shall be removable for alignment or cleaning by using security key part #WMF082. The water inlet connection shall be 1". The unit shall be the Combination Jet (WMD104) for vertical surface mount, by Crystal Fountains (905) 660-6674.
- I. Anti-vortex plates shall be provided at the suction points of the main recirculation pump(s) in the surge tank(s). Each plate shall be connected to the suction pipe via a PVC flange and shall be 1/2 in. thick with minimum dimension of at least 2.5 times the connecting pipe diameter. The plate shall be located 4 inches above the finished floor of the surge tank. Four (4) 3/4 in. stainless steel threaded rods, nuts, anchor bolts and washers shall be used to fix the offset distance and provide a secure base for the suction pipe.

2.05 PIPING SYSTEMS

A. General

- 1. Provide all recirculating piping between the pool(s) and the filter room, fill receptor and all interconnecting piping to and from the chemical feed systems and chemical controller.
- 2. Provide all necessary pipe supports and support systems required to support all associated piping and valves.

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

B. Pipes

1. Pipe routing as shown and detailed on the contract drawings is diagrammatic only and is not intended to show minor details or exact locations of piping systems. Installation is required to be adjusted to accommodate interference and adjustments anticipated and encountered. Pipe sizes on plans refer to nominal inside diameter of the pipe.
2. All PVC swimming pool piping shall be NSF approved and conform to the requirements of ASTM D-1785.
3. All PVC pipes and fittings shall be the product of one manufacturer. Approved manufacturers of PVC piping are Eslon, Harvel, and Chemtrol or approved equal.
4. Swimming pool piping above the floor or deck in the filter room shall be Schedule 80 PVC.
5. Swimming pool piping below the filter room floor or deck shall be NSF approved, Schedule 80 PVC.
6. All swimming pool piping under the pool floor shall be NSF approved, Schedule 80 PVC that is backfilled within a 1" minus fine crushed aggregate conforming to ASTM C136, and per recommendations indicated in the project geotechnical report. Fill material shall be submitted to the Architect for review and approval prior to placement of any below grade pool pipe.
7. All below grade swimming pool piping not located beneath the pool floor can be backfilled with native granular material free of ice, clay, debris, organic matter, and rocks larger than 4" across their greatest dimension, and per recommendations indicated in the project geotechnical report.
8. The influent and effluent lines to the Competition Pool heater unit shall be CPVC. Connections between metallic piping and/or equipment and PVC shall be flanged. Molded fittings shall be as manufactured by Asahi, Eslon, Chemtrol, Spears, or acceptable substitute. Fabricated fittings shall be as manufactured by Harrison Machine, Plastinetics, or acceptable substitute.
9. Vertical sight sump piping shall be NSF approved, Schedule 40 PVC. Horizontal sight sump piping shall be NSF approved, Schedule 40 PVC that is perforated and wrapped with fabric and have 3/8" diameter holes located top and bottom on 4 ft centers. Horizontal sight sump piping shall extend 1 ft minimum beyond the main drain.
10. Chemical feed lines from chemical feeders to recirculation piping shall be Schedule 80 PVC piping. Piping shall be hard piped into the recirculation plumbing. All required valves shall be of all PVC construction.
11. All flanged plumbing connection hardware shall be stainless steel.
12. All materials shall be installed by workmen thoroughly skilled in their trades and all work shall present a neat and mechanical appearance when complete. The CONTRACTOR, at no additional expense to the Owner, shall replace or correct any work not judged acceptable by the Architect, Owner's testing agency, or their consultants.
13. All support hardware, brackets, fasteners, hangers, etc. installed in the surge tank shall be 316L stainless steel.
14. No installation shall be made that will provide a cross-connection or interconnection between a distributing supply for drinking purposes and the swimming pool, or between the pool and a

sanitary or storm water sewer system that will permit a backflow of water into the pool water system.

15. All piping shall be hydrostatically (water) pressure tested for leaks before and after backfilling to guarantee water tightness. Pneumatic (air) pressure test not allowed.
16. The CONTRACTOR shall furnish and install 1/4" PVC water stops for this work for watertight penetration of concrete walls. Water stops shall be round and the O.D. shall be sized to 150% of the O.D. of the pipe. The water stops shall be thermo-welded to the pipe from both sides and shall be located at the centerline of the wall being penetrated prior to placing the concrete to assure a watertight seal.
17. CONTRACTOR must adhere to all the applicable provisions in Division 15 - Mechanical, "General Provisions" and "Basic Materials and Methods" for installation of piping system.
18. All mechanical equipment to be connected into the recirculation piping system shall be done so using flanged or union connections.
19. Provisions shall be made to purge all pipes in the system.
20. Concentric reducers shall be fiberglass by MerMade Filter, Inc., 316L stainless steel or cast iron with Scotchkote applied lining.

C. Pipe Hangers and Supports

1. Manufacturer
 - a. Subject to compliance with these specifications, pipe hanger and support systems shall be manufactured by Cooper B-line (basis of design), Inc, TOLCO, and Anvil International or approved equal.
2. Hangers
 - a. Pipes 2 inches and smaller
 - 1) Adjustable steel clevis hanger, B-Line models B3100 or B3104.
 - 2) Adjustable steel swivel ring (band type) hanger, B-Line model B3170.
 - b. Pipes 2-1/2 inches and larger
 - 1) Adjustable steel clevis hanger, B-Line model B3100.
 - 2) Adjustable steel yoke pipe roll, B-Line model B3114.
3. Multiple or Trapeze Hangers
 - a. Trapeze hangers shall be constructed from 12 gauge roll formed ASTM A1011 SS, Grade 33 structural steel channel, 1-5/8 by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.
 - b. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B-2000 series.
4. Wall Supports

- a. Pipes 2-1/2 inches and smaller
 - 1) Steel offset "J" hook hanger, B-Line model B3600.
 - b. Pipes 3 inches and larger
 - 1) Welded strut bracket and pipe straps, B-Line models B3064 and B2000 series.
 - 2) Welded steel bracket B-Line model B3066 or B3067 with roller chair or adjustable steel yoke pipe roll. B-Line model B3120 or B3110.
5. Floor Supports
- a. Electroplated carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line model B3093 and B3088T or B3090 and B8088. Pipe saddle shall be screwed or welded to appropriate base stand.
6. Vertical Supports
- a. Steel riser clamp sized to outside diameter of pipe, B-Line model B3373.
7. Plastic Pipe Supports
- a. V-Bottom clevis hangers with galvanized 18-gauge continuous support channel, B-Line models B3106 and B3106V, to form a continuous support system for all plastic pipes smaller than 1 inch or flexible tubing.
 - b. A vented and sloped continuous PVC Schedule 40 pipe no smaller than 1-1/2 inch outside diameter may be used to route flexible tubing with the appropriate pipe supports.
8. Supplementary Structural Supports - Design and fabricate supports using structural quality steel bolted framing materials. Channels shall be roll formed, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch or greater as required by loading conditions. Submit design for pipe tunnels, pipe galleries etc. for approval. Use clamps and fittings designed for use with the strut system.
- D. Hanger Attachments
1. Upper Attachments
- a. Beam Clamps
 - 1) Beam clamps shall be used where piping is to be suspended from building steel. Clamp type shall be selected on the basis of load to be supported, and load configuration.
 - 2) C-Clamps shall be locknuts and cup point set screws similar to B-Line model B351L or B3036L. Top flange c-clamps shall be used when attaching a hanger rod to the flange of structural steel, B-Line model B3034 or B3033 or approved equal. Refer to manufacturers recommendations for set screw torque. Retaining straps shall be used to maintain the clamp position on the beam where required.
 - 3) Center load beam clamps shall be used where specified. Steel clamps shall be B-Line models B3050 or B3055. Forged steel beam clamps with cross bolt shall be B-Line B3291-B3297 series or approved equal as required to fit beams.
 - b. Concrete Inserts

- 1) Cast in place spot concrete inserts shall be used applicable, either steel or malleable iron body, B-line B2500 or B3014 or approved equal. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Select inserts to suit threaded hanger rods sizes, B-line models N2500 or B3014N series.
- 2) Continuous concrete inserts shall be used where applicable. Channels shall be 12 gauge, ASTM A1011 Grade 33 structural quality carbon steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of 2,000 lbs/ft. in concrete, B-Line models B221, 321, or 521 or approved equal. Select channel nuts suitable for strut and rod sizes.

E. Hanger Accessories

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

F. Hanger Finish

1. Indoor Finishes

- a. Hangers shall be zinc plated in accordance with ASTM B633 OR shall have an electro-deposited green epoxy finish.
- b. Strut channels shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 OR shall have an electro-deposited green epoxy finish.
- c. Zinc Plated hardware is not acceptable for use in chemical rooms.

G. Valves

1. Valves 3 inches and larger shall be butterfly type valves, with PVC body, 175# SWP with stainless steel shaft, polypropylene disc and replaceable resilient seat bonded to a rigid shaft and guaranteed for bubble tight shutoff from 27 inch vacuum to 150 PSI. Extended neck 2 inch beyond flanges for any insulated piping shall be provided with handle for manual operation. Valves to be Asahi/America, Chemtrol, George Fisher (G.F.), Bray or Dominion or approved equal.
2. Valves smaller than 3 inches shall be PVC true union ball valves, full port, three-piece construction, blowout-proof stem, Viton seal with socket end connectors.
3. Check valves shall be a quick closing non-slam type, either self-aligning wafer or flanged type, of corrosion resistant materials suitable for use in a swimming pool environment. Install check valves in accordance with the manufacturer's recommendations. Locate check valves at least 5 pipe diameters from pumps and fittings. Provide check valves as indicated, where two pumps are used in parallel and on water feature or water play equipment systems where water is being pumped significantly above the source pool water level. Check valves shall be either by Technocheck Corp., elastomer hinge design, Style 5005 series, with PVC body and disks, stainless steel bolts, connectors and fittings, or bronze/stainless steel body with 316L stainless internals; or shall be by Centerline/Crane, series 800, elastomeric lined, with bronze/stainless disks and 316L stainless fittings, or approved equal, for installation between 150 lb flanges.
4. Modulating float valve in the surge tank(s) shall have PVC body and stainless steel wafer disc. All hardware shall be non-corrodible. The float-operated valves shall be furnished and installed horizontally on the main drain lines in the surge tank(s). Valve shall consist of all non-corrosion components including shaft, float arm, pins and floats. Valve shall be suitable for mounting on

a 125E class standard PVC flange. The float arm leverage weight and pivot lengths shall be adjustable to obtain desired ratio of surge tank level change to pool gutter overflow level change. Two floats and stabilizer required. Valve shall be Model FV-D XWB (Extra Weight Ball) as manufactured by MerMade Filter, Inc. or approved equal manufactured by EPD.

5. Submerged valves up to 3 inches shall be PVC true union ball valves. Submerged valves over 3 inches shall be PVC bodied, wafer type, butterfly valves with stainless steel handle extensions as required. Valves shall be by approved manufacturers listed above. Submerged valves must be provided with all stainless steel connectors. The stem housing extensions shall be properly supported and braced.
6. All butterfly type valves 8 inches and larger shall be fitted with a water tight gear operator.
7. All valves located 7 feet or greater off the floor shall be fitted with a chain operator.
8. All submerged valves, valves buried below grade, or valves not readily accessible, shall be furnished with a stainless steel reach rod and handle.

H. Pipe and valve identification

1. All exposed pool piping shall be equipped with color coded flow directional arrows at thirty (30) inch intervals per local and state swimming pool health code. The Contractor shall verify that all pool piping identification is in accordance with all local and state health regulations.
2. All valves shall be identified with minimum 1-1/2 inch diameter brass tags stamped with minimum 1/2-inch high numbers and attached to valves with #16 brass jack chain. (Plastic laminate engraved tags with nylon attachment acceptable.) Valves shall be described as to their function and referenced in the operating instruction manual and wall mounted piping diagram to be prepared by the CONTRACTOR.

I. Testing

1. All piping installation and pressure testing shall be reviewed by the Owner's testing agency before commencement of backfilling. A minimum notice of one (1) week is required prior to review. Results of review shall be documented.
2. All pool related piping, shall be hydraulically pressure tested (with water, not air) to a pressure of not less than 50 PSI for a period of no less than two (2) hours.
3. Contractor is responsible for the maintenance of a sustained 20 PSI pressure on all pool related piping throughout the course of construction.
4. The Contractor shall adhere to the applicable provisions of Division 15 - Mechanical, "General Provisions" and "Basic Materials and Methods" for installation of piping system.

2.06 CHEMICAL TREATMENT SYSTEMS

A. Calcium Hypochlorite (Chlorinator Briquettes)

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

2. A factory-authorized representative shall provide training to the owner and the training shall be video taped per 13150, Section 1.12 of the project contract documents.
3. Pulsar
 - a. The Sanitization System for the Competition Pool shall be a Pulsar® 500 System, for the Lazy River Pool shall be a Pulsar® 500 System, and for the Children's Pool shall be a Pulsar® 1 System and shall operate in a non-pressurized manner to ensure optimum safety and ease of operation
 - b. A post filter recirculation loop will be added to the main pool recirculation system to supply the chlorination system. The recirculation loop will provide the inlet water supply to the chlorinator as well as the vacuum to evacuate the chlorinated solution.
 - c. The Sanitization System shall be N.S.F.® listed.
 - d. The Sanitization System shall incorporate the principle of spray technology. Water shall spray on to the grids of Briquette Tank making contact with Pulsar® Plus Dry Chlorinator Briquettes. The briquettes shall be in contact with the water for a short time creating a chlorinated solution which will fall into the discharge tank. The chlorinated solution shall be drawn by the vacuum from the discharge tank and introduce into the recirculation system. The output shall operate with a vacuum range between 5" and 29" Hg.
 - e. The vacuum is created by a Mazzei venturi, model 1585X, which is installed in the post filter recirculation loop driven by a 1hp Pulsar® booster pump. The venturi is installed on the discharge side of the Pulsar® pump creating a flow through the venturi, which provides the suction on the discharge valve evacuating the discharge tank. An emergency overflow switch shall ensure that water flow to the spray manifold is shut off in the unlikely event that the discharge tank has not emptied properly.
 - f. The System will operate with an inlet water pressure of 25-45 psig. The inlet water is supplied from the 1hp Pulsar® pump.
 - g. The chlorine output shall be controlled by a timer or an ORP controller. The timer has twenty settings and will be controlled by a PLC/HMI. The timer will allow a minimum available chlorine (AvCl) output.
 - h. The Sanitization System shall be capable of functioning in temperature between 40° F. and 115° F.
 - i. The Sanitization System shall operate with Pulsar® Plus Dry Chlorinator Briquettes having 65% minimum available chlorine with a 0.4 to 0.6% scale inhibitor (by weight).
 - j. The Sanitization System shall be capable of satisfactory performance if installed as per the Manufacturer's recommendations (Reference Pulsar® Installation Manual). An Authorized Representative of the Manufacturer shall be located within a reasonable distance of the facility and shall be available to install and service the system as required.
 - k. Manufacturer warrants parts (excluding electrical components) of the Sanitization System to be free of defects in workmanship and material for 2 years from date of installation.
4. PPG PowerBase
 - a. General Description

- 1) The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for pool applications. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator, electrical box, centrifugal pump, and solution tank for ease of installation and operation. The system shall be the PowerBase Model by PPG Industries, Inc. Only Accu-Tab® Blue SI calcium hypochlorite tablets by PPG Industries, Inc shall be used, the patented blue colorant added for safety (to help prevent accidental mixing with other chemicals).
 - 2) The base proposal requires providing equipment as specified herein, though substitutions will be considered. The bidder is cautioned that substitutions must meet the quality and operational requirements of each feature specified in Section 2 below. Batch systems with pressure mixing components producing chlorine concentrations exceeding the limits of the specifications will not be considered.
 - 3) Any system offered shall use an NSF Standard 50 listed erosion feeder and tablet combination, and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.
- b. System Features
- 1) A maximum chlorine solution level of 0.05% (500 ppm) shall be maintained to prevent calcification in system components. Systems producing chlorine concentrations higher than 0.05% shall not be acceptable.
 - 2) Delivery shall be by erosion feed technology to control accurate and consistent concentration limits in the chlorine treatment solution. Soaking type, spray and/or vortex technology systems shall not be acceptable.
 - 3) The chlorinator shall automatically and continuously feed a limited quantity of chlorine in solution as needed; when the system is not running, no more chlorine than that amount which can be fed in one minute or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
 - 4) A centrifugal pump wired to the system electrical box shall feed freshly mixed chlorine treatment solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
 - 5) All piping in the chlorinator unit shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.
- c. System Components
- 1) Tablet Chlorinator. Accu-Tab® chlorinators by PPG Industries, Inc are designed exclusively for Accu-Tab® Blue SI calcium hypochlorite tablets by PPG Industries, Inc. Tablets are placed on a sieve plate inside the chlorinator; as water flows across the sieve plate, the tablets erode at a rate proportional to the flow rate.
 - 2) Inlet Water Supply Connection.
 - a) Children's Pool - Model 1030 (up to 60,000 gal indoor / 20,000 gal outdoor) - 1" FNPT (water supply of 10 GPM required).

- b) Lazy River - Model 3140AT (up to 500,000 gal indoor / 200,000 gal outdoor) - 2" FNPT (water supply of 60 GPM required).
- c) Competition Pool - Model 3500 (up to 1,500,000 gal indoor / 1,000,000 gal outdoor) - 2" FNPT (water supply of 60 GPM required).
- 3) Inlet Solenoid Valve. Opens and closes on command when the system receives a signal. 110 VAC required from chemical controller. Applicable to models 3140AT and 3500.
- 4) Inlet Water Strainer. A strainer to protect chlorinator components from start-up debris and sand from broken filter laterals.
- 5) Flow Meter. A rotameter flow meter, measuring the flow of the water-eroding stream to the chlorinator.
- 6) Inlet Control Valve. PVC gate valve mounted in line with the flow meter allows operator to adjust flow of water-dissolving stream. Applicable to models 3140AT and 3500.
- 7) Solution Tank. PowerBase 3500 made of HDPE, all others made of PVC. Capacities:
 - a) Model 1030 7.5 gallon
 - b) Model 3140AT 22 gallon
 - c) Model 3500 30 gallon
- 8) Float Valve. Made from Schedule 80 PVC and 316L stainless steel, this float valve maintains the solution tank level.
- 9) High Level Switch. Prevents the solution tank from overflowing. High level: when activated, a switch opens the circuit to the solenoid valve, causing the solenoid valve to close. Applicable to models 3140AT and 3500.
- 10) Solution Delivery Pump. Delivers chlorinated solution to the return line. A single-stage centrifugal pump is provided for systems with pressures up to 20 PSIG. (For systems requiring a discharge pressures greater than 20 PSIG, a custom selected pump shall be utilized.)
- 11) Discharge Check Valve. A PVC swing check valve prevents reverse flow of water into the system.
- 12) Discharge Control Valve (manual). Used to balance system output water flow with system input water flow.
- 13) Outlet Connection
 - a) Model 1030 1" NPT
 - b) Model 3140AT 2" NPT
 - c) Model 3500 2" NPT
- 14) Aluminum Frame. Type 6061-T.
- 15) Nema 4X Electrical Enclosure

d. Optional Equipment

- 1) High Pressure Pump. On systems requiring unit discharge pressures greater than 20 PSIG.
- 2) High-High-Low (HHL) Level Switch. A second high level switch (Hi-Hi) is installed above the high level switch that will run the solution delivery pump in case of an upset condition in the solution tank. A low level switch will protect the pump by preventing it from running dry.

e. Electrical Requirements

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

B. pH Buffering System (CO₂)

1. Shop drawings complete with a piping diagram depicting the location in which the CO₂ feeder is to be connected to the system shall be provided and approved prior to installation. Installation of the system shall be as specified in the manufacturer's directions and no exceptions shall be taken.

2. Bulk Storage

- a. Provide a system for storing, regulating and feeding carbon dioxide for pH control. The system shall consist of CO₂ storage tank(s), a pressure reducing/regulating system, a feed and rate of flow adjustment control system, injection or mass transfer system, and all valves, tubing, fittings and appurtenances required for a complete and operable system. The system is to include the following components.

1) CO₂ Storage Tanks

- a) Provide two (2) 450 lb or 600 lb mass storage tank(s) meeting ASME requirements, specifically designed and configured for use with CO₂. The tank(s) shall be of an insulated, vacuum-jacketed double wall construction with a rated service pressure of at least 292 psig. The outer shell shall be stainless steel and given a 10 mil dry film thickness epoxy coating, the inner shell shall be of stainless steel.
- b) Each tank shall include shut off and pressure regulating valves, gauges for accurate output pressure control, a 350 psig pressure relief valve, and shall be provided with a dual pressure building/economizer regulator that includes a 7.5 amp, 120 VAC heater extending into the tank and the liquid CO₂.
- c) Usage rate capacity shall have a range of 3.2 pounds per day to 20 pounds per hour. Secure tank to building wall with a coped saddle and a 16 GA x 3" stainless steel strap bolted to wall.
- d) Fill tank with CO₂ for initial testing and operation, and provide full tank(s) at the time of Owner acceptance.
- e) The tank(s) shall be as manufactured by Taylor-Wharton, MVE, or approved equal

3. Dual Tank Switchover System (NOTE TO SPECIFIER: only if multiple bulk tanks are daisy-chained)

- a) Dual tank automatic switchover system with gauges. Stranco CO2 -10, one (1) required.

4. Adjustable Rate of Flow Feed Unit(s)

- a. Provide an adjustable rate of flow feed unit to control the flow of CO2 from the storage tank(s) to each feature to receive CO2. The feed unit(s) shall be connected to the storage system with thick wall 3/8 inch OD reinforced braided polyethylene tubing enclosed in schedule 40 PVC. Feed system shall include 120 volt AC solenoid operated valve for remote on/off control of CO2.

1) Competition Pool requires one (1) Stranco Model # CO2-9, 20-200 SCFH

2) Lazy River Pool requires one (1) Stranco Model # CO2-9, 20-200 SCFH

3) Children's Pool requires one (1) Stranco Model # CO2-9, 20-200 SCFH

C. Ultraviolet Dechloramination and Disinfection System

- 1. It is the intent of these specifications that the swimming pool water be routinely monitored and treated by UV sterilization in the range of 220nm to 400nm to kill bacteria, viruses, molds and their spores and to continuously remove chloramines. The concentration of free chlorine residual shall at all times meet the requirements of the Health Department authority having jurisdiction over the swimming pool.
- 2. The method of monitoring and treatment specified and shown on the drawings is intended as the basis for receiving bids. It is not the intent of these specifications to limit competition. The base proposal must be on furnishing equipment as specified; however, a bidder may at his option offer a substitution. The bidder is cautioned that any substitution must meet the quality and operational requirements of these specifications. Any proposed UV system must have a UL listing on the complete system, and be listed under NSF Standard 50. Any substitute system shall have Health Department approval for this project prior to being offered.
- 3. The UV system offered under these specifications shall have been used for a minimum of ten years in swimming pool applications and the bidder must supply a list of at least ten satisfactory installations with contact names and telephone numbers. The specified equipment shall be by Hanovia, Siemens Water Technologies, or Triogen. System design based upon Hanovia.

4. Equipment General Description

- a. The UV System shall be a complete unit with all necessary controls. The system shall be preassembled and controls packaged for ease of installation at the job site and shall include:
 - 1) the UV chamber with flow and output safety control;
 - 2) a UV medium pressure arc tube modified to emit UV light from 220nm to 400nm;
 - 3) an automatic, adjustable, electric motor-driven quartz sleeve cleaning system;
 - 4) operational and power controls.
 - 5) the ability to dose control the UV delivered to the pool water.

- b. The system for the Competition Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,600 GPM with 10" return to pool pipe size and be a model PMD320E1/10AW.
- c. The system for the Lazy River Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 500 GPM with 6" return to pool pipe size and be a model PMD200D1/8AW.
- d. The system for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 300 GPM with 4" return to pool pipe size and be a model PMD150D1/6AW.
- e. The system for the Water Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 1,155 GPM with 8" return to pool pipe size and be a model PMD320E1/8AW.
- f. The system for the Sprayground Feature Pump for the Zero Entry Pool at the Butler Park Outdoor Aquatic Facility shall be sized for the recirculation rate of 158 GPM with 4" return to pool pipe size and be a model PMD150C1/4AW.

Pool Type	Model Number	US EPA 3-log and calculated 40mj/cm2 (GPM)	Calculated 60 mj/cm2 (GPM)	Lamps	Power (KW)	Voltage (V) with Breaker Size
Children's Pool	ECF-210-4V	540	350	2-1.0kW	2.0	208 V (1 ϕ)– 20A 220 V (1 ϕ)– 20A
Lazy River Pool	ECF-225-10V	1310	1230	2-2.5kW	5.0	208 V (3 ϕ)– 50A 240 V (3 ϕ)– 50A 480 V (3 ϕ)– 40A
Competition Pool	ECF-230-12V	2046	1680	2-3.0kW	6.0	208 V (3 ϕ)– 50A 240 V (3 ϕ)– 50A 480 V (3 ϕ)– 40A

5. UV Chamber

- a. The UV chamber shall be pressure rated for continuous operation at 150 psi, tested to 225 psi and constructed of type 316L stainless steel.
- b. It shall be designed for an internal pressure drop not to exceed 2 psi at maximum flow.
- c. The chamber shall incorporate:
 - 1) a temperature sensor to shut off the UV arc tube when there is inadequate flow in the chamber;
 - 2) an UV intensity monitor which alarms when the UV arc tube output drops below the dosing level required for proper operation. The monitor shall be of the wet probe type wavelength specific to 240nm - 280nm with a 4-20mA output. It shall display actual lamp intensity (mW/cm2) on the control cabinet door display.
 - 3) a stainless steel terminal cover fastened to the chamber end plate, to which is affixed the electrical conduit, to protect the lamps and electrical leads.

- 4) a design for laminar flow to provide maximum efficiency in the transfer of UV to the water
- 5) Limit switches shall be located to position the wiper, and to prevent the wiper parking over the active arc tube. The switches shall be magnetic type, and shall include visual indication of the wiper position. The wiper mechanism shall be fail safe, and shall shut the system down in the event of failure, as described below.
- 6) The chamber shall contain a quartz sleeve, which is sealed at both ends by a UV shrouded O ring. The quartz must be annealed for durability and against breakage. Systems that contain a quartz thimble shall not be permitted. The thimble is inherently buoyant and poses a safety risk to operators during annual maintenance.
- 7) The wetter surfaces shall be chemically passivated and all welds ground to eliminate any potential corrosion mechanisms. Crevices (as found behind a quartz thimble) shall not be permitted under any circumstance.

6. Automatic Wiper System

- a. For periodic cleaning of the quartz sleeves and the UV monitor probe, the chamber shall be fitted with an automatic cleaning mechanism. It shall consist of a single SS yoke with Teflon bosses and replaceable molded viton wiper rings which travel the full length of the quartz sleeve twice per cleaning cycle. The frequency of the wiper cycle shall be adjustable from 15 to 720 minutes and set for job conditions. The mechanism shall be driven by a two-pole bi-directional electric motor and acme lead screw. Reed type limit switches shall control the length of travel. The wiper mechanism wiper rings in the "parked" position shall not be over the lamp, blocking the transfer of UV light, or creating a "hot" spot on the arc tube.

7. Ultra Violet Lamp

- a. The UV lamp shall be a high intensity, medium-pressure UV arc tube modified to emit a continuous UV spectrum from 220nm to 400nm into the water. Full output must be available from 0 to 200 degrees. The lamp shall be UL approved with one electrical lead at each end.
- b. Each lamp shall be individually numbered and the manufacturing process shall permit full audit and traceability of assembly. In addition to an individual serial number, the part number shall be displayed on the lamp.

8. UV System Control

- a. The system control cabinet shall be epoxy coated steel, NEMA 12, fan cooled with louvers and replaceable filters. The control system shall be de-energized when the cabinet door(s) are open. All wiring shall be harnessed in DIN channels. The power supply to the UV arc tubes shall be from a constant wattage transformer. The entire system shall be UL listed and there shall be a decal clearing showing this listing displayed in the cabinet. The control cabinet shall display via a back lit liquid-plasma display the following information:
 - 1) Power on
 - 2) UV intensity (% and mW/cm²)
 - 3) UV dose (mJ/cm²)
 - 4) Flow rate in GPM

- 5) Arc tube ready indicator
- 6) Any alarm condition
- 7) Wiper status and alarm
- 8) Consumable spare parts list with part numbers
- 9) Local/remote operation switch, door mounted
- 10) Data logging of UV dose, lamp hours, lamp intensity for regulatory audit.

- b. The control panel shall contain an Earth Leakage detector, which shall provide fail-safe protection for bathers and those working on the equipment within the pool environment. This requirement is mandatory, as the voltages used within UV systems can pose risk of death.
- c. The control panel shall be UL LISTED, and in addition shall conform to EN 50081 and EN 61000. The panel and all UV components shall be manufactured to ISO 9001-2000.

9. Optional Equipment

- a. Power Switching - The UV system shall have power switching capability to increase or decrease the power to the lamp as necessary to achieve the proper dose required by the swimming pool. The power switching shall have four (4) power levels capable of automatically adjusting between the four levels, increasing or decreasing, depending on the quality of the pool water. NOTE: 50% turndown capability shall not be permitted as an equal to power switching.

10. Instructions

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

11. Warranty

- a. The equipment shall be warranted in writing that when operated and maintained according to the manufacturer's operating instructions provided and accepted, it will perform in complete accord with these specifications. All components (excluding the UV arc tube) have a limited warranty to be free from defects in workmanship and materials for a period of 12 months from date of start-up or 18 months from date of shipment, whichever occurs first. UV arc tubes are warranted to operate for 4000 hours when operated continuously. A continuously operated UV arc tube that fails prior to 4000 hours of operation shall be replaced free of charge. Intermittently operated UV arc tubes (>1 on/off cycle per day) will be replaced free of charge should failure occur prior to 2000 hours and prorated between 2000 and 4000 hours. All warranty replacements are FOB point of shipment.
- b. Provide in writing that the system is capable of providing a maximum of 0.3ppm or less of combined chlorine when tested prior to swimmers entering the water in the morning.

2.07 WATER CHEMISTRY MONITORING AND CONTROL SYSTEMS

- A. The water chemistry control system for each pool or spa shall provide continuous monitoring and control of sanitizers, oxidizers, pH, ORP, temperature, system flow rate, and water chemistry balance calculations. Controller shall have the ability to call for pH from both CO₂ and Muriatic acid systems on a user programmable time-of-day schedule to alternate between feeding CO₂ or acid. The controller shall manage the recirculation pump with a programmable Fireman Cycle feature, which automatically turns off the Heater and UV systems prior to shutting off the recirculation pump. All line-voltage wiring shall be performed in a separate NEMA 4X enclosure that precludes access to the controller electronics.. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the Owner and the training shall be videotaped per 131100, Section 1.12 of the project contract documents. The specified controller, a BECSys7 manufactured by BECS Technology, Inc. shall be provided or Chemtrol by SB Control Systems, AcuTrol by Pentair, ProMinent, or a technically equal system capable of providing equal performance for all operating functions.
- B. Certifications
1. The controller shall carry the following product certifications
 - a. NSF/ANSI Standard 50;
 - b. UL 61010-1
- C. Sensors
1. The controller shall come with the following sensors
 - a. pH - The controller shall provide a measurement of pH by utilizing a sensor with the following characteristics:
 - 1) 0 – 14 sensing range
 - 2) ABS body with ½" NPT process connection
 - 3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal
 - 4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction
 - 5) A silver/silver chloride (Ag/AgCl) reference element
 - 6) A general purpose glass membrane pH sensing element
 - 7) Operating temperature range of 0 - 80 degrees C
 - 8) Operating pressure range of 0 - 100 psiG.

- 9) The controller shall continuously monitor, display and data log pH with 0.1 or 0.01 resolution (programmable).
- b. ORP - The controller shall provide a measurement of ORP by utilizing a sensor with the following characteristics:
 - 1) -1000 to +1000mV sensing range
 - 2) ABS body with ½" NPT process connection
 - 3) Minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, shall not be considered equal
 - 4) A porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction
 - 5) A silver/silver chloride (Ag/AgCl) reference element
 - 6) A solid platinum or solid gold ORP sensing element with a minimum of 1 cm² surface area; platinum-plated and gold-plated sensing elements, which are susceptible to abrasives, shall not be considered equal
 - 7) Operating temperature range of 0 - 80 degrees C
 - 8) Operating pressure range of 0 - 100 psig
 - 9) The controller shall continuously monitor, display and data log ORP with 1mV resolution
- c. Flow Sensor - The controller shall provide a measurement of pool circulation flow rate and volume by utilizing a flow sensor with the following characteristics:
 - 1) 0-8800 gpm (0-33265 liter/min) measuring range,
 - 2) Magmeter flow sensor with a frequency output,
 - 3) Dual O-ring seal,
 - 4) Cable to meet length requirement for installation,
 - 5) Saddle to meet return line size,
 - 6) Flow volume: 999 trillion gallons, 1 gallon resolution; 999 trillion liters, 1 liter resolution.
 - 7) The controller shall continuously monitor, display and data log flow rate with 0.1 gpm resolution.
- d. Temperature - The controller shall provide a measurement of water temperature by utilizing a sensor with the following characteristics:

- 1) 32 – 212°F (0 – 100°C) sensing range;
- 2) 2 wire, 100Ω resistive temperature detector (RTD) with a 0.00385 Alpha.
- 3) The controller shall continuously monitor, display and data log temperature with 1°F resolution.

D. User Interface

1. Standard Display - The standard display shall be a backlit transfective LCD with 14 line x 40 alpha/numeric graphical characters that will continuously display information related to the following:
 - a. All installed sensor readings
 - b. Set points, with current control status
 - c. All active alarms, including time activated
 - d. Smart menus w/ integrated on-screen help
 - e. Contrast adjustment of the backlit LCD shall be provided through clearly marked keys on the front-panel without the need for access to internal controller circuitry. After initial adjustment, controller shall monitor internal temperature and automatically adjust contrast to prevent LCD blackout in extreme ambient temperature conditions. Controllers that do not include front-panel contrast adjustment and automatic temperature compensation shall not be considered equal.
 - f. The standard user interface shall include single-touch access to Set Points, Relay Modes, Calibrations, Backwash status and settings, Menu access, and Reset Fail/Safes. An alphanumeric keypad shall be provided for ease of system configuration.

E. Control Functions

1. Water Chemistry

- a. pH Control: The controller shall continuously control pH. Chemical feed shall be configurable for feed-up, feed-down, or dual feed and either on/off or time-based proportional feed.
- b. Sanitizer Control: The controller shall continuously control sanitizer based upon the ORP reading, the amperometric sensor, or both with a bracketed control program. Chemical feed shall be configurable for either on/off or time-based proportional feed.
- c. Bracketed Sanitizer Control: With the amperometric ppm sensor, the controller shall be configurable for bracketed sanitizer control; The bracketed control algorithm shall allow either the ORP or ppm setpoint to be chosen as the primary control point, while using other parameter to create a secondary

boundary (min and max settings) that must be maintained in addition to the primary control point.

- d. Sanitizer Booster Feed: The controller shall have a sanitizer booster program with selectable ORP and/or ppm set points with separate ending set points, allowing the option of the booster sanitizer to control to a lower set point while the primary system can recover.
- e. UV Control: A Fireman Cycle feature shall turn off (ramp down) the UV relay 0 to 60 minutes (settable) prior to backwash initiation or recirculation pump shutdown.
- f. Superchlorination: The controller shall have a programmable superchlorination function, based upon ORP or ppm superchlor setpoint, which is triggered manually.
- g. Dechlorination: The controller shall have a programmable dechlorination function, based upon ORP or ppm dechlor setpoint, which is triggered either manually or by the completion of the superchlorination function.
- h. LSI & RSI: The controller shall compute the Langelier Saturation Index and the Ryznar Saturation Index based upon current inputs and the Ca Hardness and Alkalinity entered by the operator.

2. Expanded

- a. Flow Monitoring: The controller shall continuously monitor, display, and datalog system flow, maintaining a total flow volume. A Low Flow Alarm shall be operator settable, which can be programmed to disable chemical feeds. Controller shall also have a Minimum Flow Rate setting to turn off heater whenever system flow is less than this programmed minimum level.
- b. Heater Control: The controller shall perform on/off control of a heater based upon an operator settable temperature set point. A Fireman Cycle feature shall turn off the Heater 0 to 60 minutes (settable) prior to recirculation pump shutdown. The controller shall immediately turn off the Heater when system flow is less than the heater Minimum Flow Rate setting.

F. Main Recirculation Pump

1. On/Off Control with Relay

- a. Controller shall provide the capability to interface to and control a recirculation pump with a programmable relay. The controller shall provide 3 operator-settable independent Fireman Cycle settings and relays for the Heater, UV and Ozone/Auxiliary controls. The controller shall include the following capabilities, available as appropriate based upon installed sensors and implemented features:
 - 1) Fireman Cycle: Upon the following events, the controller shall automatically delay recirculation pump shutdown until the Heater, UV and Ozone/Auxiliary

controls have been deactivated and the corresponding Fireman Cycles have expired:

- a) Backwash Operations
 - b) Energy Conservation mode (24 hr., 7 day function)
 - c) Manual off (per Operator)
- 2) Immediate: Upon the following events, the controller shall immediately turn off the recirculation pump (and Heater, UV and Ozone/Auxiliary controls), without first satisfying Fireman Cycle timing requirements:
- a) Surge Tank Level Low Alarm: Turn off pump immediately (surge tank is almost empty)
 - b) Strainer Vacuum High Alarm: Turn off pump immediately (possible entrapment)
 - c) Emergency shutdown, triggered by front-panel Emergency Off: Turn off pump immediately (per Operator)

2. VFD Interface with 4-20mA signal

- a. Controller shall provide the capability to interface to and control a recirculation pump equipped with a Variable Frequency Drive (VFD) through a 4-20mA signal. The controller programming shall allow the operator to manage the VFD entirely from the water chemistry controller, by providing the following capabilities:
 - 1) Programmable setpoint specified as either flow rate, effluent filter pressure, or fixed setting,
 - 2) Four programmable operator-triggered alternate profiles ("Manual Turndowns"),
 - 3) Four programmable scheduled alternate profiles ("Scheduled Turndowns"),
 - 4) Override setting for backwash,
 - 5) Ramp up and ramp down settings,
 - 6) Minimum output setting.
 - 7) Remote access to current VFD status and all VFD parameters shall be provided through the BECSys for Windows PC software provided with controller. The name of each alternate profile shall be changeable by the operator, so that VFD menus and data log entries are intuitive and recognizable by the users of the system.
 - 8) Systems that do not provide both local and remote management of the VFD through the water chemistry controller shall not be considered equal.

G. Control Outputs

1. Relay Outputs

a. Solid-State Relays

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

2. Mechanical Relays

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

- 1) 1 integral 8A dry contact mechanical relay, and
- 2) 4 integral 3A dry contact or line powered mechanical relays.
- 3) Since mechanical relays have the inherent risk of failing in the closed (active) position, as a safety measure the controller shall preclude the ability to assign any of the integral mechanical relays to chemical feed functions. Systems that do not preclude mechanical relays from being configured for chemical feeds shall not be considered equal. All mechanical relays shall have a provision for an electrical interlock with the circulation pump motor starter.

3. 4-20mA Outputs

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

- 1) Any enabled input, scaled between two operator-defined end points,
- 2) VFD control of recirculation pump.

H. Safety Features

1. Manual-On limit

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

2. High/Low Alarm Settings & Control Lockouts

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

3. No Flow Alarm & Flow Restored Delay

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

4. Feed Limit Alarms

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

5. Emergency Off

- a. The controller shall have a dedicated Emergency Off button on the front panel of the system, which immediately halts all chemical feeds and control outputs when pressed. This feature shall be password protectable, which shall require entry of one of the Security passwords.

6. Safety shield

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

I. Security

- 1. The controller shall have three security password levels: six for operators, two for managers and one for the distributor providing for a history of access identified by the user.

J. Data Logging

- 1. The controller shall have 512K battery backed-up RAM for input level recording and events. All input level shall be recorded for 10 to 56 days depending on sample rate (2 to 10 minutes).

2. The controller shall record and maintain the latest 1100 events over a maximum of 14 days recording all alarms, parameter changes, user logins, and operational cycles related to all control features.

K. Local Alarms Indicators

1. The controller shall signal all alarm conditions with the following indicators:
 - a. A bright red flashing LED on the front of the controller,
 - b. Activation of a master alarm signal provided as a dry contact relay enabling the use of 0-240 VAC alarms, and
 - c. Each active alarm listed on the LCD display along with time activated.

L. Remote Communication, Access & Alarm Notification

1. Ethernet

- a. The controller shall come with a standard, integral 100BaseT Ethernet connection. The controller shall be capable of providing Remote Access via PC with Ethernet connection and Alarm Notification via email or text message via an Ethernet connection to the Internet.

2. Remote Access

- a. The controller manufacturer shall provide BECSys for Windows™ graphical remote operation software, for interactive connection to the controller from a PC. Remote operation software shall be Vista-compatible, and have all of the following operational modes:
 - 1) Site Data Base – for organizing and accessing multiple controllers on site, or at multiple sites.
 - 2) Graphical Operator's Console – to display current readings, setpoints, alarm points and control status in an easy-to-read graphical mode.
 - 3) Data Log Graphing – to review data logs with time-synchronized event data; data log traces shall be configurable, with color and line style selectable by operator.
 - 4) Full Menu Tree – All system parameters accessible through a full menu tree interface.
 - 5) Auto-Polling – to allow automatic download of data logs from all controllers in site database.

3. Alarm Notification

- a. The controller shall be capable of providing alarm notification to 8 different recipients. Each recipient shall be individually configurable to receive alarm notification by one of the following methods.
 - 1) Email: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.
 - 2) Text Message: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.
 - 3) Fax: Notification message shall include system type, serial number, location, system ID, and all active alarm including the date and time each alarm was triggered.
 - 4) Numeric Pager: Notification message shall include callback number. Controller shall acknowledge pager notification when callback is received, and not notify subsequent recipients programmed for pager notification.
4. The controller shall come with a standard, integral 100BaseT Ethernet connection that supports a MODBUS TCP/IP connection to 3rd party applications such as EMS, BMS, BAC and SCADA systems. The MODBUS TCP/IP 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 MODBUS TCP/IP interface.

M. Enclosures

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

N. Flow Cell

1. PVC flow cell
 - a. The flow cell shall have a PVC body with two ½" NPT ports for pH and ORP sensors, two ¼"NPT ports for temperature sensor and sensor wash acid injection, and a clear acrylic front viewing window. The flowcell design shall provide precise sample flow rate and water velocity regulation past the probes. The flowcell shall come provided with PVC ½" isolation ball valves, PVC ¼" wet test valve and standard reed or optional rotary flow switch.

- b. Each flow cell shall be equipped with a pressure-sensing device. The pressure sensor shall consist of a compound pressure/vacuum gauge manufactured in stainless steel, 2 ½" diameter, liquid filled with an operating pressure range of 0 to 60 psig and vacuum of 0 to -30 in./ Hg.

O. Start-up and Manuals

1. The control system shall be provided with on-site start-up, on-site operator training, and 1 year on-site warranty service performed by a representative trained and authorized by the controller manufacturer.
2. Manufacturer shall supply an Operation and Maintenance Manual describing features, operating instructions, maintenance procedures and replacement parts.

2.08 FLOW METERS

A. Flow Meter

1. Flow meters (3 required) shall be installed according to the manufacturer in the filtered water return lines to each of the pools. Flow sensor shall be the GF Signet 2551 insertion magmeter. Furnish and install the coaxial cable from the sensor to the display/transmitter. Flow meter accuracy shall be +/- 2% of reading. The flow instrument shall have a LCD for simultaneous display of four-digit flow rate and eight-digit totalizer. Display/Transmitter capability may be part of chemical controller function or as separate Signet GF Signet 8550 display/transmitter. Signet GF Signet 8550 display/transmitter shall be powered by 24VDC and provide a 4-20mA output.
2. Backwash piping flow meter (3 required) shall be a pilot, impact ball, variable area type with one piece, impact resistant machined acrylic plastic body. GPM scale to be permanently etched or imprinted on the meter. Flow rate indicator to be of stainless steel material. Scale range to be appropriate for specific flow rate. Pipe size to accommodate backwash rate. Manufacturer shall be BLUE-WHITE or approved equal
3. Installations are to be installed in a straight run of pipe, with a minimum 10 pipe diameters upstream and minimum 5 pipe diameters downstream of any pipe fitting.

2.09 WATER LEVEL CONTROLLERS

A. In Surge Tank Water Level Controller (Three (3) Units Required)

1. Provide a water level sensing and control system for each body of water (Competition Pool, Lazy River Pool, and Childrens Pool) that will monitor the water level in the surge tank and automatically activate the auto water make-up control valve. For sensing water level and activating make-up water control valve for each pool, use Series ELC-810 Controller housed in a watertight NEMA 4X UL94 5V UL flammability rated polycarbonate enclosure to meet IP66 and NEMA 4, 4X, 12 and 13 ratings. The Controller shall utilize one sensor to control water level. ELC-810 series shall have a menu-driven LCD display screen and utilize a five-switch user interface for navigation through the menu. The menu shall allow changing the following settings: delay to shutoff, alternate sensor option, maximum time on, manual override, delay to normal, type of sensor, high level option, flow sensor active, and sounder with alarm. All menu settings shall be capable of password protection. The Controller shall be capable of displaying the following data: last fill time, last drain time, last alarm. The Controller shall be capable of determining the following: maximum time on exceeded, over current to solenoid valve, no valve/valve wiring problem, and sensor not working properly. The Controller shall have a low voltage interlock with auto water make-up solenoid valve, shall provide adjustable time delay for increasing level and manual override; and shall require 115 VAC, 1 phase, 60 Hz power.

Manufactured by AquatiControl Technology, Model ELC-810-SS-DW-XXX (Contractor to coordinate the specific length(s) of cable required for each controller prior to ordering). Refer to drawings for additional information. Provided and installed by CONTRACTOR and connected by electrical.

2. Provide a proximity switch sensor that shall be sensitive to within +/- 1/8" (4mm) of nominal water level. Supply voltage to sensor shall be 12V to 24V DC from Controller. Current consumption shall be < or = 15mA. Response frequency shall be 100Hz. Maximum control output shall be 200mA. Sensor operating temperature shall be -25 Deg. C to 70 Deg. C. Operating humidity shall range from 35% RH to 95% RH. Sensor shall be mounted in a 1" SCH80 PVC pipe (length to be determined by depth of surge tank). Sensing pipe to be mounted to surge tank wall with composite/non-metallic hangers and stainless steel hardware. Sensing pipe shall be capable of being submerged under water safely. Refer to drawings for additional information.
3. Wiring from the sensor to the Controller shall be provided by the CONTRACTOR and shall be connected to the terminal points mounted within a corrosion-resistant, nonmetallic NEMA 4X enclosure. All wiring connections shall be made through the bottom of the enclosure. The enclosure size shall be no less than 8" wide x 5" high x 4" deep. The access door shall be the entire front face panel of the enclosure. Confirm location in field.
4. Major components shall be plugged in using WAGO terminal blocks for ease of installation and replacement. Unit shall be designed to activate a 24-volt AC solenoid valve.
5. Provide a make-up water solenoid valve, normally closed, stainless steel fitted, bronze body, 24 VAC slow closing type. Size to pipe. Interlock with automatic water level control system. Refer to the Drawings for additional information. Such as ASCO, or approved equal.
6. Discharge of make-up water shall be into a fill standpipe and piping to the respective surge tank. Refer to the Drawings for additional information.

2.10 INSERTS AND ANCHOR SOCKETS

- A. Sockets and anchors shall be provided as stainless steel or cast bronze for swimming pool accessories. The CONTRACTOR shall confirm compatibility of deck equipment and deck anchors with the deck equipment manufacturer. All anchors or sockets shall be furnished with flush closure caps and escutcheons with set screws where indicated. Escutcheons shall be of the keyhole or oblong shape, similar to the casted, electro-polished stainless steel escutcheon with set screw by Paragon #28303SS, or approved equal.
 1. Anchor sockets for all railings and grab rails shall be of the wedge type, cast bronze, 4 inches in depth and made to receive 1.50 inch OD tubing as manufactured by Paragon #28105, or approved equal. The wedge shall be cast bronze, incorporate a stainless steel tightening bolt and flat washer, and be designed as the sacrificial element to the anchor system. All metallic components shall be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance.
 2. Anchor sockets for all stanchions and water polo goals shall be of cast bronze, sized to receive a full 6 inches penetration of 1.900 inch OD tubing as manufactured by Paragon Aquatics Catalog No. 38201TC, Spectrum Products No. 23626, or approved equal. Each anchor socket is to be furnished with a flush threaded, vandal proof closure cap Paragon Aquatics Catalog No. 38201TC or Spectrum Products No. 23628, and a grounding lug with screw. Furnish Paragon Aquatics catalog no. 38303, Spectrum Products catalog no. 23630, or approved equal spanner wrenches for removing the closure cap.

3. Cup anchors for racing lane lines, water polo tether and boundary lines etc. shall be incorporated into the perimeter overflow system. Cup anchors shall be 316L stainless steel with stainless steel threaded eyebolts. The heavy-duty cup anchors shall be 3-3/8" in diameter. Cup anchors shall be Spectrum round cup anchor, part no. 58280, or approved equal.
4. Anchors sockets for single post starting platforms located on the rollout shall be designed to prevent rocking. The insert shall be made of urethane resin to facilitate removal of platform. The liner shall be replaceable when worn. A stainless steel cap shall be provided to flush mount on the deck when platform is removed. Anchors for starting platforms shall be by the starting block manufacturer - SR Smith Rock Solid anchor, Quickset Dual-wedge anchor by KDI Paragon, Grizzly/Growler anchor by Spectrum, or Competitor anchor by Kiefer.
5. Anchors for the diving board stands shall be all bronze threaded castings for respective 5/8" threaded anchor bolts. The stand shall be designed for mounting with the use of Duraform catalog number 70-231-900 bronze deck anchors.

2.11 DECK EQUIPMENT

- A. Grab rails shall be furnished and installed as required in the quantities and to the dimensions as shown on the drawings. Grab rails shall be fabricated of one continuous length of polished and buffed tubing. The tubing shall be ASTM-A-554 grade 304L stainless steel, 1.50 inch OD x .120 inch wall thickness, polished and buffed to 320 grit finish and shall be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. All bends shall be smooth and free of wrinkles. Grab rails shall be pretzel bend as manufactured by Spectrum Products, SR Smith, similar to Paragon Aquatics, part number 35124, or approved equal.
- B. Entry rails shall be furnished and installed as shown on the drawings, fabricated from one continuous piece of polished and buffed ASTM-A-554 grade 304L stainless steel, 1.500 inch OD x .120 inch wall thickness, polished and buffed to 320 grit finish and shall be passivated for maximum corrosion resistance. Bends shall be smooth and wrinkle free. Custom rails shall be as manufactured by Spectrum Products, or approved equal. Custom rail submittal drawings shall be complete with details of custom fabrication and installation information.
- C. Railings for the diving tower and springboard pedestals shall be furnished and installed as detailed on the architectural drawings. Rails shall be custom fabricated of one continuous length of tubing wherever possible. The tubing shall be type 304L stainless steel, 1.500 inch OD x .120 inch wall thickness polished and buffed to 320 grit finish with slip resistant finish.
- D. Stanchion posts (backstroke and false start) shall be furnished and installed as required and in the quantities shown on the drawings. The posts shall be a straight length of type 304L stainless steel tubing, 1.900 in. OD x .145 in. wall thickness x 8 ft. 0 in. overall length, polished and buffed to 320 grit finish. Stanchions shall be capped at one end with a closure plug containing a U-shaped hook and fitted with a stainless steel eyebolt attached to an adjustable nickel plated bronze sliding collar. Stanchion shall be as manufactured by Paragon Aquatics, catalog no. 38106, or Spectrum Products catalog no. 23614 with Paragon Aquatics catalog no. 38301 or Spectrum Products catalog no. 23625, sliding collar, with eyebolt or approved equal.
- E. Starting Platforms
 1. Single post starting platforms for the rollout gutter (9 required, including 1 spare) shall have number plates on both sides numbered 1 through 8. Spare block shall not be numbered. Platform block height shall be 29-1/2" inch above water level. The platform top shall be 24 in. x 32 in. constructed of an acrylic outer body skin and a slip resistant sanded tread over a solid laminated board covered with fiberglass and resin roving. Blocks shall include "rock solid anchor system" by SR Smith. Frames to be 2.5 square inch x .120 inch wall thickness 304

stainless steel tubing with a powder coated finish. Architect/Owner to select colors. Verify height of platform above water before ordering. A rear access step shall be provided and shall be 8-inches x 12-inches. Backstroke bar shall allow both horizontal and vertical grab positions. Platforms shall be custom blocks as detailed on the plans similar to the Legacy starting platform with rear step by SR Smith, Keifer Competitor, Paragon Track Start Quickset, Spectrum Growler, or approved equal. Each starting platform shall have two labels affixed stating "Warning-Execute Shallow Racing Dive - Impact with Pool Bottom can Cause Permanent Injury."

2. Starting platform safety covers (9 required) are designed to keep unwanted users off starting platforms. The cover is made of 1/16" thick tough, lightweight plastic with a UV stabilizer and fits 24" x 32" platform tops. The conical shape and safety orange color act as a deterrent of starting platform use. Each cover is provided with a bungee cord for securing cover platform top.

F. Water Polo Goals

1. Goals shall be constructed to meet all official regulations of FINA, NCAA, NFSHSA, and USWP. Where a conflict may exist between these specifications and the official regulations of FINA, FINA shall govern. Special finishes and backings shall comply with the regulations. Deck-mounted water polo goals shall be adjustable vertically to provide the regulation cross bar elevation in shallow or deep water.
2. Deck mounted water polo goals (2 required) shall have the goal cage framework fabricated of type 304L stainless steel tubing, 1.900 in. OD x .065 in. wall thickness, polished and buffed to a 320 grit finish. All connectors and fittings shall be type 304L stainless steel. Assembly hardware shall be 18-8 stainless steel. The fascia shall be 3 inch x 7/8 inch x 1/4 inch thick fiberglass, series 500 white. The cage shall be adjustable cage so that the cross bar of the goal can be set in strict accordance with regulations. The supporting legs shall swivel to permit flat storage of the cage. The goals shall be furnished with solid blue coated nylon backing securely fastened to the cages. The deck mounted goals shall be as manufactured by Spectrum Products #84297 (30" setback), or Paragon Aquatics catalog no. 36104 with Spectrum Products no. 84290, or Paragon Aquatics catalog no. 36202 solid canvas backing and Paragon Aquatics catalog no. 36201 white mesh netting, Anti-Wave universal wall-mounted goal, Kiefer WPG1401D, or approved equal.

G. Lifeguard Chairs

1. Lifeguard chairs (4 required) shall be constructed of UV inhibited recycled HDPE chairs. Seat height shall be 60" above the pool deck. All joints shall be secured using T- 316L stainless steel screws. All major sub-assemblies shall be secured together with chrome-plated CP18-8SS through bolts and nuts. Chair shall include umbrella guide and holders. Chair shall be provided with sand color finish. Chairs shall be provided with a two (2) year warranty. Lifeguard chairs shall be Mendota #47747 by Spectrum, or approved equal.
2. Lifeguard chairs (10 required) shall be constructed of UV inhibited recycled HDPE chairs. Seat height shall be 36" above the pool deck. All joints shall be secured using T- 316L stainless steel screws. All major sub-assemblies shall be secured together with chrome-plated CP18-8SS through bolts and nuts. Chair shall include umbrella guide and holders. Chair shall be provided with sand color finish. Chairs shall be provided with a two (2) year warranty. Lifeguard chairs shall be Mendota #42022 by Spectrum, or approved equal.

H. Diving Stands (Custom Color – White)

1. Diving stands for the one-meter springboards shall be installed as shown on the plans. The diving board stand shall consist of heavy aluminum castings dipped in erudite chromic acid

solution, followed by a 20 mil coat of baked epoxy. Finish must be touched up in the field if damaged in shipping or assembly. The roller tube and tracks shall be heat-treated extruded aluminum processed by Alcoa Duranodic hard anodizing process. The bearings for the roller tube and slide shall be nylon with grease fittings, adjustable and field replaceable. The diving board anchor hinges and pins shall be heat treated aluminum forgings with a design tensile strength of 35,000 psi and shall receive Alcoa Duranodic hard anodizing. Hinges shall be designed to allow 180-deg. rotation of the diving board to the rear of the stand. Hinges shall be mounted on a transverse casting machined to allow 7 leveling positions in one-inch increments.

The diving board anchor bolts shall be 5/8-inch diameter by 3-1/2 inch long silicon bronze. The diving stand shall be supplied with top and intermediate guard rails on two sides. The diving stand guard rails shall be stainless steel tubing firmly attached to the guard rail supports with stainless steel band fasteners. The rails shall extend to the edge of the swimming pool and the rail ends shall be fitted with rubber safety tips. Fulcrum shall have an adjusting wheel at one end that can be turned by hand or foot. Diving stands to be as manufactured by Duraflex International Corp.

- a. One meter stand (2 required) shall be Durafirm catalog #70-231-400 and the color of the stand shall be white. Include eight (8) bronze deck anchors, Durafirm catalog #70-231-905.
- I. Diving boards (2 required) shall be an aluminum extrusion type springboard. The diving boards shall be a Maxi-Flex Model "B" diving board as manufactured by Duraflex International, Inc., model #66-231-330 or approved equal. The diving board shall be 16 ft long and 19-5/8 inches wide. The top surface shall be finished with three coats combined with a mixture of sand and white aluminum oxide to affect the non-skid surface with 200 perforations.
- J. Surge tank access hatch (4 required) shall be furnished and installed as shown on the drawings. The access hatch shall be a single door 2 ft.-6 in. x 2 ft.6 in with 1" fillable pan to receive ceramic tile and grout or concrete fill to match the surrounding deck. The frame shall be 1/4 inch extruded aluminum with built in neoprene cushion and continuous anchor flange. Door shall be 1/4" aluminum plate reinforced with aluminum stiffeners as required. Door shall be equipped with heavy continuous stainless steel hinges and shall have compression spring operators for easy operation. Door shall open to 90 degrees and lock automatically in that position. Door shall be built to withstand a live load of 150 lbs. per square foot and equipped with a continuous Type 316L stainless steel hinge, tubular type, and an automatic hold open arm with release handle. All hardware is to be type 316L, 18-8, stainless steel. A flush lift handle and a snap lock with removable key wrench shall be provided. Factory finish shall be mill finish with bituminous coating applied to the exterior of the frame. The access door shall be Type TER-2 single leaf pan type door as manufactured by the Bilco Company.
- K. Surge Tank and Pump Pit ladder rungs shall be 1/2 inch Grade 60 steel encased with co-polymer polypropylene plastic as manufactured by M.A. Industries, Inc, phone 770-487-7761.
- L. Pool Lift
 1. Pool lift (4 required) shall be a portable, battery powered handicap lift. It shall be capable of easy movement to multiple locations around the pool. Lift shall comply with the Americans with Disabilities Act Access Guidelines (ADAAG), be capable of lifting 300lbs. and shall include a foot rest, battery, charger, battery console cover, waterproof control, and a seat belt assembly. The following accessories shall also be provided: arm rest assembly, lift cover, stability vest, extra battery, wireless controls, and spineboard attachment. Lift to be a MATE (Mobile Anchor Transport Evolution) manufactured by Spectrum Products complete with an Traveler handicap lift, or a PAL (Portable Aquatic Lift) Lift #200-0000, manufactured by RehaMed International, or approved equal. Contractor to confirm pool lift fits on pool perimeter and operates correctly

2. Provide a "Pool/Spa Lift Available upon Request" sign, at least 9"x 14" in size and printed on sturdy aluminum sheet stock. The sign is to include both text and graphic. Mount with stainless hardware are required for a long life under hard use. Available from RMT RehaMed International, Miami, FL. Post in location as directed.

2.12 LOOSE EQUIPMENT

- A. Competition floating lane lines shall be as shown on the drawings and described in these specifications. Floating lane lines shall be a non-turbulent type with wave quelling floats and 3/16" stainless steel coated cable. Floats shall be injection-molded polyethylene. Colors to alternate the length of the pool with a contrasting solid color for the final 15 feet for 25 yard course and 16 feet 5 inches for 25 meter course (Architect/Owner to select colors). All floating lane lines shall be furnished as completely assembled and installed with take up reel, type 304 stainless steel spring and cable lock, hooks, and wrench. 5/8" wrench shall be made of a forged steel shaft with a polished chrome finish. The take up reel shall be constructed of type 304 stainless steel. The spool shall be a bronze nickel-plated casting with a nylon sleeve. Floating lane lines shall be similar to Competitor Swim Products, Competitor 4" Lanes pre-assembled and sized to fit the length of the pool. Provide Competitor lane line extension hooks as detailed on the drawings complete with protective sleeve. Floating lane lines with disconnects for shorter distance is acceptable. Provide contrasting disks located 15 meters from each end to meet resurfacing requirement. This requirement shall be met for each possible course length.

Quantities:

Competition Pool:	Provide 15 at 25 yards
	Provide 9 at 25 meters
	Provide 10 additional extension hooks
	Provide one spare floating lane line that can accommodate all race courses (disconnects are acceptable)

- B. Backstroke flags shall be made of PVC material, triangular in shape (12" wide x 17" long), and alternating in color, butted end to end on vinyl covered stainless steel cable. Submit samples for review and approval. The cable shall be attached to a stainless steel take up reel at one end and a stainless steel tension spring end-fitting at the other. Equipment shall be similar to the following items by Kiefer: backstroke flag (product no. 600800), racing lane cable (product no. 210210), take-up reel (product no. 210218S), and spring end fitting (product no. 210219).
- C. Lane rope storage reel (2 Required) shall be fabricated from two powder-coated enclosed aluminum wheels joined together by a 1-1/4 inch aluminum axle. This unit must ride easily on four 6" stainless steel casters with individual brakes. The reel shall have a collapsible tow handle for safe movability. The storage reel should be able to hold 902' of 4" lane ropes or 492' of 6" lane ropes. The CONTRACTOR is responsible for assembly. The correct number of storage reels shall be provided to store all lane line markers. Lane line storage reel to be Competitor Swim Products Elite Stor Lane Reel, Catalog #200 850 with Competitor storage reel cover, catalog #200 861, or approved equal.
- D. Pace Clocks
 1. Battery powered pace clock (4 required) shall be a portable type with stand, 31-inch octagonal face with a stabilizing foot and a built-in recessed handle. The pace clock shall be the Kiefer, 31" pace clock, catalog #210403 or approved equal. Color selections shall be made by the Architect.
- E. Lifeline shall be 3/4 inch blue and white polyethylene rope with floats that are 5 inch diameter by 9 inch long. Floats to be spaced on five foot centers. All metallic rope hooks shall be stainless steel. Provide lifeline at five foot break between shallow and deep water as shown on the drawings. Lifeline to be equal to Recreonics no. 14-381.BW or Lincoln Aquatics 44-115 safety line rope,

Recreonics no. 14-381 or Lincoln Aquatics 44-190 locking 5" x 9" floats, and Recreonics no. 14-456 or Lincoln Aquatics 44-125 rope end hooks.

- F. T-wrench for operation of valve extensions shall be fabricated of ¾" diameter SCH 40 stainless steel pipe. The T-wrench shall be 4'-0" in length with a 24" long welded "T" handle. The wrench shall be fitted with a ¾" square stainless steel male end, 1" in length, for operation of valve extensions at the surge tank. Two complete T-wrenches shall be provided.

2.13 MAINTENANCE EQUIPMENT

- A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.

1. Wall brush (6 required) - Brush backing shall be a flexible polyethylene material with five (5) rows of nylon bristles. Pool brush holder shall be permanent mold cast aluminum with hydrofoil flap. Holder shall have stainless steel screws to facilitate brush changes. Handle bracket shall be quick detachable mount to fit standard 1 ¼ or 1 ½ inch diameter handles. Brush to be Recreonics no. 10-135, Lincoln Aquatics 31-020, or approved equal.

2. Skimming net (6 required) - Skimmer head shall consist of one-piece molded plastic frame with a reinforced, integral handle bracket suitable for quick attachment to a standard 1¼ or 1 ½ inch diameter handle using bolts and wing nut. The standard nylon net shall be attached to the frame using the groove and spline method. Net depth shall be 4 inches minimum in the center. Skimmer net shall be manufactured by Skimlife No. SS8, or approved equal.

3. Telescopic Poles (6 required) - Cleaning tool handle shall be of the telescopic design and fabricated from corrosion resistant, high-quality anodized aluminum. Poles should be fully adjustable, to desired length, with a simple twist of a cyclac threaded locking device. Poles should consist of a 1 inch tube fitted inside a 1¼ inch tube and be adjustable from a range of 8 ft. to 16 ft. Handle shall be adjustable from 8 ft. to approximately 16 ft. having a threaded bushing type clamp to lock handle at desired position. Poles shall be manufactured by Pool King, or approved equal.

4. Portable Vacuum Poles

- a. Stainless steel poles (3 required) –Vacuum head attachment poles are to have a heavy duty 1¼ inch stainless steel handle with special brass male and female threaded inserts on the ends. Poles are to be 8 ft. each, totaling a 24 ft. length for vacuum head attachment. Poles are to be Recreonics no. 10-330 with female thread adaptor being Recreonics no. 10-335 or approved equals.

5. Test Kits

- a. Provide two (2) test kits FOR EACH MECHANICAL ROOM – The first test kit shall feature liquid reagents, color comparator, waterproof instructions and treatment charts, chemistry guide and water gram. Test kit to have the ability to test for free and total chlorine (0.5 – 5.0 ppm), bromine (1-10 ppm), pH (7.0 – 8.0), acid and base demand, total alkalinity, calcium hardness and cyanuric acid. Test kit shall be Taylor Complete 2005 test kit, or approved equal.

The second test kit shall be photometric and utilize tablet reagents for stability that will allow accurate measurement of free and total chlorine (0-10 ppm), bromine, pH, alkalinity, calcium hardness, and cyanuric acid. The test kit shall have solid-state digital electronics and built-in filters. The test kit shall be direct-reading with automatic blank settings, automatic power cut-off, and store the last 10 results in nonvolatile memory. Test kit shall be a Pooltest 6 system based on the Palintest system of water analysis. Provide SPH

006D Pooltest 6 - Hard Carry Case Kit and SPC 006 Check Standard or AquaPRO 6 Test Kit manufactured by Orbeco-Hellige Inc. and Reference Standard Kit (LP275680).

6. Vacuum Cleaner

- a. Vacuum cleaner (filtered water return to pool) - (3 required) to be complete with a 36 inch dual manifold head with 50 feet of 2 inch floating hose. Hose to be Recreonics, catalog no. 10-422 or approved equal. 24 ft. stainless steel pole shall be available for attachment. The portable cartridge vacuum cleaner system shall include a 155 square foot T-316 stainless steel up-flow single cartridge filter, a 1 HP self-priming thermoplastic self-priming pump 1-1/2" suction and discharge connection and 110 cubic inch strainer capacity. Cartridge shall be Harmsco no. ST/155 or approved equal. The pump motor shall be 115/230 volt single phase, 60-cycle, open-drip proof and shall be UL and NSF listed. The pump motor shall be provided with a 120-volt Hubbell switch, weather proof switch cover, in-line pre-wired GFCI and a 100' power cord. The cord shall be wired to a 20 amp, 115/230 volt switch which shall be mounted on pump motor. All interconnecting pipe and fittings shall be schedule 40 PVC. The entire assembly shall be bolted to a T-316 stainless steel cart and shall have pneumatic wheels with grease fittings and roller bearing hubs. The system shall be provided with one spare cartridge filter. Unit to be Recreonics, catalog no. 10-806, Lincoln Aquatics no. 27-010, or approved equal. Accessories shall include a 1½ inch x 25 ft. discharge hose with stainless steel hose clamp. Hose to be manufactured by Quaker Plastic Corporation no. QT-131, or approved equal.

7. Robotic Pool Cleaner

- a. Provide one (1) single pump motor driven automatic swimming pool vacuum device. Cleaner weighs 18 lbs and has internal oil-cooled, water-cooled, brushless pump motor that filters 6,600 GPH. Jet-drive valve system on top propels the cleaner forward and back by diverting the filtered water expelled by the pump motor. Four non-marring rubber wheels on free-spinning axles guide the cleaner along pool surfaces. Motion sensor detects any obstruction in the path of the cleaner and changes direction. Two axle locking screws provide adaptable cleaning patterns for pool shape and size. The cleaner is to have four moving parts only. Cleaners with drive motors, gears, pulleys, belts or tracks are not acceptable. The cleaner to have an automatic program to clean pool floor and radius walls, travelling 1 ft per second, scrubbing pool surfaces with two power-washing jets, vacuuming a 2¼ ft wide path using two offset 7½ square inch suction inlets underneath, filtering fine debris <10 microns small and solids as large as 1½ inch into an internal reusable filter bag. Unit complete with 120 ft cord, manual guidance attachment, 2 filter bags, digital timer, power supply with 24 volt transformer, operator manual. Requires 110 volt GFCI receptacle onsite, consumes 2½ amps electricity. The pool cleaner shall be a JetMax Turbo as manufactured by Aqua Products, or approved equal.
- b. Provide one (1) dual motor driven automatic swimming pool vacuum device. Cleaner weighs 45 lbs and has internal water-cooled brushless drive motor with automatic program to clean the pool floor and walls, travelling 1¼ ft per second, scrubbing pool surfaces with onboard rubber brushes. Two separate internal oil-cooled, water-cooled, brushless pump motors filter 9,600 GPH, vacuuming a 2 ft wide path using two offset 7½ square inch suction inlets underneath, filtering fine debris <10 microns small and solids as large as 1½ inch into an internal reusable filter bag. Solid ½" 316 stainless steel axles extend the length of the cleaner connecting to a commercial-grade drive-train with Kevlar reinforced drive belts. Stainless steel reinforced side plates are capped with soft gray tracking wheels for durability and corner and curve tracking agility. Unit complete with remote control, air sensor, UltraKart Junior, 120 ft cord, set of SK3016BL7 deep clean super brushes, filter bag, digital timer, power supply with 24 volt transformer, 1 hour cleaning cycle delay option, operator manual. Requires 110 volt GFCI receptacle onsite, consumes 5 amps electricity.

The pool cleaner shall be a DuraMax Duo Junior as manufactured by Aqua Products, Inc., or approved equal. Include with 120 ft cord.

8. Stainless Steel Cleaner - Provide a stainless steel cleaner. The cleaner shall comprise of one (1) gallon of organic passivation solution. It shall be complete with instructions for proper maintenance of stainless steel surfaces and material safety data sheets for the passivation solution. The cleaner shall be the Spectra-Clean System 2 as manufactured by Spectrum Products. Product to be applied with 3M scouring pad, or equivalent.

2.14 SAFETY EQUIPMENT

- A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.
 1. Ring buoy and extension rope (3 required) – Buoy shall be 24 inch diameter vinyl clad PVC foam with a metal ring molded inside. Buoy shall have a 3/8 inch polyethylene rope attached to it at four points and be a minimum 60 feet in length. Preserver shall be U.S.C.G. approved. Buoy and rope to be mounted at each lifeguard chair on hooks. Ring buoy to be manufactured by Cal-June no. G-24-WH or approved equal. Throw rope to be Recreonics no. 12-261, Lincoln Aquatics No. 42-050, or approved equal.
 2. Life hook and pole (3 required) – Life hook shall be an anodized aluminum 3/8 inch OD "shepherd's crook" with a 1-1/8-inch OD handle attachment suitable for a 1 1/4-inch 16 ft. aluminum extension pole. Hook shall be of looped construction. Each pole to be provided with a set of spring type stainless steel pole clamps for mounting on each lifeguard chair. Life hook shall be equal to manufactured by Rainbow no. 153. Pole clamps shall be Recreonics no. 10-353, or approved equal.
 3. Spineboards (3 required) - Spineboard shall be 72" long x 20" wide, constructed of 100% virgin high density polyethylene. The design shall provide stiffness and torsional rigidity while remaining lightweight. The spineboard shall accommodate up to 500 lbs and shall feature customizable buoyancy that allows users to adjust the buoyancy by inserting polyethylene foam rods (supplied with the spineboard). There shall be (10) handholds around the perimeter of the board. The spineboard shall be supplied with one (1) 2-piece head immobilizer, one (1) head strap, four (4) body straps, one (1) head immobilizer with head bed, and two (2) flotation rods. The spineboard shall be CJ Rescue 6 package as manufactured by CJ spineboard at 1-206-824-8886 or approved equal. The CONTRACTOR shall provide one (1) set of heavy duty stainless steel utility hooks per spineboard for storing the spineboard at a convenient and readily accessible location near the pool (Recreonics catalog no. 10-362).
 4. First aid kit (1 required) - First aid kit shall be a 100 unit kit per American Red Cross standards as manufactured by Swift First Aid, or approved equal.
 5. Rescue tube (14 required) - Provide one rescue tube for each lifeguard chair. Rescue tube to be manufactured by Bremen Corporation No. 21414-14, or approved equal.
 6. Safety eyewash station (2 required) - Safety eyewash station shall be a self-contained system in which eyewash bottles are securely positioned in a portable holder. Eyewash bottles shall be 32 ounces and easily removable from case, and shall contain a sterile, saline solution with the ability to neutralize a varying quantity acids or caustics. Eyewash stations shall be equipped with a double back screw and holes for easy mounting in location to be determined by the Architect. Stations shall be Recreonics 12-033, Lincoln Aquatics 49-026, or approved equal.

7. Safety eyeglasses - Furnish and install a safety eyeglass dispenser station containing ten (10) pairs of safety glasses. Eyeglasses shall be ANSI/OSHA accepted, and be equal to Lab Safety Supply Inc. (1-800-356-0783) no. WQ-14740B.
8. Bag Valve Masks – Provide two (2) bag valve mask assistant resuscitation systems, one size Adult (1500ml tidal volume) and one size Infant/Child (450ml tidal volume). Product shall be a latex free disposable bag mask unit with support strap, transparent patient valve, and textured surface to eliminate slipping. Integral swivel valve, available with a closed reservoir system. Standard pack includes resuscitator, oxygen reservoir and a transparent bag for storage. Bag Valve Masks shall be Ambu SPUR II, or approved equal.

2.15 THERMOMETERS

- A. The following items are to be supplied by the CONTRACTOR unless otherwise noted. All proprietary names are to designate performance only. Equal products will be accepted.
 1. Portable thermometer (3 required) shall be a molded ABS plastic tube body type with the ability to measure temperature in both degrees Fahrenheit and Celsius. A 3 ft. polyethylene cord is to be attached to thermometer. Thermometer is to be manufactured by Pac-Fab/Rainbow no. R141036 or approved equal.
 2. Inline thermometer to be near the heating loop and shall have a 9 inch adjustable angle with a minimum 6 inch stem. There shall be a minimum of two (2) thermometers per loop, and must have ability to read temperature in both degrees Fahrenheit and Celsius. Thermometers are to be Recreonics no. 32-702, Lincoln Aquatics no. 21-125, or approved equal.
 3. Digital temperature indicator (3 required) shall be a 115 volt, wall mounting case, sensor and a stainless steel immersion well. Weiss Instruments model 20DT or approved equal. Digital thermometer not required if Chemtrol 3000 is used.

2.16 SWIMMING POOL FINISHES

- A. Diamond Brite – Reference specification section 13153, Swimming Pool Cementitious Finish.
- B. Pool Tile – Reference specification section 13154, Swimming Pool Tile.

2.17 WATERPROOFING

1. Interior surfaces of Gutter, Surge Tank Backwash Pit with NO additional finishes: Apply two (2) coats of Aquafin IC (total 100 mil thickness), Xypex, Vandex, Plainseal 88, Thoroseal directly to surface of gutter, surge tank and backwash pit.
2. For waterproofing applications that are to receive a painted finish: Apply two (2) coats of Aquaron CPSP or LATICRETE Hydro Ban directly to surface of pool structure.
3. For waterproofing applications that are to receive cementitious finish: Apply two (2) coats of Aquaron CPSP directly to surface of the pool structure.
4. For waterproofing applications that are to receive ceramic tile finish: Apply two (2) coats of MAPEI AquaDefense or LATICRETE Hydro Ban directly to surface of the pool structure. Prior to the application of the waterproofing material thoroughly inspect the structure for cracking and repair cracks as needed. Upon completion of proper curing apply flexible or polymer modified thin/thick-set tile adhesive over top coat.

2.18 SEALANTS

- A. Provide sealed expansion joints as shown on the pool and pool structural drawings or noted on the Contractor's construction/expansion joint layout, and as required. Expansion joints shall be constructed and sealed as indicated and in accordance with the manufacturer's recommendation. Sealant to be manufactured by LATICRETE International, Inc., Mapei, or Deck-O-Seal.
1. For submerged joints:
 - a. Latasil, one component, neutral cure, high performance, 100% silicone sealant in the color(s) as selected. Shall be used in conjunction with Latasil 9118 Primer per manufacturer's recommendations.
 - b. Mapesil T, 100% silicone sealant in the color(s) as selected.
 2. For joints behind the coping, or other horizontal deck joints:
 - a. Deck-O-Seal, two component (gun-grade or pourable, self-leveling), high resilience, non sag, non flowing, polysulfide-based sealing compound in the color(s) as selected. Shall be used in conjunction with P/G Primer per manufacturer's recommendations.
- B. Material Storage
1. All materials are to be stored in the original unopened factory containers in a cool dry location 60 to 80 degrees F. Protected from the elements and the hazards of construction. Open only as many containers as can be used in any particular period.
- C. Joint Preparation
1. Clean the joints of all deleterious material, to sound, clean and dry substrate.
 2. Joint is to be formed or filled with an approved, resilient, non-asphaltic, closed cell, polyethylene joint filler material down to firm substrate. Allow space at the top of the joint for the installation of approved closed cell polyethylene backer rod and install same to the required depth below the surface of the slab to control the depth of the sealant bead to within manufacturer requirements.
- D. Surface Preparation
1. Concrete surfaces to receive sealant must be fully cured, clean, dry and free of dirt, dust and any deleterious material that might compromise the adhesion and performance of the sealant. Curing aids, form release agents and joint former residue must be completely removed, if necessary by sand blasting and/or grinding. Loose dust must be brushed off.
 2. Prime all surfaces to receive Latasil sealant with Latasil 9118 Primer prior to sealant application, and surfaces to receive Deck-O-Seal sealant with P/G Primer prior to application.
- E. Application
1. Apply sealant in accordance with the manufacturer's recommendations.
 2. Tool the joint immediately after application to insure a firm, intimate contact with the joint interface.
 3. Remove excess sealant and smears from adjacent surfaces with Xylol or Toluol before sealant cures.

4. After the sealant has fully cured (generally a minimum period of five days at 72 degrees and 50% humidity), paint the surface of the sealant with a chlorine resistant chlorinated rubber or equivalent pool paint, such as Ramuc, in a compatible color as selected by the Architect.
NOTE: Latasil cannot be painted.

2.19 UNDERWATER LIGHTS

- A. Underwater lights shall be equivalent to 500 watts of incandescent light and provided by the CONTRACTOR. Underwater lights shall be UL listed and in the quantities shown and as detailed in the construction drawings and as described in these specifications. Coordinate for proper installation. Refer to the drawings for quantities and locations.
- B. The pool underwater lights shall be 120VAC or 12VAC, 70 watts LED-type, and equivalent to 500 watts of incandescent light. Fixture housing shall be stainless steel construction with minimum wall thickness of 0.020 inch per UL 676 underwater pool lighting standard. The niche shall be stainless steel with cast brass mounting ring or PVC plastic with stainless steel mounting ring. Brass construction pressure grounding lug on interior and exterior services. Lens shall be 8-3/8 diameter clear tempered heat resistant glass. Gasket to be single-piece "U" shaped santoprene or silicone. Fasteners shall be silicon-bronze or stainless steel. The light fixture shall be supplied with a #16-3 STW (120V) or 12-3 SJTW (12V) submersible cord with ground wire positively grounded inside the fixture. Cord entrance shall be a watertight seal and epoxy encapsulated. Light fixture to be IntelliBrite 5g White LED pool light series by Pentair Commercial Pool and Aquatics or approved equal. Underwater lights shall be furnished with cord length as required to allow for deck relamping of all fixtures.
- C. Junction boxes shall be furnished in the quantities required and shall be located at least 8" above the pool coping and 5' from the pool edge. Refer to the Electrical drawings. Cord length shall be sufficient to run from fixture to the junction box with sufficient cable in the niche to re-lamp the fixture on the deck. The conduit from the niche to the junction box shall be sealed and hydrostatically pressure tested for leaks before and after backfilling to guarantee water tightness.

2.20 WATER FEATURES AND SUPPORT EQUIPMENT

- A. The Directional Jet N°1 VOR-305.4000 (10 Required) shall be constructed of 304/304L stainless steel with an outside diameter of 3" (7.6cm) and a wall thickness of 3/4" (2cm). The spray head housing shall be fitted with a spray cap assembly consisting of a brass locking ring and an adjustable brass spray sphere. The nozzle system shall be free of finger entrapment hazards. The anchoring system shall have an integrated levelling system facilitating installation and a plumb finished to the activity deck surface.
 1. Overall play product dimensions: The overall height of the Play Product shall be 0" (0cm) above ground.
 2. Play Product Interactivity: The high or low streaming arc of water produced by the Directional Water Jet creates visual interest.
 3. Hydraulic Activity/Components: The water effect from the spray head shall produce a single soft stream adjustable from the vertical position to a maximum of 25° from vertical. Rotating the adjustable spray nozzle 90° from the vertical position sets the spray head to its water-tight winterized position.
 4. Hydraulic Requirements: The hydraulic requirements shall be 2-4 gpm (8-15 lpm) @ 3-5 psi (0.2 – 0.3 bar) Low consumption nozzles that minimize water usage while maximizing spray effects are also available.

- B. Wavy Palm Tree (15 Required) VOR-0510.2XXX by Vortex .
- C. Children's Pool – Interactive Water Play Structure
 - 1. Interactive Water Play Structure by White Water West Industries Ltd., +1 (604) 273-1068, www.whitewaterwest.com, or approved equal.
 - 2. One (1) Required
 - 3. Model Number: AP150TB
 - 4. Hydraulic: Maximum Recommended, 750 GPM @ 45 TDH
 - 5. Description:
 - a. Work by Slide Supplier:
 - 1) All AquaPlay Model 150TB components.
 - 2) Installation supervision, ride testing, and certification.
 - 3) Labor, materials, and equipment to complete the installation.
 - 4) Operations and maintenance manuals.
 - b. Related Work by General Contractor:
 - 1) All construction, demolition, and repairs to decks, fences, and landscaping.
 - 2) All electrical works, buildings, and permits.
 - c. Related Work by Pool Contractor:
 - 1) All Pool construction work.
 - 2) Supply and installation of mechanical equipment and related piping.
 - 6. Quality Assurance:
 - a. The Participatory Water Play System shall be suitable for installation in public swimming facilities and specifically designed for use by children and adults. It shall be manufactured by a company that has at least three years of experience in the manufacturing of such systems and at least 10 years of experience in the design and engineering of children's wet and dry play areas and swimming pools.
 - 7. Materials:
 - a. All materials shall be structurally sound and suitable for safe play. Durability shall be insured on all steel parts by the use of proven coatings such as galvanization. Main piping of the structure shall be of six and four inch schedule 40 steel pipe.
 - b. All parts not required to be structural may be fabricated from PVC and suitably protected from ultraviolet deterioration.
 - c. All nozzles (if required) shall be stainless steel, brass or galvanized steel.

- d. All dissimilar metals are to be isolated with dielectric fittings.

8. Manifold System:

- a. The play system shall have integrated into its overall design a manifold system for regulating the water flows and pressures to each individual effect. The manifold shall be constructed of PVC or steel pipe and shall utilize bronze disc butterfly valves, bronze gate valves and/or PVC ball valves.
- b. The manifold system shall be easily accessible at all times for adjustment. Each valve shall be permanently labeled as to the effect it controls.

9. Hardware:

- a. Primary structural fasteners (bolts, nuts, washers and screws) shall be galvanized, primed and painted with at least one coat of epoxy paint. Secondary fasteners shall be stainless steel where required (slides and tire swings). No bare steel hardware will be allowed.

10. Decks and Stairs:

- a. All decks and stairs shall be fiberglass and shall have an integral non-slip finish on the exposed surface. All corners shall be rounded with no exposed square edges allowed. Each fiberglass panel shall be structurally capable of supporting a minimum load of 100 pounds per square foot.

11. Slides:

a. Fiberglass Laminate Materials:

- 1) Gelcoat: Interior gelcoat shall be high quality isophthalic polyester with U.V. inhibitors. 18 to 20 mils thick ride surface, 20 mils exterior coating.
- 2) Resins: Thixotropic promoted low profile polyester resin with alternate layers of continuous roving chop and 18 oz. woven roving.
- 3) Structure: Fiberglass lamination with sandwich panel center line reinforcement. Standard flume section shall be minimum weight 20 oz. per square foot. Flanges shall be minimum 1/4" thick and extend at least 4 3/4" from the slide surface, "L" type.

b. Joints, Connections and Seams:

- 1) Flume to flume joints shall be fastened with 3/8" ASTM approved stainless steel bolts, washers (2 per bolt), and self locking nuts.
- 2) Flume to support system connections shall be made with ASTM approved stainless steel hardware, and shall be connected separately from water slide section connections to the exterior flange of the flume.
- 3) All connections shall be external to the flume interior. No connection, hardware or penetration shall be made to the flume interior.
- 4) Fiberglass joint connections shall be made using waterproof non-shrink caulking with suitable adhesion to fiberglass. Silicone sealants will not be permitted. Caulking shall be supplied by the slide manufacturer.

- 5) Fiberglassing over seams within the riding surface is not permitted. 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.

c. Color:

- 1) Shall be integral to the fiberglass. The color shall be selected by the Architect and Owner from all available colors submitted within thirty (30) days of award in the form of color chart or color chips. Opaque colors may be two-tone, different inside and outside if desired.

12. Tunnels:

- a. The tunnel body shall be 30" diameter, fabricated from fiberglass or molded polyurethane.

13. Side Panels:

- a. All areas below platforms and stairs less than 5' - 6" high shall be completely sealed off from the public and secured with 3/8" reinforced PVC or fiberglass panels. All panels shall be ultra-violet protected with an epoxy finish.

14. Valves:

- a. Main operating valves: All operational wheel valves shall be fabricated of steel with bronze or stainless steel discs and EDPM seat or 100% PVC.
- b. Wheels and connecting hardware shall be specially fabricated so as to provide minimum opportunity for injury during rotation. Specifically, the handwheels themselves shall be flexible (impact resistant) and fabricated from cast urethane not to exceed a hardness value of 95A (90%).
- c. All rope operated valves shall be self-closing with stainless steel or brass bodies and/or operating parts. The valves as well as the supply pipe shall be capable of withstanding a 175 pound live load.

15. Watergun:

- a. All waterguns shall be manufactured with trigger or handle operated mechanisms so water flow may be controlled completely by the operator. This operating mechanism must be encased and isolated inside of a sealed stainless steel tube. The mechanism must be easily accessible for maintenance and replacement.
- b. The watergun shall be mounted on a swivel base that will allow the gun to travel approximately 60 degrees horizontally and 45 degrees vertically. The base shall be mounted so that the gun is at least six foot high. The assembly shall have an independent control source to regulate the flow to the gun.

16. Tire Swings:

- a. Hangers: Hangers shall have two radial/thrust bearings pressed into a greased lower housing, providing a 360 degree rotation. The lower housing shall have three rings for attachment of chain hooks. The housing shall be attached to a standard automobile universal joint with a threaded and welded shaft. The joint shall be protected with a heavy rubber expandable boot bonded to the housing. The hanger base shall be securely welded to the overhead pipe.

- b. Tire: Tire swing tires shall be 29" O.D. X 15" I.D. X 6" high and be rotationally molded of an ultraviolet light stabilized ethyl vinyl acetate and high density polyethylene. These materials shall be blended to retain flexibility at below freezing temperatures. The tire shall be black in color. All holes through the tire shall be molded in place. Standard automobile tires are not acceptable.

17.Warranty:

- a. The complete system shall be warranted from the manufacturer for a period of not less than one year.

18.Installation and Operating Manuals:

- a. The manufacturer shall furnish the purchaser with at least two sets of complete installation and operating manuals. The installation manual shall illustrate a step-by-step procedure for assembly of the entire system. The operating manual shall describe the start-up procedure and day to day operation of the feature.

D. Children's Pool Features

- 1. Sprayground Features by Water Odyssey, (512) 392-1155, <http://waterodyssey.com>, or approved equal.
- 2. Jet Way
 - a. Three (3) Required
 - b. Model Number: W011
 - c. Hydraulic: Maximum recommended, 4'-0" Height; 9 GPM @ 4 PSI per nozzle
- 3. Geyserino
 - a. One (1) Required
 - b. Model Number: W073
 - c. Hydraulic: Maximum recommended, 5'-0" Height; 75 GPM @ 8 PSI per nozzle
- 4. Aqua Arch
 - a. Four (4) Required
 - b. Model Number: W006
 - c. Hydraulic: Maximum recommended, 4'-0" Height x 7'-0" Throw; 5 GPM @ 3 PSI per nozzle
- 5. Water Cage
 - a. One (1) Required
 - b. Model Number: W012
 - c. Hydraulic: Maximum recommended, 4'-0" Height; 60 GPM @ 3 PSI per nozzle

E. Log Raft Water Walk – Lazy River

1. Log Raft Water Walk by Water Odyssey [(512) 392-1155, <http://waterodyssey.com>], Playtime [(303) 662-0302, www.experienceplaytime.com], or approved equal.
2. Log Raft Water Walk to be per Detail 2/SP3.3. Contractor to submit proposed Log Raft Water Walk system to the design team prior to purchasing.

1. General

- a. The specifications for products in this section have been developed utilizing designs and data provided by PLAYTIME. All materials and components of the waterwalk system shall be designed, manufactured, and/or supplied by PLAYTIME, (303) 662-0302, or approved equal.

2. Materials

a. Waterwalk Floatables

- 1) Provide six (6) floatables consistent with the following theme and sizes:

- a) Three (3) water log 3'-6" L x 3'-6" W x 7" H
- b) Three (3) frog floatables 4'-0" L x 2'-7" W x 7" H

- 2) All shall be constructed as shown on the drawings and anchored to the pool bottom to provide a floating walkway across the pool as shown in the plans. The pads are to be constructed as follows:

- a) Heavy duty stainless steel inner structure;
- b) High gloss vibrant colors;
- c) Coated foam impact attenuating protection on all surfaces;
- d) One stainless steel U-bolt inset to a stainless steel plate inside each floatable element located in the center of each pad for connection to the floor tether; and
- e) Tethered to the pool floor cup anchor by two (2) 5/16" stainless steel shackles, a 5/16" eye-to-jaw swivel, and a 9/32" stainless steel chain.

b. Overhead Netting

- 1) Provide overhead Netform System that spans the pool over the waterwalk suspended from the posts shown in the plans. Ropes should be fed through the holes in the column at the desired height and secured to the posts using stainless steel turnbuckles on each end to allow for height adjustment. The rope shall be 3/4" diameter and come with a steel core and have integral Schedule 40 stainless steel spreader bars to reduce sag. High density polypropylene knot connections shall be provided. All connection hardware shall be stainless steel and have strength consistent with rope. Netting and connectors shall be supplied by PLAYTIME, or approved equal.

c. Safety Padding

- 1) Provide a minimum 2" thick safety padding according to the manufacturer's recommendations at the entry and exit to the waterwalk. Refer to the drawings for the required extent of the padding.

d. Posts

- 1) Structural calculations to support the waterwalk shall be supplied by PLAYTIME, or approved equal. Provide four (4) support posts for the overhead netting system, two (2) at the waterwalk entry and two (2) at the waterwalk exit as shown on the drawings. All waterwalk posts shall have a palm theme. The pre-engineered posts shall have a diameter of 12" and a height of 10'-0". Structural calculations to support the waterwalk shall be provided by the manufacturer.

2.21 POOL CONCRETE COPING

A. Precast Concrete Coping

1. The precast pool coping shall be SBN/DBN style by Federal Stone (www.federalstone.com), equivalent by Dallas Cast Stone, Co. (www.dallasstone.com), or approved equal. Coping shall have the shape and dimensions as shown on the construction drawings. Custom cast radius coping sections shall be provided where required to match the pool profile. All concrete shall have an equal strength and reinforcing per Division 3 – Concrete. Coping color selections by Owner/Architect. **Contractor shall include manufacturers complete range of custom color options in the base bid.**
2. Precast Coping Sealer
 - a. When recommended by coping manufacturer, coping shall be sealed with Sure Klean® Weather Seal Siloxane PD by Prosoco, or equivalent sealer product, to reduce the possibility of staining. Refer to coping manufacturer requirements. Ensure that sealer does not create a slip-resistance issue on coping surface.
2. Precast Coping Installation & Setting Materials
 - a. Surface preparation shall be in accordance with ACI 302. The horizontal surface of the pool beam shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards 7 to 9 for acceptable profile height). Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations.
 - b. Slurry Bond Coat
 - 1) Horizontal surface of the pool beam where coping will be set shall receive a slurry bond coat of either Laticrete 254 Platinum one-step, polymer-fortified, thin-set mortar, or Mapei 4:1 bag mix with Planicrete AC Additive in compliance with ANSI A108.1A (2.2 & 5.2), prior to thick bed mortar application. As manufactured by Laticrete International, Mapei, Inc., or approved equal.
 - 2) The complete underside surface of each piece of pool coping shall also receive a slurry bond coat of either Laticrete 254 Platinum one-step, polymer-fortified, thin-set mortar, or Mapei 4:1 bag mix with Planicrete AC Additive in compliance with ANSI A108.1A (2.2 & 5.2), prior to final setting in thick bed mortar. As manufactured by Laticrete International, Mapei, Inc., or approved equal.

- 3) Ensure bond coat is continuous and free of voids prior to application of mortar bed and setting of coping stone. Mortar bed shall be set over slurry bond coat while bond coat is still moist. Refer to manufacturer recommendations for proper setting and curing procedures.

c. Mortar & Leveling Beds

- 1) Provide a dry pack, thick mortar bed on horizontal surface of pool beam for setting and leveling of coping stones. Mortar bed shall consist of either Laticrete 3701 Fortified Mortar Bed, or Mapei, 4:1 bag mix with Planicrete AC Additive. Apply over a properly prepared slurry bond coat. Maximum lift thickness not to exceed 2". Refer to manufacturer recommendations for proper setting and curing procedures.

d. Coping Grout

- 1) Use either Laticrete PermaColor Grout or Mapei Ultracolor Plus Grout in accordance with the manufacturer's requirements for grout joints between coping stones. Grout products shall be as manufactured by Laticrete International, Mapei, Inc., or approved equal.

e. Elastomeric Sealant

- 1) Use Laticrete Latasil sealant for all expansion/movement joints. Apply sealant over Latasil 9118 primer. All primer and sealant installation shall be in accordance with the manufacturer's requirements. As manufactured by Laticrete International, Inc., or approved equal.
- 2) Provide sealed expansion joint with full depth expansion joint material and backer rod at back of coping stone where coping is adjacent to pool deck slab or other structures. Expansion joint material shall be non-crosslink polyethylene foam. Ensure joint sealant is installed level with coping/deck surface and that ponding of water does not occur at joint. Sealant shall be Laticrete Latasil sealant as manufactured by Laticrete International, Inc. or approved equal. Sealant color shall match coping/grout color.
- 3) For straight runs of coping over 40 feet in length, provide an expansion joint between coping stones every 20 feet maximum. Expansion joint shall be installed for the full depth of the coping stone and through the mortar setting bed. Expansion joint material shall be non-crosslink polyethylene foam, trimmed to fit the void of the coping joint, and leaving a 3/8" recess at the coping surface and nosing for installation of sealant material. Sealant shall be Laticrete Latasil sealant as manufactured by Laticrete International, Inc. or approved equal. Sealant color shall match coping/grout color.

- f. All mixing and application procedures shall be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative shall visit the site to verify field conditions, confirm materials and application requirements and ascertain that all materials and systems are so installed. Documentation shall be provided to this effect.

2.22 MOVABLE BULKHEAD

A. MATERIAL

1. The CONTRACTOR shall provide and install a movable bulkhead (1 required) fabricated to match the design of the end wall gutter. The bulkhead must span the width of the pool. The dimensions are nominally 4 feet 0 inches wide by 75 feet 0 inches long by 5 feet 0 inches deep.

2. Provide a complete fiberglass movable bulkhead that is entirely constructed of materials which are unaffected by corrosion when immersed in chlorinated swimming pool water. Paint or protective coatings on any internal or external areas of the bridge are prohibited.
 3. The movable bulkhead in its original solid state must be permanently compatible with chlorinated swimming pool water. The use of carbon steel, mild steel, aluminum, manganese, copper, brass or wood for any structural section, fasteners, hardware or parts of the bridge will not be allowed.
 4. Bulkhead manufacturer shall supply anchor pin assemblies and support structure integral to the bulkhead, and be responsible for coordinating proper alignment, operation, and support of the bulkheads on the gutter curb, as well as its locking mechanisms that will rigidly set the bulkhead at each course as shown on the drawings.
- B. The bulkhead shall be designed to support 5600 lbs with ½" maximum deflection. The safety factor for all live and dead loads shall be at least 10. The bulkhead shall be designed for a uniform lateral live load of at least 30 pounds per linear foot and a point load of at least 500 pounds at the center with a maximum deflection of ½ inch. Racing lane cup anchors shall be molded into the structure and be designed to prevent pullout at a load of at least 400 pounds each.
 - C. Bulkhead shall be fitted with anchors for racing starting platforms in the locations noted and in the positions required by the manufacturer of the selected starting platforms. The anchor installations shall be reinforced to produce negligible deflection under the maximum loading conditions recommended by the starting platform manufacturer.
 - D. Removable guard rails shall be provided at both ends of the bulkhead. Rails shall be custom fabricated of one continuous length of tubing. The tubing shall be type 304L (outdoor) stainless steel, 1.900 inch OD x .145 inch wall thickness polished to 320 grit.
 - E. The internal air chambers shall be so constructed that when adding air pressure to raise the bulkhead for a change in position it shall be balanced and eliminate the need for removal of the starting platforms. Moving the bulkhead shall be easily accomplished by one person at each end of the bulkhead. Units shall glide freely on corrosion proof guides, or skid plates, both at the gutter lips and side walls. Provide all equipment, including blowers, necessary to operate air flotation chambers.
 - F. Suitable means of anchoring the bulkhead shall be provided to resist all dead and live load components. Contractor shall provide and install the anchor plates at the park positions shown on drawings. Install a 1" thick fiberglass pin plate receptacle at each park position similar to Stark Model Number SB051. Bulkhead shall be anchored to the end wall for long course competition.
 - G. Suitable provisions for electronic timing system shall also be provided. Access hatches shall be included at both ends of the bulkheads to facilitate inspection of the interior of the bulkheads, anchor mechanisms, and to allow for installation of future wiring in an existing raceway gutter to carry electronic timing cables and conductors.
 - H. Provide factory trained and experienced personnel for coordination, consultation, and instruction for the actual bulkhead delivery and for training of the Owner's personnel in the use, operation, and maintenance of the bulkhead. Provide necessary instruction and coordination as required to coordinate anchorage installation.
 - I. Provide racing lane line anchors at water line along only those faces of the bulkheads where shown on the drawings.

- J. Lane line and men and women's water polo boundary line anchors shall be included with the pool bulkhead. The cup anchors shall be molded into the structure and supplied with a stainless steel pin for attachment.
- K. Racing lane targets shall be supplied on those sides of the movable bulkhead where shown on the drawings. Lane targets to coincide with lanes on the pool floor and markers on the pool walls.
- L. The entire surface of the bulkhead shall be slip resistant. This shall include the black wall targets and white field surface.
- M. Quality Assurance
 - 1. A factory quality control program must be submitted to the Owner/Architect with submittals, which ensures that structural tolerances critical for Movable Bulkheads used for competition have been maintained.
- N. Basis of design: The bulkhead shall be manufactured by Stark Bulkheads, Inc. (360-403-7707), or approved equal.
- O. Guarantee
 - 1. The manufacturer and Contractor shall guarantee that on completion of the installation, the unit will move freely from one location to the other, providing walls are straight and parallel and do not vary more than plus or minus 1/2 inch and will not rack or bind/stop when moved. Bulkhead manufacturer and Contractor shall coordinate the unrestricted travel of the bulkhead the entire length of the pool (unless noted differently on the drawings).
- P. Installation of Bulkhead
 - 1. The installation shall be true, level and plumb with the existing structure to permit full range of movement.
 - 2. The exposed surfaces will be free of all imperfections or irregularities. A field inspection by the Owner will be conducted upon completion of the installation to ensure compliance before acceptance.
 - 3. During installation, protection shall be provided for the existing deck, pool walls, pool floor and general building construction. The Contractor shall bear the costs for replacement or repair as a result of damage by neglect.
 - 4. Support jacks shall be used beneath the bulkhead until the pool is filled and the bulkhead becomes self-supporting.
 - 5. All costs for installation onto the pool gutter, adjustments, certification of dimensions and cleanup upon completion shall be borne by the Contractor.
 - 6. Contractor shall locate the anchor plates at each stop point and at end walls. Race course dimensions shall be field certified in compliance with the competitive standards having jurisdiction and be submitted to Owner/Architect in writing by the certifying engineer or land surveyor.
 - 7. The bulkhead shall not be moved until water is in the pool and at the level of the gutter lip.
 - 8. Provide instruction to the Owner's personnel in use, operation, and maintenance of the bulkhead.

2.23 POOL COVER – Competition Pool Only (**Alternate AA#2**)

- A. The swimming pool cover system shall be the standard catalogued product of a company regularly engaged in the manufacture of such products. Alternate swimming pool cover systems shall not be considered unless equal to the specified product and must be submitted for approval not less than ten (10) days prior to bid date. Submittal data must include complete documentation relating to all the specified features and include manufacturer's sales literature, specification sheets, energy conservation audit, installation/maintenance manuals and engineering drawings.
- B. The swimming pool cover system shall be of the energy conservation type. The covers shall be supplied in panel sections, allowing for ease of storage, and ease of installation and removal. The cover panel materials shall withstand the commercial aquatic facility's environment. Panels shall receive edging materials to strengthen the panel and to allow for deployment and retrieval without damaging the panel's main body materials. All materials shall be ultraviolet stabilized to ensure long life. The cover panels shall be reversible, allowing for the panels to be rotated, using both sides and end to end, every other year, supporting additional panel life. Warning labels shall be affixed in four places to both sides of the panel and shall instruct in the panels proper use and warn patrons of hazards associated with covered swimming pools. Cover panel systems shall be supplied with a protector, for use when panels are not deployed.
- C. The swimming pool cover system and its accessory items shall be manufactured by Spectrum Products, T- Star Enterprises, or approved equal.
- D. Cover Material
 - 1. Material shall be woven, twelve by twelve count per inch, high-density polyethylene, ultraviolet stabilized film fabric, flame laminated to both sides of a 1/8-inch thick, closed cell, medium density, white, polyethylene foam. The woven polyethylene film fabric shall be coated on the exposed sides with an ultraviolet stabilized, chemically resistant polyethylene coating. The combination of film, foam and woven components shall be non-toxic, non-absorbent, non-permeable and buoyant. Color shall be blue on upper surface and on under surface. In addition to the above, cover shall meet the following requirements:
 - 2. Cover Design Criteria
 - a. Cover panels shall be divided into widths suitable for convenient daily use (removal and deployment), totally covering the surface of the swimming pool without gaps or overlaps. Cover panels shall be compatible for use with storage reel(s) and not exceed a width equal to one foot less than the length of the storage reel winding tube on which it is to be stored.
 - 3. Edging
 - a. Protective-reinforcement edging shall be installed along ends and sides of each panel. A weighted non-metallic/non-corroding material shall be sewn into the panel protective edging. The weighted edge shall be flat and shall conform to the shape of the cover. Cover end edges shall be reinforced with a double layer of polyethylene-coated film fabric. The end edging shall be designed, in such a manner as, to prevent panels from diving when they are being pulled across the surface of the swimming pool. The encapsulated weighted edging shall be wrapped around the cover corners. The entire corner construction shall be reinforced with a 1/8-inch thick load dispersion plate. Both ends of each cover panel shall be equipped with no less than three (3) non-corrosive/metallic grommets and quick-release loops for easy connection to a storage reel or to the next cover panel.
 - 4. Sewing

- a. All sewing shall be double locking chain stitch, using ultraviolet stabilized, chemically resistant, 100% polyester thread. Main body seams shall be double overlap parallel double chain lock stitched. No butt, welded, glued or heat-sealed seams will be employed. All sewing shall be accomplished with computer-controlled machines, synchronizing speed with stitch length to assure uniformity and strength.

5. Warning Labels

- a. Warning labels consistent with the recommendations of the Federal Consumer Protection Agency shall be permanently affixed to each end of each cover panel and to the sides of perimeter panels on both side of the panel.

E. Products

1. Competition Pool – The pool cover system shall be the Marias II for standard rectangular swimming pools model #500013 by Spectrum Products, the Energy Saver by T-Star Enterprises, or approved equal.
2. The Portable Storage Reel Assembly shall be the Bitterroot III by Spectrum Products 15-foot triple tube storage reel model #50180, the T33 Series triple tube storage reel by T-Star Enterprises, or approved equal.

F. Warranty

1. A five-year warranty shall be provided for the pool cover system.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS, INSPECTION AND PREPARATION

- A. Carefully examine all of the contract documents for requirements that affect the work of this section. Prior to starting any work, notify the General Contractor of defects requiring correction. Do not start work until conditions are satisfactory.
- B. Verify that all work by others, related to this section, has been completed. This includes all earthwork, concrete work, and mechanical, electrical and plumbing connections.
- C. Protect all materials and work completed by others from damage while completing the work in this section.

3.02 FIELD MEASUREMENTS

- A. Verify benchmark and pool location prior to layout.
- B. If field measurements differ from the construction drawing dimensions, notification shall be given to the Architect prior to proceeding with work.

3.03 EXCAVATION, REINFORCING STEEL AND SWIMMING POOL PNEUMATICALLY APPLIED OR CAST-IN-PLACE CONCRETE

- A. Reference Division 2 - Site Work
- B. Reference Division 3 - Concrete

- C. Reference Section 13151 – Swimming Pool Pneumatically Applied Concrete
- D. Reference Section 13152 – Swimming Pool Cast-In-Place Concrete

3.04 TOLERANCES FOR CONSTRUCTION OF THE POOL SHELL

- A. The completed structures shall be constructed level and to the dimensions, elevation, depths and thickness as shown on the plans.
- B. The elevation tolerance of the pool shell and gutter lip shall be plus or minus 1/8 inch.
- C. The vertical wall surface tolerance of the pool shell, for the first 36 inches from the water surface shall be plus or minus 1/4 inch from plumb measured with a 6 foot straight edge.
- D. For competitive race courses, the following pool shell tolerances shall apply:

Course	Tolerance	Minimum	Maximum
25 yard	+ 1 3/16" /- 0"	75' – 3/4"	75' – 1 15/16"
25 Meter	+ 1 3/16" /- 0"	82' – 1"	82' – 2 3/16"

1. The above dimensions include allowances for a touchpad at each end of the course. The maximum dimension includes the construction tolerance. These above tolerances also apply to courses utilizing moveable bulkhead(s).
 2. The above dimensions apply to a vertical plane extending 1'-0" above and 3'-0" below the surface of the water at all points of both end walls.
- E. The CONTRACTOR shall provide the services of a registered engineer or land surveyor who shall measure and certify the elevations of the gutter lip at 10 foot centers as well as the length of each lane for each possible racing course. Course length survey must be made with the pool filled with water between 78 and 82 degrees Fahrenheit. Forms for the lane measurements are available from USA Swimming (719-866-4578) and must be submitted by the Contractor.
 - F. Ground wires or grade pins, if used, shall be installed in such a manner that they accurately outline the section of the pool shell as indicated on the plans. They shall be located at intervals sufficient to insure proper thickness throughout and shall be maintained tight. Grade pins or grounding wires shall not be permanently embedded in the pool shell.

3.05 WATER TIGHTNESS TEST

- A. This test applies to the pool(s), the surge tank(s), and the gutter system(s). The water tightness test shall be completed prior to the application of the pool finish.
- B. Water Tightness Test Procedure
 1. Preparation
 - a. Allow the concrete structure to set 28 days for curing purposes. Once the pool shell has gained sufficient strength to withstand the test load and after all the outlets have been securely sealed, the pool shall be filled with water.
 2. Fill: Fill and then isolate the pool(s), the surge tank(s), and the gutter system(s). The water tightness test shall begin after the vessel has been filled for a minimum of three (3) days. During the filling, all outlets shall be monitored for water tightness and all concrete joints shall be

monitored for any visible leakage. If any visible leakage from the vessel is observed, the condition shall be corrected prior to the start of the test.

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

3. Evaporation/Precipitation Measurement Procedure

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

4. Measurement

- a. On a separate sheet of paper draw a sketch of the pool. Measurements shall be taken at the pool(s), the surge tank(s), and the gutter system(s). Multiple test points with averaging are recommended for vessels which may be exposed to wind. Document the separate findings on the chart below. Repeat the measurements and document every 12 hours for a total of three (3) days. The General Contractor shall check the pool(s), the surge tank(s), and the gutter system(s) for water loss with the Architect or Owner's representative every 12 hours.

Total Allowable Water Loss:	Total Gallons:		(0.1%) x 0.001 =	Allowable Loss	Pan Depth Per 24 Hrs.
		_____	_____		
		—	—		
Pool Measurements	Competition Pool / Lazy River Pool / Zero Entry Pool		Gutter System	Surge Tank	Pan Measurements
12 Hrs.					
24 Hrs.					
36 Hrs.					
48 Hrs.					
60 Hrs.					
72 Hrs.					

5. Total Loss = 7.481 x Structure Surface Area (SF) x Total Water Loss per Day (FT) – Evaporation per Day (FT) + Precipitation per Day (FT)

a. Day #1 =

b. Day #2 =

c. Day #3 =

6. Repair

- a. The allowable leakage rate for an unlined pool structure shall not exceed 0.1 percent of the total water volume in a 24-hour period. (Example: 0.001 x 200,000 gallon pool = 200 gallons per 24 hour period.) This excludes the loss/addition of evaporation/precipitation.

7. Absorption

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

8. Evaporation

- a. Evaporation should not have a significant effect on natatoria that are completely enclosed with no air circulation during the water tightness test. However, evaporation will have a significant effect on the water level in natatoria that has air movement across the water surface or are still partially uncovered.

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

10. With regard to this test, the curing requirements, the final fill and the cost of the water for two (2) complete fillings shall be borne by the Owner. Any subsequent fillings or partial fillings (more than 25%) of the pool shall be by the CONTRACTOR, at its own expense.

3.06 PIPING INSTALLATION

A. General

1. Provide and erect, according to the best practices of the trade, all piping shown on the drawings and required for the complete installation of these systems. The piping shown on the drawings shall be considered as diagrammatic in indicating the general run and connections, and may or may not in all parts be shown in its true position. The piping may have to be off set, lowered or raised as required or as directed at the site. This does not relieve the CONTRACTOR from responsibility for the proper erection of the systems or piping in every respect suitable for the work intended as described in the specifications and approved by the Architect. In the erection of all piping, it shall be properly supported and proper provisions shall be made for expansion, contraction and anchoring of piping. All piping shall be cut accurately for fabrication to measurements established at the construction site. Pipe shall be worked into place without springing and/or forcing, properly clearing all windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted. All pipes shall have burrs and/or cutting slag removed by reaming or other cleaning methods in strict accordance with the manufacturer's instructions. All changes in direction shall be made with fittings. All open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the systems. Plugs of rags, wool, cotton waste or similar materials may not be used in plugging. All piping shall be arranged so as not to interfere with removal and maintenance of equipment, filters or devices, and so as not to block access to manholes, access openings, etc. Flanges or unions as applicable for the type of piping specified shall be provided in the piping at connections to all items of equipment. All piping shall be installed to ensure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access.

B. Pipe Hangers and Supports

1. Pipes shall be adequately supported by pipe hangers and supports specified in Paragraph 2.05 Pipe, Hangers, and Valves.
2. Horizontal PVC Schedule 80 piping shall be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 120 degree F and as listed below:

Nominal Pipe Size (Inch)	Hanger Support Spacing (Feet)	Minimum Rod Size for
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		Single Rod Hanger (Inch)
1-1/4" and less	5	3/8"
1-1/2" to 3"	6	1/2"
4" to 6"	8	5/8"
8" to 12"	10	7/8"
Greater than 12"	12	1"

3. Horizontal CPVC Schedule 80 piping shall be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 140 degree F and as listed below:

Nominal Pipe Size (Inch)	Hanger Support Spacing (Feet)	Minimum Rod Size for Single Rod Hanger (Inch)
1/2" and less *	4	3/8"
3/4" to 2"	6	3/8"
2-1/2" to 3"	7	1/2"
4" to 8"	8	7/8"
Greater than 12"	10	1"

- C. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape.
- D. Install hangers to provide a minimum of 1 inch space between finished covering and adjacent work.
- E. Place a hanger within 12 inches of each horizontal elbow.
- F. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
- G. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in section 2.05.C.3. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to the support spacing schedules.
- H. Do not support piping from other pipes, ductwork or other equipment that is not building structure. Do not modify building structure for hanger installation.
- I. Concrete Inserts
 - 1. Provide inserts for placement in form work before concrete is poured.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Where concrete slabs form finished ceilings, provide inserts to be flush with the slab surface.
 - 4. Provide hook rods to concrete reinforcement section for inserts carrying pipe over 4 inches.
- J. Pipe Hangers and Supports
 - 1. All piping shall be rigidly supported from the building structure by means of hanger assemblies properly selected and sized for the application in accordance with the manufacturer's recommendations and specifications.

2. All piping in a service tunnel, if required shall be supported by a structure of the CONTRACTOR'S design. The structure shall be non-corrodible and shall be of a size and configuration to rigidly support all the piping as shown in the plans at a minimum spacing as shown below.
3. Piping hangers shall be spaced per the below schedule and shall have hangers not more than one foot on each side of every change in direction. The piping systems shall be installed in an approved manner and shall not overload the building structural frame. The CONTRACTOR shall provide additional hangers and miscellaneous steel supports as may be required to distribute the piping system load over several structural members where required or directed. Maximum allowable spacing for piping shall be as follows:

<u>PVC Piping</u>	<u>Maximum Spacing</u>
3/4" thru 2"	5'-0"
2 1/2" thru 4"	6'-0"
6" thru 10"	9'-0"
12" thru 14"	12'-0"

4. Round rods supporting the pipe hangers shall be of the following dimensions:

1/2" to 2" pipe	-3/8" rod
2-1/2" to 3" pipe	-1/2" rod
4" to 5" pipe	-5/8" rod
6" pipe	-3/4" rod

5. Hanger rods shall be galvanized steel. Provide for controlling level and slope by turn buckles or other approved means of adjustment and incorporate lock nuts.
6. Where piping is installed side by side, the CONTRACTOR may support the piping by utilizing trapeze type hanger assemblies. Horizontal trapeze member shall be non-metallic channel. The CONTRACTOR shall provide heavier members as required for the load to be supported for the entire span distance. Hanger rods shall be as specified above and properly sized for the load supported, but not less than 5/8 inches diameter.
7. The use of pipe hooks, chains, or perforated iron for pipe hanger supports will not be permitted.
8. Attachment of piping hangers to the building structure shall be provided in a manner approved by the Architect. The CONTRACTOR shall provide concrete inserts to be installed by the General Contractor in the building construction at the time the concrete is poured and hangers shall be attached to these inserts.

K. Piping Installation

1. Trench bottoms shall be smooth and free of rocks and debris. If the trench is dug in ledge rock, hardpan or where large boulders are not removed, place 3 inches of sand or compacted fine-grained soil below pipe. Pipe must be supported over its entire length with firm, stable material. Blocking may not be used to change pipe grade or provide intermittent support over low sections in the trench. Surround the pipe with backfill meeting the requirements of Section 02200 with a particle size of 1-1/2 inch or less and in accordance with the project geotechnical report. Compact in layers not to exceed 6 inches with vibratory method. Follow installation methods of ASTM D2774 "Underground Installation of Thermoplastic Pressure Piping".

L. Flushing, Draining and Cleaning Pipe Systems

1. The CONTRACTOR shall flush out all water systems with water before placing them in operation. Other systems shall be cleaned by using compressed air or nitrogen. After systems

are in operation and during the test period, all strainer screens shall be removed and thoroughly cleaned.

M. Expansion and Contraction

1. The CONTRACTOR shall make all necessary provisions for expansion and contraction of piping with offsets, loops, flexible connections and anchors as required to prevent undue strain. The CONTRACTOR shall provide shop drawings for proposed method and arrangement for control of expansion and contraction of piping.

3.07 EQUIPMENT AND SYSTEMS INSTALLATION

- A. The CONTRACTOR shall assemble and install all equipment, special parts and accessories as shown on pool drawings, specifications and shop drawings of the equipment suppliers.
- B. The CONTRACTOR shall furnish all anchors and inserts to be imbedded in the deck including all fittings, inserts and structure sleeves and required anchorage as shown on the plans and as indicated in this section of the specifications. Equipment shall be set true and plumb, using factory jigs where available. Removable equipment items shall be easily removable from anchors and shall fit without noticeable wobble.
- C. Provide templates for all equipment anchors. Provide anchor bolts of the size and spacing as required by the equipment manufacturer. All anchor bolts shall be stainless steel Type 316L and of a length capable of adequate anchorage into rough slab-on-grade allowing for finish deck tile and setting bed. Anchors shall be set and cast into place during building concrete work. Inspect all anchor settings for horizontal and vertical alignment prior to placing concrete.
- D. The CONTRACTOR shall install all equipment and systems in accordance with manufacturer's directions. Equipment shall all be assembled and in place for final observation.
- E. All items necessary to complete this section are shown on the plans or described in the specifications including items that may be purchased by the Owner. Items are detailed and specified as a guide for dimensional purposes. The CONTRACTOR must make provisions accordingly and submit shop drawings and submittals based on that data.

3.08 START-UP AND INSTRUCTION

- A. The CONTRACTOR shall supply the services of an experienced swimming pool operator/instructor for a period of not less than two days (total 16 hours) after the pool(s) have been filled and initially placed in operation. During this period, the Owner's representatives who will be operating the pool(s) shall be thoroughly instructed in all phases of the pool's operation. The CONTRACTOR shall deliver six (6) complete sets of operating and maintenance instructions for the swimming pool, structures, finishes and all component equipment. Prior to leaving the job, the CONTRACTOR shall obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and all necessary operating information provided. The CONTRACTOR shall, in his contract, include the cost of two (2) additional days (total 16 hours) of instruction and operational check out by the qualified representative of the CONTRACTOR during the first season of operation.
- B. Written reports of each of these visits outlining the pool's operation, competence and performance of the pool's operation personnel, and other pertinent comments shall be submitted to the Owner and Architect/Engineer within one (1) week after each visit.
- C. The CONTRACTOR shall provide specific written procedures to be followed for emptying and refilling the pool as mentioned previously in this section. The procedures must be included in the

bound volume of operating instructions and references in the front index with a note headed by the words: "CAUTION -- VERY IMPORTANT".

3.09 CONCLUSION

- A. It is the intention of these specifications to provide a complete installation. All accessory construction and apparatus necessary in the operation or testing of the performance of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving the CONTRACTOR from furnishing and installing such parts. Any such omission or clarification shall be brought to the attention of the Architect prior to bidding as provided in this section.

END OF SECTION 13150

SECTION 13153

SWIMMING POOL CEMENTITIOUS FINISH

PART 1 - GENERAL

1.01 SUMMARY

- a. Provide a Diamond Brite, Pebble Tec or Pebble Sheen finish to the pool structure(s). Provide installation of bond coat prior to application of pool finishes. A ceramic tile trim shall be furnished and installed on the vertical tile band, stair nosing's, recessed wall steps, depth markings, wall targets, floor lane markings and all other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- b. The spa shall have an all tile finish. Refer to the Swimming Pool Tile, 13154 specification.
- c. Provide water analysis and pre-fill requirements.

1.02 SUBMITTALS

- a. Samples
 1. Prepare 12-inch square panel at the site showing color and texture for pool plaster. Finished cementitious finish work shall match the approved sample panel.
- b. Certificates
 1. Submit certificates attesting that the materials furnished meet the requirements specified herein.
- c. Test Report
 1. Submit results of domestic water analysis and calculation of amounts of chemicals required to balance pool water on initial fill of pool.

1.03 PRODUCT DELIVERY AND STORAGE

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

1.04 JOB CONDITIONS

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

1.05 QUALITY ASSURANCE

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

1.06 SURFACE PREPARATION

a. Surface Preparation

1. Surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened by sand blasting, water jetting, shot blasting, scarifying, or grinding. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations.
2. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering.

PART 2 - PRODUCTS

2.01 DIAMOND BRITE

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

B. Bond Coat

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

C. Mixing

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

D. Application

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

E. Coverage

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

- F. Proprietary plaster finish is to be applied by a licensed applicator as approved by the manufacturer.

2.02 PEBBLE TEC / PEBBLE SHEEN

- A. The CONTRACTOR shall install a slip-resistant pebble stone surface in the areas as indicated on the drawings. Description: Pebble Tec finish shall be a blend of selected colored aggregates and

fortified white Portland cement. Color and texture shall be selected by the Architect. Finish to consist of Pebble Tec as supplied by Pebble Technology, Inc. (480) 948-5058, or approved equal. Confirm all installation requirements with the manufacturer.

B. Surface Preparation

1. Surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened by sand blasting, water jetting, shot blasting, scarifying, or grinding. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations. Lightly moisten walls and floors prior to application of Pebble Tec

C. Bond Coat

1. Scratch Kote System by Multicoat Corporation, Bond Kote by SGM, Inc., or approved equal. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering. If over a waterproof membrane, refer to waterproof section of Swimming Pool specification, section 13150/131100, paragraph 2.17.

D. The cement-pebble stone mixture is to be pneumatically applied to the pool surface.

E. After application of Pebble Tec material the surface is to be hand troweled for exposure of pebble material.

F. Spray down troweled surface with water to remove excess cement and exposure of pebbles.

G. Surface is allowed a minimum of a 24 hour hardening period. Upon hardening the surface is cleansed with an approved solution as provided by the manufacturer for final exposure and luster of pebble surface.

H. Surface is to be buffed so as to ensure all sharp edges are removed and final surface texture is per the manufacturer's recommendations.

I. Natural pebble stone surface is to be applied by a licensed applicator as approved by the manufacturer.

2.03 ACRYLIC CEMENT COATING

A. Primer

1. On old concrete, saturate surface with Weathermaster CMX-4 acrylic modifier as a bond aid. Apply base coat before the bond aid is completely dry. If the bond aid dries, reapply Weathermaster prior to base coat.

B. Base Coat

1. Base coat shall consist of three (3) gallons of Weathermaster CMX-4 acrylic modifier, One (1) 100#bag of Type 1 ASTM white Portland cement and One (1) 100# bag of #4 silica sand. Add water in limited quantities based on temperatures and mix to be mixed by hand in clean container

2. Apply base coat to primer while primer is still damp. (Primer is only necessary on cured concrete). Apply base coat using pattern gun, squeegee or trowel over the area to be treated to a uniform thickness of 1/16". Allow base coat to sufficiently dry.

C. Texture Coat

1. Texture coat mixture shall consist of three (3) gallons of Weathermaster CMX-4 acrylic modifier, One (1) 100# bag of Type 1 ASTM white Portland cement and One (1) 100# bag of #4 silica sand. Add water in limited quantities based on temperatures and mix by hand in clean container
2. Spray texture coating using pattern pistol over 60-70 percent of base coat. Lightly trowel moist texture in a circular motion as required to produce the approved texture. Allow surface to completely dry and sawcut all marked expansion joints if plastic joints are not used.

D. Finish:

1. Spray apply Acrylic Finish Coat color to entire application to a uniform color. When dry, remove all protective materials from adjacent surfaces. When dry, scrape surface with scrapers to remove loose cement.

E. Protection

1. Restricted access and protect acrylic deck coating during the period of installation. No traffic to be allowed on acrylic deck coating for at least 48 hours after installation.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES AND BOND COAT

- A. Clean base surfaces of projections, dust, loose particles, grease, bond breakers, and foreign matter; make sufficiently rough to provide a strong mechanical bond. Sandblast, acid etch, or waterblast to achieve appropriate profile. If acid etching, surfaces must be neutralized and powerwashed prior to proceeding. Do not apply cementitious finishes directly to the surfaces of masonry or concrete that is coated with any acidic solution compound or similar agent until compound or agent is completely removed by water blasting. Thoroughly wash entire surface with 2,000 psi high-pressure water immediately prior to application of finishes. Wet cementitious base surfaces with a fine fog water spray to produce a uniformly moist condition and check screeds, pool equipment, and accessories for correct alignment before work is started. Do not apply finish materials to base surfaces containing frost. Install temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.
- B. Prepare and clean concrete surfaces by removing oil or grease. Repair all cracks, surface damage as required prior to proceeding. Protect or mask all adjacent surfaces that are not scheduled to receive cementitious finish. If expansion or construction joints exist in the areas where cementitious finish will be applied cover plastic joints for protection (if plastic joints are used). Additionally, mark joints for saw-cutting if area will be saw-cut.
- C. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering.
- D. Contractor to thoroughly verify the site conditions prior to the application of cementitious finish. Verify concrete is free of ridges and sharp projections. Verify that all concrete surfaces that are to

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

3.02 APPLICATION OF CEMENTITIOUS FINISH

A. General

1. Confirm all application requirements with the manufacturer. Apply finish plaster to the properly prepared substrate at the minimum thickness required by the manufacturer, but no less than 3/8 inch thickness at any location. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:
 - a. Place cone on level, dry non-absorptive base plate.
 - b. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release all air bubbles.
 - c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.
 - d. Place cone in a vertical position adjacent to freed plaster sample suing care not to jiggle base plate.
 - e. Lay straightedge across top of cone being careful not to vibrate cone; measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.
2. All mixing of materials and application procedures shall be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative shall visit the site to verify field conditions, confirm materials and application requirements and ascertain that all materials and systems are so installed. Documentation shall be provided to this effect.

B. Workmanship

1. Unless otherwise required by the manufacturer, apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another. Finish proprietary plaster as required by the manufacturer.
2. All cementitious finishes shall be applied by a licensed applicator as approved by the manufacturer.
3. Waterproofing system shall be provided with a manufacturer's warranty of no less than 10 years.

C. Curing

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

D. Patching, Pointing, and Cleaning Up

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

3.03 PRE-FILL SPECIFICATION

- A. Contractor shall employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date, and shall employ a swimming pool experienced water chemistry consultant to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of water filling. Refer to section 13150 for water filling requirements.
 1. Have on hand quantities of the chemicals as determine above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid are in addition to standard bromine/chlorine products and alkalizer/pH control products required elsewhere.
- B. The pool(s) shall not be plastered until directed by the Owner's representative and the filtration system and chlorination system are complete and ready for start-up. The Contractor shall supply all chemicals required for treatment of the pool water.
- C. The Contractor shall submit domestic water analysis to the Owner and/or Architect at least 2 weeks prior to filling the pool(s).

END OF SECTION 13153/131104

SECTION 13154

SWIMMING POOL TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. The cementitious pool finish shall have ceramic tile markings and trim at locations including the, vertical tile band, stair nosings, recessed wall steps, depth markings, wall targets, floor lane markings and all other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- B. The CONTRACTOR shall furnish and install the work of this section.

1.03 RELATED SECTIONS

- A. Section 13150 - Swimming Pool
- B. Section 13153 - Swimming Pool Cementitious Finish

1.04 QUALITY ASSURANCE

- A. Reference Standards: Conform to the following standards unless otherwise required herein.
 - 1. American National Standards Institute (ANSI)
 - a. Requirements: Subsurfaces and Preparations by Other Trades.
 - b. A108.02 – General Requirements: Materials, Environmental, and Workmanship.
 - c. A108.1, Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.
 - d. A108.1C – Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry Set or Latex-Portland Cement Mortar.
 - e. A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - f. A108.6 – Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy for the Epoxy Grouting Installation Process.
 - g. A108.10 – Installation of Grout in Tile Work.

- h. A108.13 – Installation of Load Bearing, Bonded, Waterproof Membranes for Thin Set Ceramic Tile and Dimension Stone for the Waterproofing Membrane Installation Process
 - i. A137.1 Standard Specifications for Ceramic Tile.
 - 2. American Society for Testing and Materials (ASTM)
 - a. C144-99, Aggregate for Masonry Mortar
 - b. C150-00, Portland Cement
 - c. C171-97a, Sheet Materials for Curing Concrete
 - d. C206-97, Finishing Hydrated Lime
 - e. C207-91 (R1997), Hydrated Lime for Masonry Purposes
 - f. F-1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - g. F-2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes
 - 3. Tile Council of North America (TCNA); 2013 Edition, Handbook for Ceramic Tile Installation.
 - 4. International Standards Organization (ISO)
 - a. ISO 13007 – Part 1: 2004 Ceramic Tiles – Grouts and adhesives; specifies the value of performance requirements for all tile adhesives.
 - b. ISO 13007 – Part 2: 2005 Ceramic Tiles – Grouts and adhesives; test method for adhesives.
 - c. ISO 13007 – Part 3: 2005 Ceramic Tiles – Grouts and adhesives; terms, definitions and specifications for grout.
 - d. ISO 13007 – Part 4: 2005 Ceramic Tiles – Test methods for grout.
 - 5. American Concrete Institute
 - a. ACI 302 – Guide for Concrete and Floor Slab Construction
 - 6. International Concrete Repair Institute (ICRI)
 - a. Concrete Surface Profile (CSP)
 - B. Tile installers shall have two years experience in similar pool projects which the Owner may require written proof thereof and proper tools to install tile.
- 1.05 MANUFACTURERS
- A. Subject to compliance with requirements provide ceramic tile, mortar and grout of the following manufacturers: American Olean Tile Co. (tile), Dal-Tile Co. (tile), Buchtal (tile), KlinkerSire (tile), Mapei Corp. (thin-set, waterproofing, grout and admixtures), and Laticrete International Inc. (thin-set, waterproofing, grout and admixtures) or approved equal.

1.06 SUBMITTALS

- A. Submit shop drawings indicating tile layout, patterns, joint layout, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details.
- B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.
- C. Samples:
 - 1. Mount tile and apply grout on 24 x 24 inch backerboard to indicate pattern, color variation and grout joint size variations of each pattern. Furnish mounted tile samples as requested by the architect/owner.
- D. Submit manufacturer's installation instruction.
- E. Submit maintenance data.
 - 1. Include recommended cleaning and stain removal methods, cleaning materials.

1.07 PRODUCT DELIVERY AND STORAGE

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

1.08 JOB CONDITIONS

- A. Inspect and verify job conditions. Report all defects in base surfaces for correction before proceeding.
- B. Maintain a temperature range of 40 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average an temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.
- C. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

1.09 COLORS

- A. Colors to be selected by the Architect/Engineer. Note that swimming pool regulations may dictate color selections within the pool tank. See 2.01 Tile Materials for price group breakdowns.

1.10 WARRANTIES

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

- B. All setting materials shall be provided by the same manufacturer. All mixing materials and application procedures shall be done in accordance with manufacturer's recommendations and requirements. Documentation shall be provided to this effect by the contractor with verification from the manufacturer. This documentation shall be included in the operations and maintenance manual under warranties as documentation qualifying the project for a 15 Year Systems Warranty by Laticrete International, Inc., Mapei, Inc. or approved equal.
- C. The CONTRACTOR shall agree to repair or replace any work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

PART 2 - PRODUCTS

2.01 TILE MATERIALS

- A. Standard grade conforming to ANSI A137.1. Provide trimmer units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors shall be as indicated and specified, colors of approved shades. Mesh mounted or perforated paper backed tile is not allowed where the mesh of paper remains as a permanent part of the installation. If dot mounting is used, a minimum of 67% of the depth of the tile shall be free from any dots to ensure proper grout curing.
- B. All tile shall be "frost-proof" and suited for an outdoor pool installation in a freeze/thaw climate.
- C. Unglazed Ceramic Mosaic Tile
 - 1. Slip-resistant porcelain unglazed ceramic mosaic tile, cushion or all-purpose edges, two inch square from price group 2 for floor, walls, and stair treads unless otherwise noted. Minimum dynamic coefficient of friction shall be 0.42 for wet surfaces and 0.65 for ramped surfaces. Where (special shapes) are required they shall be selected from price group 3. Equivalents provided by Knoxite, Dal-Tile or American Olean. For wet surfaces: Buchtal Chroma Mosaics with front mount film (seven color options) 2x2 7161HVF or American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3. For ramps: Buchtal Chroma non-slip mosaics with glass fiber net (four color options) 2x2 7161H. Or for wet surfaces or ramps: Buchtal Chroma non-slip 5x5 32020H thirteen color options) or Dal-Tile or American Olean Unglazed color-body mosaics 2"x2" with 7.5% abrasive grain (7 color options). All colors to be selected by the architect.
 - 2. Ceramic tile band below the pool gutter lip, crown detail at stairs, and recessed steps shall be selected by Architect from Dal-Tile, Keystone Unglazed Mosaic, 2" x 2" price group 4, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 1-3, or powder glazed 2x2 Buchtal Chroma Mosaics provided by Knoxite.
 - 3. Contrasting ceramic tile nosings at pool stairs, recessed steps, underwater bench, underwater shelf, shall be selected by the Architect from Dal-Tile, Keystone Unglazed Mosaic, price group 3 and 4, American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3, or Safety Edge Tile from Inlays, Inc.; Black CPC00022, Blue CPC00021.
 - 4. 4" wide contrasting ceramic tile stripe and 12" lane markers on the pool floor shall be selected by Architect from Dal-Tile, Keystone Unglazed Mosaic, 2"x2" price group 3, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 3, or from Knoxite, as 4x4 Buchtal Chroma Colors 22010H-717, 5556 Grey Black and 5535 Blue or 2x2 Mosaic 7160HVF 5535 Grey Black. The main race course wall targets and lane markers shall be black. The cross course wall targets and lane markers shall be midnight blue.

- D. Handhold Tile at pool perimeter shall be provided as C701 available from Dal-Tile.
- E. Provide tile trim units where indicated or necessary for a complete and finished installation. Provide rounded units for external and internal corners and angles. Provide trim units of material and finish identical to the adjoining tile. Provide SCR/L701 units where the C701 hand hold is interrupted to permit draining. Contractor should request via non-standard production. The SCR/L701 units are available through DalTile at 314-997-6970 or 1-800-672-2086.
- F. Message Tile and Depth Markings
 - 1. Horizontal and vertical depth markings and warning signs shall be 6" x 6" with 4" high numbers and letters. All horizontal depth markers shall be slip resistant.

2.02 SWIMMING POOL TILE SETTING MATERIALS AND INSTALLATION

A. Surface Preparation

- 1. Surface preparation shall be in accordance with ACI 302. The surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards 7 to 9 for acceptable profile height). Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations.

B. Slurry Bond Coat

- 1. Horizontal surfaces to receive a thick bed mortar application shall be installed over a slurry bond coat of either Laticrete 254 Platinum one-step, polymer-fortified, thin-set mortar, or Mapei 4:1 bag mix with Planicrete AC Additive over a clean concrete slab, in compliance with ANSI A108.1A (2.2 & 5.2). As manufactured by Laticrete International, Mapei, Inc., or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.

C. Mortar & Leveling Beds

- 1. **Bonded Thick Bed Method (Floor / Horizontal Surfaces):** Provide a dry pack, thick mortar bed on horizontal surfaces consisting of either Laticrete 3701 Fortified Mortar Bed, or Mapei, 4:1 bag mix with Planicrete AC Additive. Apply over a properly prepared slurry bond coat. Maximum lift thickness not to exceed 2".
- 2. **Render- Scratch and Float Coats (Wall / Vertical Surfaces):** Provide wall render (scratch and float coats) on vertical competition turning surfaces to a depth of 4 feet below the water surface, consisting of either Laticrete 3701 Fortified Mortar Bed, or Mapei, 4:1 bag mix with Planicrete AC additive for lift thicknesses up to ½". Wall render is made to a plastic consistency when used vertically. Fill all holes and bring surface up to line and plane as required. As manufactured by Laticrete International, Mapei, Inc. or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat. (Refer to Course Length Tolerances for competitive pools.)

D. Tile Grout

- 1. Use either Laticrete Spectra LOCK Pro Premium Grout or Mapei Kerapoxy CQ Grout in accordance with the manufacturer's requirements as manufactured by Laticrete International, Mapei, Inc. or approved equal.

E. Elastomeric Sealant

1. Use Laticrete Latasil sealant for all inside/outside corners, expansion/movement joints, and to seal lighting/plumbing fixture penetrations. Apply sealant over Latasil 9118 primer. All primer and sealant installation shall be in accordance with the manufacturer's requirements. As manufactured by Laticrete International, Inc., or approved equal.
- F. All mixing and application procedures shall be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative shall visit the site to verify field conditions, confirm materials and application requirements and ascertain that all materials and systems are so installed. Documentation shall be provided to this effect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Complete water tightness test prior to tile installation. Concrete tank shall be watertight per ASTM D5957, the Tile Council of North America, and specification 13150.
- B. Clean substrates of dust, dirt, oil, grease and deleterious substances and mechanically roughen concrete and shotcrete for bond. Conform to applicable reference standards and to recommendations of manufacturers of materials used and meeting ICRI, CSP of 2-3
 1. Dampen concrete substrate to receive tile work according to above referenced standards or tile manufacturer's instructions, as required.
- C. Substrates to receive thin set tile applications shall meet normal construction tolerances of 1/4" in 10' where competition tolerances do not apply, and shall meet competition tolerances where required elsewhere in these specifications, and shall be free of bumps, dips and surface irregularities that may effect the satisfactory installation of the tile.
- D. Tile Wetting
 1. Dampen tile according to above reference standards or tile manufacturer's instructions, as required.
- E. Screeds
 1. Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.02 TILE INSTALLATION

- A. Arrange tile according to patterns detailed. Set tile with flush well-fitted joints, finished in true planes, plumb, square, joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts.
- B. Follow Tile Council of North America installation methods P601 and B417 to achieve total tile system thickness for thin or thick-set.
 1. Thick Set
 - a. Apply specified setting bed mortar, up to 2" in thickness, on cured and dried concrete pool shell. Tamp and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 3/32" to 1/8" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of

each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust any out-of-line or out-of-level tile.

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

- D. Grout Joint Sizes

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

- E. Ceramic Tile Joint Grouting

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

- F. Expansion Joints

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

- G. Fill and Empty Rates

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

3.03 TESTING AND INSPECTION

- A. Before filling of the pool, and its subsequent provisional acceptance at substantial completion, the tile installation shall be visually inspected and sounded in the presence of the Architects and/or the Owner's representative to verify adhesion of the tile to its substrate as well as its overall compliance with the requirements of this Section.
- B. Any and all tile work found to be loose, improperly adhered, out of plane, misaligned or otherwise non-conforming shall be removed and replaced at no additional cost to the Owner.

3.04 CLEANING

- A. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile shall be cleaned with pH neutral solutions, free of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.
- B. Leave finished installation clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.

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

3.05 REPLACEMENT TILE

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

END OF SECTION 13154

SECTION 13155

WATERSLIDES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 - specification sections, apply to the work specified in this section.

1.02 SUMMARY

- A. Furnish all labor, material, equipment and services for installation of the fiberglass waterslide(s) including all foundations, anchor bolts and support structure.
- B. The outdoor open flume waterslide shall have an approximate slide length of 181.4 lineal feet at the centerline, a vertical drop of approximately 25.5 feet and consist of multiple turns, entry sections and straight sections as shown on the project plans.
- C. The outdoor closed flume waterslide shall have an approximate slide length of 170.2 lineal feet at the centerline, a vertical drop of approximately 25.5 feet and consist of multiple turns, entry sections and straight sections as shown on the project plans.
- D. **Alternate AA#1** - The outdoor Bowl Slide shall have an approximate slide length of 153.4 lineal feet at the centerline, a vertical drop of approximately 54.9 feet and consist of multiple turns, entry sections and straight sections as shown on the project plans.
- E. Provide minimum interior cross section, 36-inch-wide x 28-inch-deep, with the side riser on the outside of curves forming a 230 degree enclosure. Splashguards on the outside of slide high wall, as necessary, must be an integral part of slide section. Bolt-on sections are not permitted.
- F. Design, furnish and install foundation system, structural supports and all other related work to meet specified and indicated criteria.
- G. Furnish and install fiberglass waterslides as indicated on the Drawings, specified herein, and as necessary for proper completion including, but is not necessarily limited to:
 - 1. All fiberglass flume components.
 - 2. All flume structural support systems including foundations and support columns.
 - 3. All tower, platforms, stairways and related supports.
 - 4. Installation supervision, ride testing and certification.
 - 5. Labor, materials and equipment to complete the installation.
 - 6. Operations and maintenance manuals.
 - 7. On site startup training.
 - 8. Proper signage as required.

H. Related work specified elsewhere

1. All demolition and repairs to decks, fences and landscaping.
2. Construction of concrete drilled pier or spread footer foundations, columns and flatwork as required.
3. All electrical works, buildings, permits and modifications if any to the pool.
4. Supply and installation of mechanical equipment and pool piping as necessary for slide operation.

1.03 QUALITY ASSURANCE

- A. Supplier shall demonstrate their specific experience and competency in the manufacturing and installation of waterslides.
- B. The supplier shall have completed at least five installations comparable to the system specified herein within the last 5 years. Submit a list of such projects with name, address and current telephone number of the Owner's operator and Architect of Record to the Architect with bid on bid date.
- C. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligation of the contract and to complete work described or if bidder does not have the qualifications stated herein.

1.04 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

- A. In addition to complying with all applicable codes and regulations, comply with pertinent recommendations contained in:
 1. Waterslide flumes shall comply with "WWA Considerations for Operating Safety", 1989, as published by the World Waterpark Association.
 2. "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 3. "Code for Welding in Building Construction" of the American Welding Society.
 4. "Specifications for Architecturally Exposed Structural Steel" of the American Institute of Steel Construction.
 5. "Manual of Standard Practice for Detailing Reinforced Concrete Structures", Publication ACI 315-92 of the American Concrete Institute.
 6. "Structural Concrete for Buildings", Publication ACI 301-96 of the American Concrete Institute.
 7. "ASTM" requirements for all steel components, of the American Society of Testing Materials.
- B. Where provisions of pertinent codes and standards conflict with this specification, the more stringent shall govern.

1.05 COORDINATION AND CLARIFICATION

- A. Coordinate with other trades affecting and affected by work in this section.
- B. The CONTRACTOR must establish with the selected waterslide installer and with other trades having related work in this Section that all work necessary to complete the installation is included in his bid to the General Contractor. Further the waterslide supplier in his bid to the CONTRACTOR will list specifically those items of related work not included in his proposal.
- C. When in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, the CONTRACTOR and/or supplier shall notify the Architect and request a clarification prior to the bid date.

1.06 CONTRACTORS ALTERNATIVE PROPOSAL

- A. Suppliers to submit their bid based on materials, equipment and methods as specified in this section. Any substitutions of material, equipment or method must be submitted in accordance with the specified procedure described in Division 1. Any required changes to the construction documents shall be described in writing and any costs or changes must be included in the price quoted to complete the installation.

1.07 SUBMITTALS

- A. Division 1 requirements.
- B. Shop Drawings
 - 1. Provide a complete set of checked shop drawings required to fabricate and assemble all systems that is signed and sealed by a Licensed Professional Engineer in the State of Florida.
 - 2. Statements
 - a. Furnish the Owner with copies of all permits and receipts for fee payments.
 - 3. Test Reports
 - a. Submit a sample form of any performance test reports that will be used by the installer following slide erection, prior to beginning slide installation.
- C. Include complete product data indexed, tabbed and referenced to specifications.
- D. Include complete shop drawings, directly from the manufacturer at appropriate scale, illustrating the fabrication and installation of the waterslide and support structure.
- E. Submit engineering design calculations that are prepared and sealed by a Professional Engineer licensed in the State of Florida, with shop drawings for waterslide layouts, structures and footings. Provide rough-in information for interfacing mechanical and electrical work. Shop drawings shall include plans, elevations, cross sections, details, sleeves, inserts and anchors to be cast into concrete, and calculations required to construct the waterslide and associated feature footing structures. Structural drawings shall clearly identify all reinforcement, construction joints, embedded items including waterstops, excavation lines and finish concrete elevations, under drainage requirements, under drain routing, clean out locations and location dimensions of all accessory items provided under this section. A licensed professional engineer shall utilize existing soils and geotechnical data in the preparation of the structural design criteria. Provide all design calculations and support data required to show compliance with performance requirements specified, including design assumptions concerning element restraint. All calculations shall be certified and sealed by the licensed professional engineer. Provide a design in response to actual site conditions.

- F. Installation of the waterslide and associated feature footings shall not commence until detailed plans and specifications are approved by the department of Building and Safety. The responsibility for all costs associated with obtaining such approval shall be part of the General Construction contract.
- G. Specify water supply requirements and required pump characteristics to Architect, for approval, prior to preparation of fabrication drawings.
- H. Guarantee / Warranty
 - 1. All work of this section shall be warranted against all defects of material and/or application for a period of one (1) year from date of acceptance. Any failures that may occur within this warranty period, due to defective installation and/or materials, shall upon written notification of such failure be immediately repaired or replaced.

1.08 MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

- A. Submit six (6) bound volumes of complete operating and maintenance instructions covering all installed equipment. Include wiring diagrams, lubrication and user maintenance instructions.
- B. Include manufacturer's recommended maintenance schedule, parts lists, piping diagram and troubleshooting information.
- C. Include one set of approved submittals as a part of each O & M manual.
- D. Certification letter: Provide a certification letter from the slide manufacturer to the owner stating that the slide has been installed properly and is functioning according to the slide manufacturer's recommendations.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers and crates with all labels intact and legible.
- B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- C. Handle materials in a manner to prevent damage.
- D. Store all materials on clean raised platforms with weather protective covering when stored outdoors. Provide continuous protection of materials against damage or deterioration.

PART 2 - PRODUCTS

2.01 SLIDE CONFIGURATIONS

- A. The preliminary slide layouts have been developed utilizing a slide path design provided by WhiteWater, Columbus, OH 614-485-9500 or 800-775-4337

2.02 FIBERGLASS FLUME SLIDE COMPONENTS

- A. Fiberglass Laminate Materials
 - 1. Gel Coat

- a. Interior gel coat shall be high quality isophthalic polyester with U.V. inhibitors. 18 to 20 mil thick ride surface, 20 mils exterior coating. Translucent fiberglass shall also have exterior UV protection clear coat.
 2. Resins
 - a. Thixotropic promoted low profile polyester resin with alternate layers of continuous roving chop and 18 oz. woven roving.
 3. Structure
 - a. Fiberglass lamination with sandwich panel centerline reinforcement. Standard flume section shall be 3/16 inch thick, minimum weight 20 oz. per square foot. Flanges shall be minimum 1/4 inch thick and extend at least 4-3/4 inch from the slide surface, "L" type.
 4. No fill material to fiberglass slide other than aforementioned products shall be allowed without written approval prior to erection.
- B. Joints, Connections and Seams
1. Flume to flume joints shall be fastened with 3/8 inch stainless steel bolts, washers (2 per bolt) and self-locking nuts.
 2. Flume to support system connections shall be made with galvanized hardware, and shall be connected separately from waterslide section connections to the exterior flange of the flume.
 3. All connections shall be external to flume interior. No connection, hardware or penetration shall be made to flume interior.
 4. Fiberglass joint connections shall be made using waterproof, non-shrink caulking with suitable adhesion to fiberglass. Silicone sealants will not be permitted. The slide manufacturer shall supply caulking material.
 5. Using fiberglass over seams within the riding surface is not permitted. 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.
- C. Color
1. Shall be integral to the fiberglass. The color shall be selected by the Architect and Owner from all available colors submitted with the bid in the form of color chart or color chips. Color variations within the inside and outside of slide shall be an option to the Owner.
- D. Waterslide shall be furnished with the following components:
1. Entry tray shall be pre-plumbed for water injection down stream of the rider entry point. Rider entry area shall be a non-skid surface, with no steps permitted.
 2. Waterslide shall be constructed so that water loss does not occur. Risers or built-up sections are required for ride safety and to control water loss, shall be provided on all curved flume sections. Risers shall be integral to the flume, and bolt-on sections will not be acceptable.
 3. Riser ends to provide a smooth transition at the beginning and ending of each riser shall be provided integral to the flume section.

4. End of each slide runout shall be complete with an end cap, at least 1'-6" long, and flush with the sides of the runout. An adjustable PVC or fiberglass weir shall be installed per the drawings at the end of the runout so that flow into the main drain below the end cap can be controlled.
5. Pool entry section shall provide a smooth finished end piece, which provides safe pool entry and masks any hardware or connections to the pool.
6. Factory pre-drilling of all sections.
7. Waterproof joint sealant
8. Stainless steel assembly hardware

2.03 FLUME SLIDE STRUCTURAL SUPPORT SYSTEM

- A. The flume support towers, tower foundations and stair systems shall consist of all elements necessary to safely and securely support the fiberglass flume or tube from starting platform to the plunge pool and consist of:
 1. Concrete footings and foundations, including excavation, backfill and compaction.
 2. Concrete/Steel support columns.
 3. Structural steel tower and stair system.
 4. Guard railing, balustrades and handrails shall be painted galvanized steel tubing. Stainless steel railings are acceptable.
 5. All connecting hardware.
- B. Design of all slide supports and footings shall be certified by a Licensed Structural Engineer in the State of Florida. Design shall accommodate the local soil conditions as indicated, and the stresses generated by the water flume ride during use.
- C. Concrete
 1. Cast-in-place
 - a. Minimum compressive strength shall be 3,000 psi at 28 days. Maximum size aggregate shall be $\frac{3}{4}$ inch. Slump shall not be more than 3 inches. Concrete shall be vibrated but not excessively so as to cause segregation of materials. Check all applicable drawings for locations of block-outs, anchors, inserts, etc. before concrete is placed.
 2. Reinforcing Steel
 - a. $F_y = 60,000$ psi min. for: ASTM A615 (deformed bar) or equivalent. ASTM A82 (welded wire fabric) or equivalent.
 3. Unless otherwise noted, concrete cover to reinforcing shall be as follows; Footing 3 in. and walls, pedestals and columns 1 $\frac{1}{2}$ in.
 4. All concrete procedures to conform to latest ACI Building Code.
 5. Steel reinforcing lap splices for concrete slab shall be a minimum of #6 bar diameter.

D. Structural Steel

1. Shall consist of radial arms with end yoke type fastening assembly for each support point. (Note: A central column support with radial arms may be used to support circular sections of 180 degrees or greater.)
2. Structural steel shall be new material of sizes and shapes listed in current AISC handbooks and as indicated on drawings.
3. Shapes and plates
 - a. ASTM A36 or equivalent minimum $F_y = 36,000$ psi (248.2 MPa)
4. Square structural section
 - a. ASTM A500 minimum $F_y = 46,000$ psi (317 MPa).
5. Round steel pipes
 - a. ASTM A53 Grade B minimum $F_y = 35,000$ psi (241.3 MPa).
6. Cast steel: ASTM A27 minimum $F_y = 35,000$ psi or equivalent.
7. Tension rods, bolts and anchor bolts: ASTM A36 minimum allowable tensile stress $F_t=19,100$ psi (131.7 MPa).
8. Structural bolts
 - a. ASTM A325, friction type or equivalent minimum allowable shear stress, $F_v=21,000$ psi (144.8 MPa). Minimum allowable tensile stress, $F_t=44,000$ psi (303.4 MPa).
9. Welding electrodes
 - a. E480XX electrode (E70XX). Minimum allowable shear stress, $F_v=21,000$ psi (144.8 MPa).
10. Grout
 - a. Masterflow 713 or approved equal non-shrink, non-metallic grout. Use as recommended by manufacturer.
11. All plates, shapes and tubes in contact are to be welded with $\frac{1}{4}$ inch minimum fillet welds all around unless otherwise indicated.
12. Unless otherwise noted all steel structure shall be galvanized.
13. CONTRACTOR shall supply temporary bracing to take care of all loads on the structure during erection to ensure the safety of the structure, leave as long as it is required, and remove when safety is assured.
14. All flumes and support arms shall be properly set and installed prior to installation of permanent column bracing. Additional column bracing as required by the engineer, in addition to those noted on the drawing, shall be provided upon site inspection.
15. All hollow structural sections shall be closed airtight with end plates sealed with welds.

16. All steel shall be thoroughly cleaned of all loose mill scale, loose rust, oil and dirt.
17. Surface to be welded shall be free from loose scale, rust, paint or other foreign matter. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by other approved methods.
18. Fabrication and erection shall conform to the latest editions of the ASTM Specifications and Code of Practice; welding shall be done by welders certified with AWS-D-1.1
19. Equivalent structural steel sizes listed in current AISC or CISC Handbook may be used upon approval of the Architect/Engineer.
20. Definitions
 - a. ASTM – American Society of Testing Materials.
 - b. AISC – American Institute of Steel Construction
 - c. CISC – Canadian Institute of Steel Construction

E. Column Systems

1. A single or multiple steel post system shall be used.

F. Starting Towers/Stairways/Railings

1. The starting tower/stairway shall consist of:
 - a. A steel top deck, stair and support system supporting the starting chute for the outdoor slide(s). Guard railing, balustrades and handrails shall be galvanized steel tubing.
 - b. Painted galvanized steel or stainless steel handrails.
 - c. Bracing and structural support (non-corrodible).
 - d. Concrete Foundation, columns and flatwork as required by the design.
2. Design
 - a. An Engineer licensed in the State of Florida shall certify the structure design. Structure shall be sized to handle the user volumes, the height required by the flume length, and the location on the existing topography.
 - b. Stair design shall follow current UBC Code per State Building Codes.
 - c. Coordinate with slide manufacturer.
3. Concrete Footings and Piers
 - a. Shall be designed and constructed to support the design loads.
 - b. All concrete shall have a minimum twenty-eight (28) day compressive strength of 4000 psi.
 - c. All footings shall be on undisturbed soil.

- d. Vertical members shall be on concrete footings, above grade and be secured with flange plates and anchor bolts.
4. Hardware
- a. Steel hardware, ASTM A-7 or A-36 (hot dipped galvanized).
 - b. Bolts, Federal Specification FF-B-SC1.
5. Starting Tower
- a. Starting tower structure shall be constructed of a galvanized steel support deck with a slip resistant finish surface consisting of either a broom finish concrete or vinyl tread inserts. Coordinate design with building structural engineer and slide manufacturer.
 - b. Awning structure to cover upper slide platform that is designed for local wind loads shall be provided. Awning shall be high density knitted polyethylene cloth, with an epoxy painted steel frame to support the structure. Bottom of awning shall be no less than 7.6 feet above platform. Awning color shall be selected by Architect.
6. Stairs and Railings
- a. Prefabricated stairway sections shall include stringers constructed of painted hot dip galvanized steel. Stair treads and landings shall be of non-corrosive and impervious fiberglass or vinyl with appropriate non-slip surface. Colors to be chosen from waterslide manufacturer color chart. Stairway systems, handrails and guardrails shall comply with all applicable codes.
 - b. Rail system shall be a minimum of 42 inch high at any point, including height above starter tub section, non-climbable and designed to prevent accidental exit. Guard railing, balustrades and handrails shall be painted galvanized steel tubing. Handrails shall be provided to meet all code requirements. Color selection by Architect/Engineer and Owner.
 - c. Railing must surround top platform on all sides (except at slide start area). Railings must be provided along stair section and continue from the top platform area, down to the bottom of the finish deck.
 - d. Stair system from finish deck to top platform shall be a minimum of 48 inches in clear width.
 - e. A chain with removable self-closing hook and sign labeled "CLOSED" shall be provided across the entry of each waterslide at the top of the waterslide platform.
 - f. A swing gate with self-closing hook and sign labeled "CLOSED" shall be provided across the stair entry point on the deck of the waterslide.
 - g. Rules Signage: Provide two (2) rules signs with all manufacture's recommended waterslide rules. Mount one sign at the top platform and one (1) at the stair base. Both slide rule signs shall be clearly visible to the slide users.
7. Finish
- a. All ferrous metal parts (All steel components of waterslide are to be factory painted with field touch-up as required.)
 - 1) Surface Preparation

- a) Blast all surfaces to be coated to the extent of an SSPC-SP6 commercial-grade level of cleanliness. Create a 1.5 – 2.0 mil profile and prime before any rust bloom forms on the surface.
- 2) Primer
 - a) Spray apply in the shop, one full coat of Tnemec Series 90-97 Aromatic Urethane Zinc-Rich or Amercoat 68 HS primer to a DFT of 4.0 mils. Allow to cure as per data sheet (4 hours at 75 deg. F.) before applying top coat.
- 3) Top Coat
 - a) Spray apply in the shop one even finish coat of Tnemec Series 74-Color Endura-Shield. Acrylic Polyurethane or Ameron PSX-700 finish to a minimum DFT of 5.0 mils. Allow to cure as per data sheet (6 hours at 75 deg. F.) before handling/loading in the shop.
- 4) Field Touchup
 - a) If the broken area of the shop applied film is rough from scaring, disc-abrade that area smooth and then solvent clean it as per an SSPC-SP1, level of cleanliness. Brush or roller apply one coat of Tnemec Series 135 Chembuild or Ameron epoxy primer. Allow to cure as per data sheet. Brush or roller apply one coat of Tnemec Series 74 or Ameron PSX-700 shop applied color to bring the film up to specification thickness.
- b. Fiberglass handrail posts
 - 1) Finish
 - a) Tnemec Series 74 or Ameron PSX-700 shop applied at 5.0 mils DFT.
 - 2) Field Touchup
 - a) Tnemec Series 74 or Ameron PSX-700 shop applied at 5.0 mils DFT.
 - 3) Manufacturer
 - a) Tnemec 816/483-3400 or Amercoat 800/244-0025 or pre-approved equal.
- c. Piping
 - 1) All above grade plumbing to be Schedule 80 PVC, unless otherwise noted. Refer to drawings for sizes and connection details.
 - 2) All above grade waterslide piping to be painted to match waterslide tower color. Paint and primer to be approved for painted PVC application. Primer to be Pro Shield Waterborne Primer/Sealer (05-208) as manufactured by Columbia Paint & Coating; paint to be Industrial Acrylic DTM Polyurethane (05-502) as manufactured by Columbia Paint & Coating or approved equal. Contractor to confirm color with Architect on site prior to painting.
- d. Top deck and landing shall have a non-slip finish.

- e. The stair system and treads shall consist of galvanized steel pans with vinyl tread inserts. The stair treads shall be concrete fill galvanized steel pans with brushed concrete finish. All stair treads and platform shall have a slip-resistant finish.
- f. All exposed concrete vertical surfaces shall have an exposed aggregate finish.
- g. Seal all concrete with a minimum of two (2) coats of H&C silicone acrylic concrete sealer, FLR Paints, Inc., 6104 31st St., East, Bradenton, FL.
- h. Colors shall be as selected by the Owner and Architect/Engineer.

PART 3 - EXECUTION

3.01 SYSTEMS INSTALLATION

- A. The waterslide installer shall assemble and install all equipment, special parts and accessories in accordance with these specifications and detailed layouts and shop drawings of equipment supplier.
- B. Installer shall furnish and install all anchors and inserts to be imbedded including all fittings, inserts, structure sleeves and required anchorage.
- C. Install all equipment and systems in accordance with manufacturer's directions.
- D. The waterslide shall be as described in the specifications. Items are detailed and specified as a guide reference and for dimensional purposes. The CONTRACTOR must make provisions accordingly and submit shop drawings and submittals based on that data.
- E. Installer shall coordinate, supervise and approve work by other trades responsible for work related to this section. All work in this section shall be performed by the waterslide installer except as noted.

3.02 SITE CONDITIONS

- A. Inspection
 - 1. Prior to installation of the work of this section, carefully inspect the installed work of other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that fiberglass slide and structural support systems may be fabricated and erected in strict accordance with the original design, the approved shop drawings and the referenced standards.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Architect.
 - 2. Do not proceed with fabrication or installation in areas of discrepancy until all such discrepancies are fully resolved.

3.03 FABRICATION

- A. Fabricate the waterslide and structural support systems in strict accordance with the approved shop drawings and referenced standards.

3.02 INSTALLATION OF FOOTINGS AND FOUNDATIONS

- A. Foundations shall be installed in strict accordance with the approved shop drawings prepared by Professional Engineer registered in the State of **STATE**.

3.03 WELDING

A. General

1. For details of joints, comply with requirements for AWS joints accepted without qualification tests.
2. Use ASTM A-233, E-70XX series electrodes.
3. Follow applicable sections of AWS specifications.

B. Types of welds unless otherwise noted

1. Make all fillet welds 1/4 inch minimum.
2. Make all butt welds full penetration welds.

3.02 ERECTION

A. General

1. Erect the fiberglass waterslides and structural support systems in strict accordance with the approved shop drawings and all pertinent regulations and standards.

B. Tolerance

1. Align all structural steel straight, plumb and level with a tolerance of 1 in 500.

C. Fiberglass Joints

1. All flange to flange connections shall be made utilizing the waterproof caulking supplied by the fiberglass manufacturer and shall be joined in such a way as to provide for a safe and matless ride. All joints shall be aligned for a completely smooth riding surface, that is, alignment must be within 1/64 inch and in no case shall the downstream side of the joint be above the upstream side of the joint.

D. Steel Finishes

1. Any field welds or scarred surfaces shall be cleaned and cold galvanized with zinc rich paint.

3.03 CLEAN-UP

- A. Upon completion of the work of this Section, immediately remove all fiberglass, debris and rubbish occasioned by this work to the approval of the Architect and at no additional cost to the Owner.

3.04 START-UP AND INSTRUCTION

- A. Supply the services of an experienced operator/instructor after waterslides have been completed and initially placed in operation. During this period, the Owner's representatives who will be operating the pool shall be thoroughly instructed in all phases of the slide operation. Prior to leaving the job, obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and all necessary operating information provided. A minimum of one (1) 2-hour session is required.

3.05 CONCLUSION

- A. It is the intention of these specifications to provide a complete installation of the waterslides as described. All accessory construction and apparatus necessary or advantageous in the operation or testing or high performance of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving the waterslide supplier or installer from furnishing and installing such parts. Any such omission or clarification shall be brought to the attention of the Architect prior to bidding.

END OF SECTION 13155

DIVISION 15 – MECHANICAL

SECTION 15000 - COMMON REQUIREMENTS FOR MECHANICAL WORK

1.0 GENERAL

- 1.01 Scope of Division:** Work shall include all materials, equipment, and labor necessary for a complete and properly functioning mechanical installation in accordance with requirements of the 2007 Florida Mechanical Code and to other pertinent codes made a part of such code by reference and local state codes, and contract drawings and specifications. Work shall be understood to include all work specified in Division 15, Mechanical, section numbers 15000 through 15999, inclusive, of the Specifications.
- 1.02 Drawings:** Architectural and structural drawings take precedence over mechanical drawings with reference to the building construction. Mechanical drawings are diagrammatic and indicate the general arrangement and extent of work. Architectural drawings indicate more exactly the desired relationship between diffusers, registers, lighting fixtures, equipment, electric panels and devices, plumbing fixtures, and other items which remain exposed in the completed buildings. Exact locations and arrangements of materials and equipment shall be determined, with the approval of the Engineer, as work progresses to conform in the best possible manner with the surroundings and with the adjoining work of other trades. Where locations of equipment, devices or fixtures are controlled by architectural features, establish such locations by referring to dimensions on Architectural (A-series) drawings and not by scaling drawings.
- 1.03 Coordination of Work:** Coordinate all work, prior to installation, with work of other trades and with architectural and structural features to preclude interference's between the work of different trades and to insure necessary clearances at crossovers and equipment. Work requiring necessarily fixed locations (e.g., piping with required slopes, lighting fixtures, and diffusers in ceilings, etc.) takes precedence over work not requiring such fixed locations and shall establish permissible routing of services associated with the latter. Should work be performed without adequate coordination so that interference's occur between work of different trades, the Contractor shall eliminate such interference's by requiring necessary rework by the trades involved. Such rework shall meet express approval of the Architect and shall be performed at no addition to the contract amount.
- 1.04 Shop Drawings:** Refer to "General Conditions". Submit to Architect for approval, before commencing work, shop drawings for all mechanical materials and equipment to be provided. In addition, submit other drawings or diagrams, dimensioned and in correct scale, requested by Architect to clarify the work intended or to show its relationship to adjacent work or work of other trades. Contractor is responsible for any delays in job progress accruing directly or indirectly from late submission of shop drawings. Shop drawings shall clearly show the following:
- A. Technical and descriptive data in detail equal to or greater than the data given in the item specification. Indicate all characteristics, special modifications and features. Where performance and characteristic data is shown on the drawings or specified, submitted data shall be provided in a degree which is both quantitatively and qualitatively equal to that specified and shown so that comparison can be made. Present data in detail equal to or greater than that given in item specifications and include all weights, deflections, speeds, velocities, pressure drops, operating temperatures, operating curves, temperature ranges, sound ratings, dimensions, sizes, manufacturers' names, model numbers, types of material used, operating pressures, full load amperages, starting amperages, fouling factors, capacities, set-points, chemical compositions, certifications and endorsements, operating voltages, thicknesses, gauges and all other related information as applicable to particular item.
 - B. Exceptions to or deviations from the contract documents. Should Engineer approve any items having such deviations which are not clearly brought to Architect's attention, in

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writing, on item submittal, then Contractor is responsible for correction of such deviations regardless of when such deviations are discovered.

1.05 Record drawings:

- A. Maintain one extra set of black-line, white print drawings for use as Record drawings. Records shall be kept daily, using colored pencil. As the work is completed, relevant information shall be transferred to a reproducible set, and copies made shall be given to the Architect.
- B. As-built information shall be shown to scale, using standard symbols listed in the legend. As a minimum, show the following:
 - 1. Location of stub-outs, dimensioned from permanent building lines.
 - 2. Location and depth of under-slab and in-slab piping.
 - 3. All routing of piping system.
 - 4. Correct all equipment schedules.
 - 5. Corrected numbers as they appear on the schedules.
 - 6. Corrected motor horsepower electrical data.

1.06 Fees and Permit:

- A. All work done under this Contract shall comply with all State and Local Codes having jurisdiction and with the requirements of the Utility Companies whose service may be used. All modifications required by these codes shall be made by this Contractor without additional charge. Where code requirements are less than those shown on the Plans or in the Specifications; the Plans and Specifications shall be followed. Where applicable, N.F.P.A. requirements shall be met.
- B. The Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction. All fees and costs of any nature what-so-ever incidental to these permits, inspections, and approvals must be assumed and paid by this Contractor.
- C. The Contractor shall comply with all applicable provisions of the Williams-Steiger Occupational Safety and Health Act.

2.0 PRODUCTS

2.01 General:

- A. All materials and equipment shall be new and without blemish or defect.
- B. Equipment and materials shall be products which will meet with the acceptance of the agency inspecting the work. Where acceptance is contingent upon having the products examined, tested, and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested, and certified.
- C. Substitutions: The following paragraphs shall govern should any conflict exist between these "substitution" paragraphs and any other paragraphs of Division 15.

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1. Substituted equipment or optional equipment where permitted and approved, must conform to space requirements. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related systems as a result of substitutions shall be made at the Contractor's expense.
 2. Note that the approval of shop drawings, or other information submitted in accordance with the requirements herein before specified, does not assure that the Architect, or any other Owner's representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved or the ability of the material or equipment involved or the mechanical performance of the equipment. Approval of shop drawings does not invalidate the plans and specifications if in conflict, unless a letter requesting such change is submitted by the Contractor and approved in writing by the Architect.
 3. Substitutions of mechanical equipment for that shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular catalogued item shown in the current catalog of the manufacturer.
 4. If bidder proposes to substitute materials and/or manufacturer's equipment in lieu of those specified, he shall submit written request to the Architect for approval no later than ten (10) days prior to the receipt of bids.
 5. Requests submitted directly to the Owner or to the Architect's consultants and/or verbal requests will not be evaluated.
 6. Should the proposed substitution be accepted, it will be incorporated into the Contract Documents by form of addendum.
 7. All substitutions proposed later than ten (10) days prior to the date for receipt of bids shall not be considered. Any substitution not accepted and any substitution request proposed later than ten (10) days prior to the date for receipt of bids shall not be used as either the basis for bidding or submittal after award of the contract.
- D. Operating conditions and capacities must be as follows:
1. No overloading.
 2. No operation at conditions outside of maximum and minimum limits recommended by the manufacturer and approved by the engineer.
 3. Compatible with all systems.
- E. Unless otherwise specified, all equipment and materials furnished must be as follows:
1. Recommended by the manufacturer for the application.
 2. Installed in accord with the manufacturer's recommendations for the application except where specifications and drawings clearly indicate otherwise.

2.02 Sleeves:

- A. General: Lay out work and set sleeves in new or existing construction so there shall be minimum of cutting, drilling and patching. All sleeves not used during construction

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period shall be sealed using grout. Unused penetrations or sleeves through fire rated barriers shall be sealed to prevent passage of smoke or heat using an Underwriters' Laboratories approved method rated at least equal to the barrier being penetrated. Method submitted must show proof of UL label.

B. Pipe sleeves:

1. Walls and partitions:

- a. Sleeves 8 inch Diameter and Smaller (above grade): Sleeves shall be 18 gauge steel pipe or plastic sleeves built into wall, partition or beam, sized to pass pipe and covering, leaving a clear space of 1/4 inch minimum between covering and sleeve. Penetrations of fire rated barriers shall have 18 gauge steel sleeves.
- b. Floors (above grade): Sleeves shall be Schedule 40 galvanized pipe or plastic, set before floor is poured, sized to pass pipe and covering, leaving a clear space of 1/4 inch between covering and sleeve, and shall extend 1/2 inch above finished floor.
- c. Duct Sleeves: Sleeves or openings sized to pass mechanical ducts and covering shall be of framed construction in roof, wall, or partitions.
- d. Sealing of sleeves:
 1. Sleeves Above Grade: Openings around pipes, duct, etc., passing through sleeves shall be made draft free and vermin-proof by packing solidly with mineral wool or fiberglass.
 2. Sealing Material: Where applicable and recommended by manufacturer, other sealing materials may be acceptable as options to above specified methods. Submit for Engineer approval prior to procurement.

2.03 Floor, Wall, and Ceiling Plates or Escutcheons, in Exposed Areas: Provide escutcheons or fabricated plates or collars at each location where pipe or exposed duct passes through a finished surface. Escutcheons for flush sleeves shall be chromium plated brass and sleeves extending above floor shall be chrome plated brass. Collars or plates for ducts and large diameter insulated pipe shall be fabricated of 18 gauge galvanized copper bearing sheet steel, secured to structure and neatly fitted around duct or pipe.

2.04 Motors: Unless specifically specified otherwise in the section covering the driven equipment (or the equipment drives), motors shall comply with the following:

- A. Three Phase: NEMA design B, three-phase, squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degree C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation material and shall be cast iron, drip proof, horizontal foot mounted type with ball bearings. Two speed motors shall be provided as scheduled and shall be two winding type.
- B. Single Phase: Squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degree C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation materials and shall be two winding capacitor start type with steel enclosure, drip proof, horizontal foot mount and ball bearings.

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- C. Scheduled Horsepowers: The horsepowers scheduled or specified are those nominal sizes estimated to be required by the equipment when operating at specified duties and efficiencies. In the case of pumps, these horsepowers are non-overloading and may also include provisions for future planned impeller changes. If the actual horsepower for the equipment furnished differs from that specified or shown on the drawings, it shall be the Contractor's responsibility to insure that proper size feeders, breakers, starters, etc. are provided at no change in contract price.
- 2.05 Substitutions Involving Electrical Changes:** If the Contractor proposes items which have different electrical and/or control characteristics (such as larger amperage requirements, etc.) than those specified and provided for and/or which otherwise change the electrical and/or control system(s), then (even if the Architect approves such items) the Contractor must correlate all sizes, voltages, amperages and wiring for applicable items so that applicable electrical and/or control changes can be made. Contractor is responsible for all related additional costs. Other coordination is as specified elsewhere.
- 2.06 Belt Drives:** Equip each motor driven machine not directly connected with V-belt drive. Belts shall be of correct cross section to fit properly in sheave grooves and shall be carefully matched for each drive. Sheaves shall be cast iron or steel, bored to fit properly on shafts and secured with keys of proper size. The rating of each drive shall be as recommended by manufacturer for service but shall be at least 1.5 times nameplate rating of motor.
- A. Fan Belt Drives: Fixed pitch sheaves shall be provided.
- B. Speed Adjustments: Adjust fan speed by change(s) in sheave size as necessary to obtain proper design air flow with fan in its installed location. Fans may be first fitted with variable pitch drive until proper fixed pitch drive size, or alternate sizes of fixed pitch drives may be used until proper fan speed is obtained. Provide all drives necessary to obtain proper fan speed needed to deliver necessary air quantity.
- 2.07 Bearings:** All bearings shall be rated for 200,000 hour operating life unless indicated.
- 2.08 Belt and Coupling Guards:** Each belt drive shall be equipped with an OSHA approved guard. Guards shall be constructed of #12 U.S. Standard gauges 3/4 inch diamond mesh wire screen, or equivalent, welded to one inch steel angle frames, and shall enclose all belts and sheaves. Tops and bottoms of guards shall be of substantial sheet metal or not less than #18 U.S. Standard gauge. Braces or supports must not "bridge" sound and vibration isolators. Guards shall be designed with adequate provision for movement of motor required to permit oiling, use of speed counters, and other maintenance and testing operations with guard in place. All direct drive equipment shall have coupling guards in accordance with Florida Department of Business Regulation safety regulations and OSHA.
- 2.09 Painting and Marking:**
- A. Painting: Painting of equipment, pipe, and ducts (insulated or uninsulated) is specified under the "Painting" Division of these specifications. Touch-up of shop coat shall be performed under Division furnishing equipment.
- B. Marking: Refer to Section entitled "Identification of Mechanical Systems".
- 2.10 Access Doors:** Provide as necessary for access to concealed valves, cleanouts, unions, dampers, coils, junction boxes, etc., where no other means of access is shown or specified. Doors shall be manufactured by the Milcor Division of Inland-Ryerson, or an acceptable equal, type as follows:

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<u>Door Location</u>	<u>Door Type</u>
Drywall	Style "DW"
Masonry or tile	Style "M-Stainless"
Acoustical tile	Style "AT"
Plaster	Style "K"
Fire-rated walls	Style "Fire Rated"

Each door shall be equipped with two flush, screwdriver operated, cam latches and, other than Style "M", shall be finished to match adjacent surface. Door sizes shall be applicable to the access required for normal service. See sections entitled "Ductwork" for access doors related to duct systems.

2.11 Excavation & Backfill:

- A. Each subcontractor shall do trench and pit excavating and backfilling inside and outside the building, as required by his work, including shoring and bracing, pumping and protection for safety of persons and property.
- B. Backfill shall be compacted in layers not exceeding six (6) inches in depth. Completed backfill shall conform to surrounding ground and finish grade and with compaction requirements of Division Two of these Specifications:
 - 1. Concrete encasement: Piping passing under footings, foundations and other locations as shown on Drawings shall be encased by eight (8) inches (minimum) concrete on all sides. Concrete shall conform to Division Three requirements.
 - 2. Extend concrete encasement eight (8) inches around piping and twelve (12) inches each side of footings or foundations.
- C. Remove non-usable excavated material from the site. Deposit any usable surplus material on site where directed by the Project Architect/Engineer. Do not remove usable material from site.
- D. Provide and maintain bracing, shoring or sheathing as required to safely support sides of excavations. The Contractor doing the excavation and the Contractor using the excavation are responsible for safety in excavations.
- E. This Contractor shall provide and operate pumping equipment to keep excavations free of water.
- F. This Contractor is responsible for repairing and restoring paving streets, curbs, walks and other work in the area where excavations are made.
- G. Provide additional excavation and backfill where required to resolve conflicts in buried lines.
- H. Coordinate timing of excavations in advance with other trades.
- I. Excavation shall be open cut from the surface.
- J. Hold trench width to a minimum.

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- K. Do not excavate utility trenches parallel to building footings closer than four (4) feet from the footings except by approval of the Project Architect/Engineer. When parallel trenches require cuts deeper than the building footings, the horizontal distance from the footing shall be equal to, or greater than one and one-half (1-1/2) times the vertical distance below the footing, but in no case shall the horizontal distance be less than four (4) feet except by the approval of the Project Architect/Engineer.
- L. Mechanical excavation shall be held to four (4) inches above final grade of the bottom of trench. The remainder shall be shaped by manual excavation, so that piping is fully supported on undisturbed soil. Shoring of piping in trench will not be allowed. Piping must be suspended from above.
- M. Bell joint holes shall be carefully excavated so that none of the load is supported by the bells or joints.
- N. Whenever, in the opinion of the Project Architect/Engineer, the soil is unsuitable for supporting piping and appurtenances, provisions for proper foundations shall be made at no additional cost to the Owner. Soil test reports are bound in the Specifications Book.
- O. The drawings for this project show the anticipated underground utilities. Locations of utilities which will interfere with proposed construction shall be assumed to be a known factor to each subcontractor unless such locations on drawings are in error.
- P. Wherever trenching or excavating, assume utilities may exist in area without such being shown on the drawings. Exercise extreme caution. Should existing facilities be damaged, repair such to Project Architect/Engineer's satisfaction at no additional cost to the Owner.
- Q. Special care shall be taken with excavation in limited distance from existing trees. Manual excavation shall be required.

3.0 EXECUTION

3.01 Electrical and Control Work Coordination:

- A. Definitions: Definitions for the purpose of mechanical/electrical control and power coordination are as follows. (Note: The use of the words, "Provide", "Furnish" and "Install" are intended only for use in describing the coordination indicated by this paragraph 3.01, and do not necessarily have the same definitions when used outside of the context of this paragraph 3.01). Any items which do not fall within the scope of this paragraph 3.01 shall be coordinated as individually specified.
 - 1. "Furnish" means to procure an item and to deliver it to the project for installation.
 - 2. "Install" means to determine (in coordination with others as necessary) the appropriate intended location of an item to set and connect it in place.
 - 3. "Provide" means to both furnish and install.
 - 4. Power Circuit: Circuit which carries main electric power to apparatus to which the power circuit is connected.
 - 5. Control Circuit: Circuit which carries electrical signals directing the performance of a controller but which does not carry the main electric power. (See NEC, Section 430-71). Such circuits shall also include those which serve a dual

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control and power function (e.g., a line voltage thermostat circuit which both activates and powers a small fan motor).

6. Controller: A device, or group of devices, which serves to govern, in some predetermined manner, electric power delivered to apparatus to which the controller is connected and includes any switch or device normally used to start and stop a motor. (See NEC, Article 100, Definitions, "Controller", and Section 430-81(a).)
7. Control Device: A device which reacts to an operating condition (pressure, temperature, flow, humidity, etc.) and which initiates transmission of an electrical control signal which causes operation of a controller or which causes operation of pressure switches, etc.

B. Auxiliary Control Device: A device (such as a low voltage control transformer, electric relay, etc.) which is located in a control circuit and which carries or responds to (but does not initiate) an electrical control signal initiated by a control device.

C. Work of Division 15: includes (but is not necessarily limited to):

1. Provide:
 - a. All controllers which are generally manufactured or shipped as integral with Division 15 equipment (for example, such as starters packaged with packaged equipment, etc.).
 - b. All electric motors and other electrical power consuming equipment (such as electric air heating coils, electric hot water heaters, etc.) which are specified in Division 15.
 - c. All controls specified in Division 15 "HVAC Controls".
 - d. All control circuits (including conduit and boxes) from any Division 16 panels to power utilizing equipment provided by Division 15 and including the necessary circuit breakers.
 - e. All control connections to equipment provided by Division 15.
 - f. All control circuits, including conduit and boxes.
 - g. All control connections to controllers, switches, motors and other mechanical systems electrical power consuming equipment (such as electric air heating coils, electric hot water heaters, etc.).
 - h. Auxiliary control devices.
 - i. All control devices (thermostats, pressure switches, flow switches, humidistats, etc.) and make control circuit connections thereto.
 - j. Any and all electronic and electric control devices and electric or pneumatic connections thereto.
 - k. Provide all starters for all mechanical equipment.
 - l. Provide all disconnects for all mechanical equipment.

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2. Furnish: All controllers. Controllers shall comply with the requirements of applicable sections of Division 16.
- D. Work of Division 16 includes (but is not necessarily limited to):
 1. Provide:
 - a. All power circuits, including conduit and boxes.
 - b. All power connections to controllers, switches, motors and other mechanical systems, electrical power consuming equipment (such as electric air heating coils, electric hot water heaters, etc.).
 - c. All remote motor disconnects (remote from the related controller) at all locations required by NEC and connections thereto except those disconnects which are specified in Division 15 to be provided as part of the equipment itself.
 2. Install: All controllers furnished by Division 15.
- E. Other Requirements:
 1. Interface Coordination: Contractor which supplies the power consuming equipment shall coordinate with actual contract document control and sequencing requirements regarding interface of the equipment with the control system specified in Division 15 and shall provide equipment wiring diagrams for final coordination for actual installation.

3.02 Tests:

- A. General: All systems shall be inspected, tested, given a trial run, and demonstrated to Architect's and Owner's satisfaction that they are complete and ready for operation.
- B. Plumbing Soil, Waste and Vent Piping: Test in accord with standard plumbing code and as otherwise specified.
- C. All Other Piping: Unless required otherwise by code or other divisions of specifications, piping shall be tested at one hundred fifty percent (150%) of normal operating pressure for a continuous 24-hour period without leaking.
- D. Systems - Air Conditioning: Refer to section describing test and balance of system.
- E. Observation of Tests: Contractor shall notify Architect in writing at least two weeks prior to scheduled test(s) and demonstration(s) to allow Architect time to schedule his observation of Contractor's test(s) and demonstration(s).

3.03 Instruction: Refer to "Instruction and Maintenance Manuals" Section.

3.04 Acceptance:

- A. Prior to requesting final inspection:

Complete all work required by drawings and specifications.

Acceptance will be made by the Architect on the basis of tests and inspection of project. Contractor shall furnish necessary mechanics to operate system, furnish test instruments and equipment as required, make necessary adjustments and assist with final inspection.

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- 3.05 Protection of Work Until Final Acceptance:** Contractor shall protect all materials and equipment from damage, the entrance of dirt and construction debris from the time of installation until final acceptance. Any materials and equipment that has been damaged shall be repaired to "as new" condition or replaced at the direction of the Architect. Where factory finishes occur and damage is minor, finishes may be touched-up. If, in the opinion of the Architect, the damage is excessive, factory finish shall be replaced to "new" condition.

END OF SECTION 15000

SECTION 15005 - INSTRUCTIONS AND MAINTENANCE MANUALS

1.0 GENERAL:

- 1.01** Provide complete written and verbal operating and maintenance instruction to the Owner for all mechanical systems.

2.0 DOCUMENTATION:

2.01 Provide two (2) Instructions and Maintenance manuals, each complete as follows:

- A. Hardback three ring loose-leaf binders.
- B. Title sheet with job name, Contractor's subcontractors control subcontractor and related contractor's or material supplier's names, addresses and phone numbers.
- C. Index of contents.
- D. A signed copy of acknowledgment of instructions to the Owner or his authorized representative. Two additional copies of the signed acknowledgment shall be sent directly to the Architect as soon as possible after receipt.
- E. Typewritten operating instructions for the Owner's personnel describing the following for each piece of equipment and systems:
 - 1. How to start and stop each piece of equipment.
 - 2. How to set equipment and systems for normal operation.
 - 3. Normal restarting procedures before contacting the service contractor.
 - 4. Complete description of functions and operations of each piece of equipment including description of how equipment operates in conjunction with automatic control systems.
 - 5. Instructions for cleaning, oiling, greasing, fueling and similar tasks.
- F. Approved shop drawings and submittal data and parts and maintenance booklet for each item of material and equipment furnished under this Division, (but not limited to) the following:
 - 1. Spare parts list and source of supply for each equipment item.
 - 2. List of valves with location, service, size, model and operating position.
 - 3. Diagrams clearly indicating automatic control hook-up.
- G. Any as-built wiring diagrams as called for in other sections of this Division as needed to show how equipment controls interface with related systems.
- H. Contractor's Site Test and Balance report.
- I. Copies of certificates of inspection.
- J. Guarantees.

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3.0 EXECUTION:

- 3.01 Verbal Instruction:** Provide verbal, hands-on, operating and maintenance instruction to Owner's authorized personnel for each equipment item and system. Instruction shall be given by competent personnel.

END OF SECTION 15005

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SECTION 15031 - PIPING: CONDENSATE DRAINS - PVC

1.0 GENERAL

- 1.01 **Work Included:** Condensate drains from cooling coil drain pans to drains.
- 1.02 **Related Work:** Section 15000: Common Requirements for Mechanical Work.
- 1.03 **Submittals:** Submit documents in accordance with Architectural Specifications and Section 15000.

2.0 MATERIAL

- 2.01 **Pipe:** PVC Schedule 40 (DWV); ASTM-D2665-87.
- 2.02 **Fittings:** Solvent - weld socket type PVC, standard weight; ASTM 2466-78.
- 2.03 **Solvent:** As recommended by the pipe manufacturer.

3.0 INSTALLATION

- 3.01 Slope uniformly toward drain.
- 3.02 Provide trap seal having a depth in inches equal to the total static pressure of the corresponding fan system. Provide threaded plug elbows and tees to permit cleaning. The piping shall be the full size of the equipment drain connection or three-quarter inches (3/4") whichever is larger.
- 3.03 Connections to copper drain nipples may be mechanical. Make connections to steel nipples with threaded adapters.
- 3.04 **Routing:** As noted on drawings.

END OF SECTION 15031

SECTION 15050 - REFRIGERANT PIPE, VALVES AND SPECIALTIES

1.0 GENERAL

- 1.01 Scope:** Provide refrigerant piping systems, complete in all respects, between the system components and connected equipment.
- 1.02 Shop Drawing:** Refer to the Section entitled "Common Requirements for Mechanical Work". Provide flow diagram shop drawings of each different type of refrigerant piping system used on this project. Indicate all pipe sizes, accessories, filters, etc.

2.0 PRODUCTS

- 2.01 Copper Pipe:** Refrigerant system piping shall be refrigerant grade, dehydrated and sealed, seamless, uniformly dead soft temper.
- 2.02 Fittings:** Refrigerant grade, wrought copper, long radius, solder joint type.
- 2.03 Flux:** Non-corrosive, specifically designed for silver brazing.
- 2.04 Solder:** Silver brazing alloy (Sil Fos) Fed. Spec. AA-S-561d.
- 2.05 Access Valves:** Schrader type designed for use with quick coupler hose fittings and provided with individual cap.

3.0 EXECUTION

- 3.01 Pipe Sizes:** Refrigerant pipe sizes which may be shown on drawings are nominal. Provide sizes not less than sizes indicated and in compliance with size recommended by the manufacturer(s) at the connected equipment. Provide change in sizes if such change is in accord with manufacturer's recommendations and with Architect's approval. Size piping to maintain minimum velocity of 500-fpm in horizontal lines and 1000 fpm in vertical risers for proper oil return; provide double suction risers and hot gas risers as may be necessary to accomplish this.
- 3.02 Refrigerant Specialties:** Refrigerant valves, driers, expansion valves, and similar items shall be provided with each system. Where refrigerant access valves are not furnished by manufacturer, they shall be field installed to enable charging and checking the system.
- 3.03 Solder Joints:** Cut tubing square using tubing cutters, with sharp cutting wheels, so as not to crimp the tubing ends. Remove all burrs using a pipe reamer and taking care not to flare the ends of the tube. Thoroughly clean the outside of the pipe and the inside of the fitting using a fine sand cloth. Apply non-corrosive paste flux to the cleaned surfaces immediately and apply silver solder and heat in accordance with manufacturer's instructions. Use care not to damage equipment or refrigerant specialty items when making up joints (protect from excessive heat).
- 3.04 Scale Prevention:** During brazing, keep pipe system full of inert gas to prevent scale formation.
- 3.05 Mechanical Joints:** Where the Contractor uses refrigerant tubing sets, follow the manufacturer's installation instructions explicitly, including the use of special tools, when making up the joints. Where precharged tubing and equipment is provided, do not cut into the system to install access valves.
- 3.06 Hangers and Supports:** Refer to any sections of this division entitled "Hangers and Supports", or entitled "Vibration Isolation". Isolate copper tubing from contact with any dissimilar metals.

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- 3.07 Evacuation and Charging:** When other than completely factory charged equipment and piping systems are used, they shall be evacuated and charged as follows: Charge the system with dry nitrogen and refrigerant and leak test all joints including factory piping within the units. Repair all leaks by disassembling and remaking the joint. After all leaks are corrected, evacuate the system to an absolute pressure of 0.2" mercury. System shall hold this vacuum test for two hours with no noticeable rise in pressure. After passing vacuum test, break vacuum twice using refrigerant and re-evacuate for a minimum of two hours each time. Charge the system in the manner and with the type and amount of refrigerant recommended by the manufacturer and in accordance with accepted refrigeration practice.
- 3.08 Protection of Work:** Protect all refrigerant piping systems from damage prior to final acceptance and make repairs to damaged systems at once, completely evacuating and charging as specified herein.
- 3.09 Other Requirements:**
- A. Arrange piping generally as shown and such that service access is facilitated. Keep refrigerant lines as short and direct as possible with a minimum number of joints. Provide sleeves through floors, wall, or ceilings, sized to permit installation of full-thickness insulation; seal air tight after installation of piping and insulation.
 - B. Provide flexible piping arrangement in hot gas discharge line of compressor. Such arrangement shall consist of a piping loop or similar measure to prevent transmission of objectionable vibration.
 - C. Provide a removable core filter-drier in liquid line. In-line filter-driers are acceptable in individual circuits of less than 10-ton nominal capacity. Provide a full size valved bypass around this filter-drier. Provide shut-off valves to isolate the filter-drier while flow is through the bypass and also a shut-off valve in the bypass so that filter-drier can be put into use.
 - D. Provide a refrigerant charging connection in the liquid line upstream from the filter-drier.
 - E. Provide a moisture indicator/sight glass in the liquid line downstream from the filter-drier. Install in vertical line if possible and a sufficient distance downstream from any valve such that the resulting disturbance does not appear in the glass.
 - F. Provide a filter-drier with isolating shut-off valves and with valved bypass only if compressor is not equipped with a suction line filter or screen.
 - G. Keep piping free from traps unless otherwise indicated. Install vertical pipe plumb. Pitch horizontal piping only where slope is desirable.
 - H. Provide shut-off valves at inlet and outlet to all condensers, receivers and evaporators to permit isolation for service. If possible, use angle valves to minimize pressure drop. Use angle valves in all cases at receivers. Use glove valves only when angle valves are impractical.
 - I. Provide solenoid valves upright in horizontal lines only unless their design allows installation in vertical pipe.
 - J. Where compressor(s) do not have pump down control and the compressor(s) associated evaporator coil(s) do not have bottom suction header connections and the evaporator coil(s) are located above the compressor(s), then loop suction line(s) to top level of coil to prevent liquid slugging.

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- K. To prevent erratic operation of thermal expansion valve, provide a suction line trap next to evaporator coil suction outlet with expansion valve bulb located between coil and trap. Provide only in suction lines which are level leaving coil outlet or which rise on leaving coil outlet. Trap not required when evaporator coil outlet suction line drops to compressor or suction header immediately after expansion valve bulb.

END OF SECTION 15050

SECTION 15190 - HANGERS AND SUPPORTS: PIPING SYSTEMS

1.0 GENERAL

- 1.01 Scope:** Provide all angles, brackets, clamps, anchors, inserts, rods, braces, frames, hangers, nuts and bolts, and other miscellaneous steel and hardware items as may be required for the proper support of equipment and all piping systems.
- 1.02 Relation to Other Work:** Contractor shall coordinate: shop drawings; placement; structural framing and overall building construction; and the work of all trades to insure an orderly and timely progress of the work. Refer to other Sections for special requirements relating to specific equipment and systems.
- 1.03 Manufacturer:** Hangers and supports shall be as manufactured by Grinnell, Division ITT, F&S Manufacturing Corp.; Fee and Mason Manufacturing Co., or an approved equal.

2.0 PRODUCTS

- 2.01** Use the following (or approved equals thereof) if and as applicable to this project:

- A. Hangers:
1. Hangers in contact with copper piping: Shall be copper plated or Teflon coated. Grinnell Fig. 97 or 97C.
 2. Hangers (other than in contact with copper piping): Shall have manufacturer's standard finish. Pipe 3" and larger: Grinnell Fig. 260. Pipe 2-1/2" and smaller: Grinnell Fig. 104.
- B. Pipe Roller Stands: Grinnell Fig. 274.
- C. Pipe Roller Hangers: Grinnell Fig. 171.
- D. Pipe Alignment Guide: Grinnell Fig. 256.
- E. Pipe Riser Clamps: Grinnell Fig. 261.
- F. Insulation Shields: Grinnell Fig. 292 with links.
- G. Beam Clamps: Grinnell Fig. 292 with links.
- H. Rod: Sized with safety factor of five (5). Grinnell Fig. 140 or 146.

3.0 EXECUTION

- 3.01 General:** Refer to Section entitled "Common Requirements for Mechanical Work." All inserts, fasteners, hangers and supports shall be installed in strict accordance with manufacturer's instructions.
- 3.02 Pipe:** Hangers shall be spaced to prevent sag and to permit proper drainage. All piping shall be run parallel with the lines of building, unless otherwise indicated on drawings. The hanger spacing and placement shall be such that after the covering (insulation and finish) is applied there will be not less than 1/2" clear space between finished covering and other surfaces, including the finished covering of parallel adjacent pipes. Hangers for insulated pipes shall be sized to encompass the insulating, finish and metal insulation shield (a metal insulation shield shall be provided for each hanger and support). Vertical piping shall be supported with pipe riser clamps at every floor penetration, unless specifically indicated otherwise on the drawings.

END OF SECTION 15190

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SECTION 15200 - PLUMBING

1.0 GENERAL

1.01 Refer to Section 15000 entitled "Common Requirements for Mechanical Work".

1.02 Description of Work:

- A. The extent of plumbing is indicated on the drawings and specifications.
- B. In general, the work consists of, but is not limited to the following:
 - 1. Hot and cold water supply piping, and all necessary valves, fittings, etc.
 - 2. A system of soil, storm, waste and vent piping.
 - 3. Plumbing fixtures and trim.
 - 4. Furnishing flashings for penetrations through the roof or as specified on drawings.
 - 5. Connections of equipment furnished by others.

2.0 PRODUCTS

2.01 Refer to individual technical sections.

3.0 EXECUTION

3.01 The plumbing materials, fixtures and installation shall comply with all requirements of the 2007 Florida Building Code and all applicable state and local codes.

END OF SECTION 15200

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SECTION 15201 - PLUMBING FIXTURES, TRIM AND SPECIALTIES

1.0 GENERAL

1.01 Refer to Section entitled "Common Requirements for Mechanical Work".

1.02 Energy Conservation Requirements:

- A. Showers: Shower heads used shall be equipped with flow control devices to limit total flow to a maximum of two and a half (2.5) gallons per minute, or as indicated in the plumbing fixture schedule.
- B. Lavatories: Lavatories which are provided in public areas shall have the following feature: Outlet devices which limit the flow of water to a maximum of 0.5 GPM.

2.0 PRODUCTS

2.01 Plumbing Fixtures and Trim:

- A. Provide all brackets, plates, anchors and fastening devices necessary for rigidly mounting fixtures in place. Unless noted otherwise, each wall hung plumbing fixture shall be supported on appropriate type of chair carriers.
- B. Use chrome-plated brass piping where exposed to view between fixture and finished wall face and jacketed where fixture is designated for handicapped use. Provide tight fitting escutcheons of chrome plated brass wherever piping passes through walls. Supply piping to all fixtures shall be anchored to prevent movement.
- C. Approved Manufacturers:
 - 1. Fixtures: American Standard, Crane, Eljer, Elkay, Just, Fiat or Kohler.
 - 2. Flush Valves: Delaney, Sloan or Zurn.
 - 3. Toilet Seats: Bemis, Beneke, Church, Olsonite or Centoco.
 - 4. Trim: American Standard, Chicago, Crane, Eljer, Kohler, T&S Brass, Zurn or Symmons.
 - 5. Electric Water Coolers: Elkay, Halsey Taylor or Oasis.
- D. General:
 - 1. Acid resisting enamel for enameled cast iron and steel fixtures.
 - 2. Cast brass P-trap with cleanout for each lavatory and sink unless otherwise indicated.
 - 3. Renewable seats and disks for supply valves.
 - 4. Stops for fixture hot and cold water supplies.

2.02 Plumbing Specialties:

- A. Cleanouts:
 - 1. Exterior type: Heavy-duty cast iron body with round, scoriated, non-tilt top.

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2. Interior floor type: Cast iron with square, heavy duty, scoriated nickel bronze top.
 3. Interior wall type: Cast iron cleanout tee with countersunk plug and square, smooth nickel bronze access cover and frame.
 4. Plugs: Heavy cast iron ferrule with screw plug.
 5. Josam, J. R. Smith, Wade, Zurn, Sioux Chief or approved equal. Refer to schedule on drawings.
- B. Traps:
1. Deep seal type on all floor drains. Provide automatic trap primers at locations shown.
 2. Exposed and/or in cabinets: Chrome plated cast brass with cleanouts.
- C. Water Hammer Arresters:
1. Shall be in accord with Plumbing and Drainage Institute Standard PDI-WH-201.
 2. Josam, J. R. Smith, Wade, Zurn or Sioux Chief are approved equals.
- D. Floor Drains:
1. Adjustable height, cast iron body, double drainage flanges, flashing clamp, nickel bronze strainer, no integral trap, inside caulk bottom outlet with adapter for ring.
 2. 6" strainer.
 3. Polished brass strainer in equipment rooms.
 4. Automatic trap primer connection except on shower drains.
 5. Josam, J. R. Smith, Wade, Zurn or Sioux Chief are approved equals. Refer to schedule on the drawings.

3.0 EXECUTION

3.01 General:

- A. Protect chrome-plated items from damage by wrenches and other hazards.
- B. Install fixtures having flush valves so that supplies to valves for all identical fixtures in each room are at same height for that fixture type. Seat valve in place so that valve discharge centerline is directly above fixture spud centerline; do not connect by bending nipple between valve spud.
- C. Install cold water on right (facing applicable fixtures).
- D. Verify, coordinate, adjust, align and secure rough-in piping to provide neat appearances and serviceable operation. Correlate with fixture manufacturer's data and recommendations and with required dimensions.

3.02 Cleanouts:

- A. Install at or near foot of each soil or waste stack and at each change in direction of building drain greater than 45 degrees.

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- B. Shall be accessible; install flush with finished wall, floor or finished grade.

3.03 Traps:

- A. Trap each fixture (except those with integral traps) with water sealed trap located as close as possible to fixture and never greater than 24" from fixture.
- B. Provide all floor drains and hub drain traps and indirect waste traps with automatic primer system for each trap.

3.04 Water Hammer Arresters: Size and locate in accord with PDI Standard PDI-WH-201.

3.05 Final Installation: Final installation of all drains (floor, roof, hub, shower and other similar types) must yield absolutely permanently water tight floor and/or roof system.

END OF SECTION 15201

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SECTION 15210 - DOMESTIC WATER SYSTEM

1.0 GENERAL

- 1.01 Scope:** Provide potable water systems complete as indicated on the specifications and drawings. Drawings scales prohibit the indication of all offsets, fittings, sleeves, and similar items; however, these deviations shall be provided as work of this Section at no additional cost to the Owner. (No change in Contract price).
- 1.02 Shop Drawings:** Refer to Section 15000 entitled "Common Requirements for Mechanical Work".

2.0 PRODUCTS

- 2.01 Interior Water Pipe:** Cold water supply piping below grade up to a point five feet outside the building line shall be type K hard drawn seamless copper water tube in a vinyl sleeve conforming to ASTM B88-89. Hot and cold water supply piping above grade shall be type L hard drawn seamless copper water tube conforming to ASTM B88.
- 2.02 Fittings:** Wrought copper, pressure type conforming to ASTM B16.22-1989.
- 2.03 Solder:** Lead free, 95-5 non-corrosive flux.
- 2.04 Pipe Protective Coating (Interior):** Protect hot and cold water piping below floor or in contact with concrete by wrapping with 20 mil thickness vinyl tape equal to Permacel No. 307.
- 2.05 Dielectric Isolators:**
- A. Unions: For pipe sizes two inches (2") and smaller, EPCO or Rockford-Eclipse insulated unions with joint connection to suit pipe and equipment.
 - B. Flanges: For pipe sizes two and one-half inches (2-1/2") and over; Plico Products flange insulation sets with: phenolic retainer, nitrile rubber seal element, polyethylene sleeves and double washer sets. Spring lock type with set screw.
- 2.06 Relief Valves:** ASME rated; size and setting as recommended by equipment manufacturer and/or indicated on drawings.
- 2.07 Valves:**
- A. All valves shall have the name or trademark of the manufacturer and the guaranteed working pressure cast or stamped on the body. Adapters shall be provided for all valves on copper lines.
 - B. All stop valves used on this work, unless otherwise specified or required, shall be of the gate pattern, suitable for 125 pound working pressure.
 - C. All gate valves shall be packed and left perfectly tight at the completion of work.
 - D. Gate Valves: Gate valves two inches (2") and smaller shall be made of the best brass of screwed pattern of the solid wedge type, double seat, non-rising stem, with gland stuffing box and iron wheel, NIBCO T-133, Stockham B-128 or Jenkins 370C. Gate valves two and one-half inches (2-1/2") or larger shall be iron body, brass trimmed, flanges ends and otherwise same type as smaller valves, NIBCO F617-0, Stockham 9-623 or Jenkins 651C.
 - E. Globe Valves: Globe valves 2: and smaller shall be the best grade brass, screwed pattern, removable disc suitable for the fluid to be controlled with gland stuffing box and

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iron wheel, NIBCO T235-Y, Jenkins 106B or Stockham B-22-T. Globe valves two and one-half inches (2-1/2") and larger shall be iron body, brass trimmed, flanged ends and otherwise same type as smaller valves. NIBCO F178-B, Jenkins 613C or Stockham 9-512.

- F. Check Valves: check valves two inches (2") and smaller shall be made of the best grade brass, screwed pattern, swing check, one disc for hot and cold water; NIBCO T4-413-BY, Jenkins 996 or Stockham B-319. Check valves two and one-half inches (2-1/2") and larger shall be iron body.
- G. Ball valves two inches (2") and smaller shall be all bronze of compact pattern with solder joint connections rated at 400 pounds WOG. Stem extensions shall be furnished for use in insulated lines where insulation exceeds 1/2" Ball valves may be substituted for gate valves in sizes two inches (2") and smaller. NIBCO S-580, Milwaukee BA 100/150 Apollo 70-100/200.

3.0 EXECUTION

3.01 Joints and Connections:

- A. General: Joints and connections shall be made permanently air, gas and watertight.
- B. Equipment Connections: Final connections to services and connections to equipment shall be made with unions for pipe sizes two inches (2") and under and with companion flanges for pipe two and one-half inches (2-1/2") and larger. Where incompatible piping material comes in contact, except for the use of valves, isolate the two materials using dielectric isolators as specified herein before.
- C. Piping drops to points of use shall each be valved for individual shut-offs.

3.02 Valves: All valves, stops, pressure regulators and similar items shall be installed in an easily accessible location. Provide access panel (refer to Section 15000 entitled "Common Requirements for Mechanical Work") for all concealed valves.

3.03 Sterilization: Sterilization solution shall be 400 PPM to 1000 PPM chlorine made from a sanitation grade chlorine or sodium hypochlorite. Solution shall remain in system for twenty four (24) hours during which time valves and faucets are to be opened and closed several times. Outlets shall be tested to insure an adequate amount of chlorine is present. At conclusion of sterilization entire system shall be flushed with clean water until chlorine content is at a level approved by the County Health Department.

3.04 Tests: Upon completion of the water supply system it shall be tested and proved tight under a water pressure no less than 25 PSI above the working pressure under which it is to be operated and retained for not less than 24 hours shall be observed by a representative of the Project Architect/Engineer before it is removed.

END OF SECTION 15210

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SECTION 15211 - GREASE INTERCEPTOR

1.0 GENERAL

- 1.01 Scope:** Provide underground ARC steel grease interceptor in accordance with all applicable requirements of Plumbing and Drainage Institute Standard PDI-G101, EPA Manual, Florida Administrative Code 10D-6 and local plumbing codes.
- 1.02 Relation to Other Work:** Refer to Section 15000 entitled "Common Requirements for Mechanical Work".
- 1.03 Shop Drawings:** Refer to Section 15000 entitled "Common Requirements for Mechanical Work". Include complete data on: dimensions; working pressure; code compliance; protective finish; acceptance by local authority; manhole; and all accessories.
- 1.04 Operating and Maintenance Instructions:** Refer to Section 15000 entitled "Instruction and Maintenance Manuals".
- 1.05 Industry Standards:** Where compliance with an industry, society, or association standard is specified or indicated, certification of such compliance shall be submitted with shop drawings.

2.0 PRODUCTS

- 2.01 Interceptor:** Shall be of capacity as indicated on Drawings, acid resistant coated fabricated steel. Grease trap shall be as manufactured by Zurn Industries, or approved equal.

3.0 EXECUTION

- 3.01** Interceptor shall be installed plumb and level in all respects, on stable compacted earth.

END OF SECTION 15211

SECTION 15215 - STORM WATER SYSTEM

1.0 GENERAL

- 1.01 Scope:** Provide storm water piping system complete as indicated on drawings. Drawing scales prohibit the indication of all offsets, fittings, sleeves, and similar items; however, these deviations shall be provided as work of this section at no additional cost to Owner (no change in Contract price).
- 1.02 Shop Drawings:** Refer to Section 15000 entitled "Common Requirements for Mechanical Work".

2.0 PRODUCTS

2.01 Pipe and Fittings:

- A. Interior above first floor slab shall be schedule 40 polyvinylchloride pipe with PVC solvent welded fittings.
- B. Interior below floor slab and up to a point five feet (5'-0") beyond the building walls shall be type PVC DWV pipe and fittings (ASTM 2665-88).

- 2.02 Roof Drains:** All roof drains will be furnished and installed with sheet lead flashing of dimensions and configurations as shown on A-series drawing. Provide all accessories required for the particular construction in which they are to be mounted. Josam, J. R. Smith, Wade or Zurn are approved manufacturers. Refer to schedule on drawings.

3.0 EXECUTION

- 3.01 General:** All piping shall be run in the most direct manner. Horizontal pipes shall have a grade of one-quarter inch (1/4") per foot wherever possible, and not less in any case than one-eighth inch (1/8") per foot. All offsets shall be 45 degrees or less.
- 3.02 Insulation:** Refer to Section 15400 entitled "Thermal Insulation".
- 3.03 Tests:** All storm drains shall be tested by filling leader with water to 10 feet head minimum and allowing to stand twenty-four (24) hours with no loss of head. Any tests shall be observed by a representative of the Architect before tests are removed.

END OF SECTION 15215

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SECTION 15220 - SANITARY DRAINAGE SYSTEM

1.0 GENERAL

- 1.01 Scope:** Provide soil, waste and vent piping systems complete as indicated on specifications and drawings. Drawing scales prohibit the indication of all offsets, fittings, sleeves and similar items; however, these deviations shall be provided as work of this section at no additional cost to Owner (no change in Contract price).

2.0 PRODUCTS

2.01 Pipe and Fittings:

- A. Interior above first floor slab shall be schedule 40 polyvinylchloride pipe with PVC solvent welded fittings.
- B. Interior below floor slab and up to a point five feet (5'-0") beyond the building walls shall be type PVC DWV pipe and fittings (ASTM 2665-88).

- 2.02 Floor Drains:** Floor drains shall be as manufactured by Josam, J.R. Smith, Wade or Zurn. Provide flashing clamp devices where required by floor construction. Refer to schedule on drawings.

3.0 EXECUTION

- 3.01 General:** Contractor shall promptly install all sewer and drain piping after excavating, chasing, or cutting for same has been done, so as to keep the openings for such piping open as short a time as possible. No piping shall, however, be permanently closed up, furred in or covered before the examination of it by the authorities having jurisdiction.

- 3.02 Scope:** All piping shall be run in the most direct manner. Horizontal pipe shall have a grade of one-quarter inch (1/4") per foot wherever possible and not less, in any case, than one-eighth inch (1/8") per foot. All offsets shall be 45 degrees or less.

- 3.03 Insulation:** Refer to Section 15400 entitled "Thermal Insulation".

- 3.04 Cleanouts:** Refer to Section 15201 entitled "Plumbing Fixtures Trim and Specialties".

- 3.05 Vents:** Vent branches shall be kept above the fixtures in such a manner as to preclude the use of the vents as waste pipes should the latter become obstructed. All branches shall be so graded as to prevent accumulation of water or scale therein. All vent pipes shall be properly graded without drops or sags and so connected as to drip back to waste pipes by gravity. Wherever practicable, two or more vents shall be connected together and extended as one vent through the roof.

- 3.06 Escutcheons:** Where waste and vents are exposed at fixtures, pipes shall be chrome-plated brass (iron pipe size) and have chrome-plated escutcheons where they pass through floors, walls, or ceilings.

- 3.07 Flashing:** At all points where the vents pass through the roof, the openings shall be flashed with sheet lead flashing weighing not less than four (4) pounds per square foot. The flashing shall be made absolutely watertight at the roofline and shall be extended up, over and down at least two inches (2") into the pipe. Each flange shield shall extend not less than fourteen inches (14") in all directions from the respective vent, underneath the roofing material.

- 3.08 Tests:** After all soil, waste and vent stacks have been installed, the outlets shall be plugged and the piping system filled with water to the highest point of the system, but with no less than 10 ft

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head of water, and allowed to remain filled for twenty-four (24) hours and proved tight under such conditions. This test may be conducted in segments as required by the sequence of construction. All tests shall be observed by a representative of the Project Architect/Engineer before tests are removed.

END OF SECTION 15220

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SECTION 15221 - WATER HEATER: ELECTRIC

1.0 GENERAL

1.01 Refer to Section 15000 entitled "Common Requirements for Mechanical Work".

1.02 Equipment Capabilities shall be as indicated on drawings.

2.0 PRODUCTS

2.01 **General:** UL approved vertical electric storage heaters. Capacity as indicated on drawings.

A. Energy Conservation:

1. All automatic, electric, storage water heater(s) shall have a stand-by loss not exceeding 4 watts per square foot of tank surface area per hour. All water heaters shall be labeled to indicate compliance with ASHRAE 90.1b-1992.

B. Construction: Glass lined tank with five year warranty. Immersion type heating elements with snap acting thermostats and high limit thermostat. Elements shall be wired for step operation. Shall have glass blanket insulation with baked enamel jacket. All water heaters shall bear ASME stamp.

C. Trim: Shall have brass drain, magnesium rod anode and stamped ASME rated temperature and pressure relief valve.

D. Acceptable: A. O. Smith, Lochinvar, PVI, Rheem, or State.

3.0 EXECUTION

3.01 Install in accord with manufacturer's recommendations or as otherwise specified or shown on drawings.

END OF SECTION 15221

SECTION 15400 - INSULATION, THERMAL

1.0 GENERAL

1.01 Scope: Provide plant, labor, and materials to insulate equipment, piping and miscellaneous items in the piping and duct systems as indicated on the drawings and specified herein.

1.02 Relation to other work: Refer to section entitled "Common Requirements For Mechanical Work". No insulation adhesives, materials or finishes shall be applied until the item to be insulated has been completely installed, tested and proved tight.

1.03 Shop Drawings: Refer to section entitled "Common Requirements For Mechanical Work".

1.04 NFPA 90A: All materials and adhesives shall conform to the requirements of NFPA 90A as to flame spread and smoke developed ratings.

2.0 PRODUCTS

2.01 Insulation Materials, General: Insulation materials shall include products from, but not limited to, the following approved manufacturers;

- a) Armstrong
- b) Calsilite
- c) Childers
- d) Compac
- e) Fasson
- f) Fosters
- g) Great Lakes
- h) Johns Manville
- i) Knauf
- j) Marathon
- k) Owens Corning
- l) Pittsburgh Corning
- m) Premier
- n) Proto
- o) Rubetex
- p) Truebro
- q) Venture
- r) Vimasco
- s) Zeston

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2.02 Ductwork Insulation Materials:

- A. Insulation, Fiber Glass Blanket Wrap (Type DI-1):
Knauf Fiber Glass Duct Insulation, two and three sixteenths (2-3/16") thick, three quarter (3/4#) pound per cubic foot density; (R=6.0).
- B. Insulation, Fiber Glass Rigid Board (Type DI-2):
Knauf Fiber Glass Duct Board, stiffness of 800EI, with reinforced foil-skrim-kraft facing; one and one half (1-1/2") thick; (R=6.5)

2.03 Piping Insulation Materials:

- A. Insulation, Fiber Glass Pipe (Type PC-1):
Knauf Fiber Glass Pipe Insulation, white all service jacket with self-sealing laps (asj/ssl).
- B. Insulation, Flexible Unicellular (Type PC-3):
Armstrong AP Armaflex Pipe Insulation.
- C. Insulation, Flexible Fiber Glass (Type PC-4):
Knauf Fiber Glass Wrap Insulation, one and one half (1 1/2") thick, three quarter (3/4#) pound per cubic foot density.
- D. Insulation, Molded Vinyl (Type PC-5):
Truebro Handi Lav-Guard Kits, snap tight fasteners.

2.04 Equipment Insulation:

- A. Insulation, Flexible Unicellular Sheets (Type EQ-3):
Armstrong Armaflex AP Sheet & Roll Insulation.

2.05 Adhesives, Mastics and Sealants:

- A. Flexible Unicellular Insulation Adhesive (Type FU-1):
Armstrong # 520 Armaflex Adhesive.
- B. Flexible Unicellular Finish (Type FU-2):
White Armstrong WB Armaflex Finish.

2.06 Miscellaneous Insulation Accessories:

- A. Vapor Barrier Tape (Type T-1):
3" wide dead soft aluminum foil pressure sensitive, acrylic based, Compac # 120.
- B. Mechanical Fasteners (Type F-1):
Mild steel cup head capacitor discharge or glued stick pins, lengths as required to prevent over compression of insulation (25% maximum allowed).
- C. Staples (Type ST-1):

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Outward clinching type, mild steel.

D. Fitting Covers (Type FTG-1):

Proto 25/50 rated PVC fitting covers, factory supplied fiber glass inserts.

3.0 Execution:

PIPING

3.01 A. Domestic Hot Water Piping:

B. Exposed Horizontal Rain Water Leaders Including The Vertical Portion Up To The Roof Sump:

Insulate with fiber glass pipe covering (PC-1), all jacket laps and butt strips sealed tight, and fitting covers (FTG-1). Heating hot water piping to be one and one half inches (1 ½") thick except for runouts to individual heating units to be one inch (1") thick. Steam supply piping to be two inches (2") thick, condensate return be one and one half inches (1 ½") thick. All other piping to be one inch (1") thick.

3.02 A. Concealed Horizontal Rain Water Leaders Including The Vertical Portion Up To The Roof Sump:

Insulate with flexible fiber glass insulation (PC-4), one and one half inches (1 ½") thick, secured with staples (ST-1), all seams sealed with tape (T-1).

3.03 Interior Condensate Drain (Cold) Piping:

Insulate with flexible cellular insulation (PC-3) three quarters of one inch (¾") thick secured with adhesive (FU-1).

3.04 Refrigerant Suction Piping:

Insulate with flexible cellular insulation (PC-3) three quarters of one inch (¾") thick secured with adhesive (FU-1). Exterior insulation to be finished with two coats of finish (FU-2).

3.05 Handicapped Lavatories:

Insulate water supplies and waste piping with molded vinyl covers (PC-5).

DUCTWORK

General: Internal insulation. See section entitled "Ductwork". This section describes all of the ductwork used on this project and defines whether the ductwork should be insulated internally as work of the section "Ductwork" or externally insulated as work of the section "Insulation, Thermal". Internally lined ductwork does not require any additional external insulation.

3.06 Low Pressure Ductwork, Interior Concealed:

All supply (including ceiling outlets), return and outside air that is not internally insulated shall be externally insulated with fiber glass blanket (DI-1). Overlap internal insulation a minimum six inches (6") beyond any such internal insulation and vapor seal raw edges as specified herein for joints. The insulation is to be wrapped around the ductwork and have it's laps secured with staples (ST-1). Where duct width exceeds eighteen inches (18"), the insulation shall be additionally secured to the bottoms of the ductwork using mechanical fasteners (F-1) spaced eighteen inches (18") on centers. Insulation shall be applied with all edges tightly butted and all

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joints and breaks in the vapor barrier sealed tight using tape (T-1) applied in accordance with the manufacturer's recommendations.

- 3.07 Flexible Duct Connections:** Insulate with flexible unicellular sheet insulation (EQ-3), one inch (1") thick, adhered with adhesive (FU-1).

EQUIPMENT

- 3.08 Exposed Roof Sumps:**

Insulate with fiber glass board (DI-2), one inch (1") thick.

- 3.09 Concealed Roof Sumps:**

Insulate with flexible fiber glass insulation (PC-4), one and one half inches (1 ½") thick.

GENERAL APPLICATION

- 3.10 Insulation Fit:**

Where insulation is applied to piping or equipment, it shall be installed with all joints fitted to eliminate voids. Voids shall not be filled with joint sealant but shall be eliminated by refitting or replacing the insulation.

- 3.11 Items Not Requiring Insulation:**

In general, the following items do not require insulation: Domestic cold water piping and vertical storm water piping.

END OF SECTION 15400

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SECTION 15600 - FANS, POWER ROOF VENTILATOR

1.0 GENERAL

- 1.01 Scope:** Provide all power roof ventilators of size, capacity, and electrical characteristics indicated on the drawings or as otherwise indicated.
- 1.02 Shop Drawings:** Refer to the Section entitled "Common Requirements for Mechanical Work".
- 1.03 Manufacturer:** Greenheck Fan and Ventilator Corp.; Loren Cook Company; or approved equal.

2.0 PRODUCTS

- 2.01 Fan Hood, Housing and Base:** Weatherproof and constructed of heavy gauge aluminum. Motor and drive shall be supported by a structural frame independent of hood, housing and curb base.
- 2.02 Fan Wheel:** Backward curved, non-overloading, aluminum, air foil blade type.
- 2.03 Drive Assembly:** Direct or belt drive type as indicated. Conform with Section entitled "Common Requirements for Mechanical Work".
- 2.04 Disconnect Switch:** Factory mounted disconnect switches wired to the motor.
- 2.05 Bird Screen:** Provide 1/2" mesh aluminum bird screens on all fans.
- 2.06 Starter:** Refer to Section entitled "Common Requirements for Mechanical Work".

3.0 EXECUTION

- 3.01 Roof Curb Placement and Fan Mounting:** Fan location shall be essentially as shown on the drawings; however, actual placement of roof curb shall be verified using field measurements and data relating to the equipment approved for actual installation. Mount fan and backdraft damper in strict accordance with manufacturer's instructions.

END OF SECTION 15600

SECTION 15661 - ROOF AIR INTAKES

1.0 GENERAL

- 1.01 Scope:** Provide factory assembled roof air intake(s) where indicated. Sizes and operating characteristics shall be as scheduled on drawings or as otherwise indicated.
- 1.02 Shop Drawings:** Refer to the Section entitled "Common Requirements for Mechanical Work".

2.0 PRODUCTS

2.01 General:

- A. Sized as indicated.
- B. Low silhouette type.
- C. Raintight under all operating conditions.
- D. Constructed of any of the following materials: (1) all fiberglass, (2) spun or extruded aluminum, (3) galvanized steel.
- E. Pass indicated air quantities at not greater than 0.05 inches w.g. total pressure and, for intakes only, 500b fpm maximum throat and perimeter velocity.
- F. 1/4" mesh galvanized steel or PVC coated bird screen.
- G. Provide with parallel or opposed blade volume dampers unless otherwise indicated.
- H. Provide with companion roof curb complying with Section entitled "Roof Curbs".

- 2.02 Manufacturer:** Greenheck Fan and Ventilator Corp.; Loren Cook Company; approved manufacturer.

3.0 EXECUTION

- 3.01 Roof Curb Placement and Fan Mounting:** Location shall be essentially as shown on the drawings; however, actual placement of roof curb shall be verified using field measurements and data relating to the equipment approved for actual installation on this project. Mount items in strict accordance with manufacturer's instructions. Permanently secure to roof curbs.

END OF SECTION 15661

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SECTION 15662 - ROOF CURBS

1.0 GENERAL

- 1.01 **Scope:** Provide a roof curb for power roof ventilator and roof air intake.
- 1.02 **Relation to Other Work:** Coordinate roof openings, curb dimensions and electrical connections including stub up through roof deck with fans actually furnished.
- 1.03 **Shop Drawings:** Refer to the requirements of Section entitled "Common Requirements for Mechanical Work".
- 1.04 **Manufacturer:** Curbs shall be matched to, and be a companion item for the equipment provided.

2.0 PRODUCTS

- 2.01 Factory prefabricated.
- 2.02 Minimum height of 12 inches (unless otherwise indicated).
- 2.03 Completely insulated internally with 2 inch minimum thickness fiberglass insulation complying with NFPA 90A.
- 2.04 Approved by Architect prior to provision of roof openings.
- 2.05 Heavy gauge steel with welded joints and hot dip galvanized after fabrication, or heavy gauge aluminum with welded joints.
- 2.06 Foam rubber gasket on top of curb.

3.0 EXECUTION

- 3.01 **Coordination of Roof Curb Placement and Equipment Mounting:** Mount equipment, curb and accessories in strict accordance with manufacturer's instructions. Correlate size(s) of roof opening(s) and roof curb(s) with actual equipment to be mounted thereon. Properly flash and seal curb opening.

END OF SECTION 15662

SECTION 15717 - SPLIT SYSTEM, DX (ELECTRIC HEAT)

1.0 GENERAL

1.01 Scope: Furnish and install split system units of the types, sizes and capacities indicated on drawings.

1.02 Shop Drawings: Refer to the requirements of Section entitled "Common Requirements for Mechanical Work".

1.03 Manufacturer: Basis of design is similar to that shown on drawings. Acceptable: Trane, York (J.C.), or approved equal.

2.0 PRODUCTS

2.01 Air Handling Units:

- A. The units shall be complete with fans, filters, motors, coils, insulated casings, belt guards, vari-pitch drives, and accessories as scheduled. Fans shall be both dynamically and statically balanced. Fan bearings shall be self-aligning, grease lubricated ball or roller bearings of the pillow block or flanged type. Provision shall be made to lubricate all bearings from the exterior of the units. All sheet metal joints in the fan units shall be gasketed with soft rubber gaskets. Internal insulation shall be one inch (1") thick, 1-1/2 lb., neoprene-coated and shall be fire and fungus proof. The drain pans shall be double wall construction, shall extend under the fan section on draw through units and shall be insulated with 0.625" thick isocyanurate foam cemented between outer and inner pan. Provide opening in belt guard for insertion of a speed counter. Fan sections shall be provided with an insulated quick fastener attached gasketed access door. The motor mounting for each unit shall be built with heavy gauge angle or tubular steel framework. Fans shall not pass through first critical speed when coming up to full load RPM. Fan, motor and drive assembly shall be internally isolated.
- B. Coils in the air handling units shall be easily removable and shall not be used to provide structural stability for the units. All coils shall have staggered tubes. The coils shall be completely enclosed within the coil housing of the air units.
- C. Coil capacities, pressure drops, selection procedures, etc., shall be certified in accordance with ARI Standard 410. Coils having sizes and conditions beyond scope of ARI certification shall be rated and selected in accordance with the ARI procedures.
- D. Refrigerant coils shall be 1/2" O.D. seamless copper tubes having 0.024" minimum wall thickness with aluminum fins suitable for use with R-410a at a maximum pressure of 250 psig. Coils shall be pressure tested before shipment at 450 psig. Coils shall include refrigerant distributor of the low-pressure drop venturi type, arranged for down feed with male sweat connections. Suction header shall be round, seamless copper tube. The distributor tubes shall be 1/4" O.D. round, seamless copper.
- E. Unit shall be furnished with factory installed electric resistance heater as scheduled on drawings.
- F. Unit shall have a factory installed non-bleed thermostatic expansion valve (TXV).
- G. Unit shall have a single-point electrical connection.

2.02 Condensing Units:

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- A. Condensing units shall be of the size and capacity as scheduled on the drawings and shall be of the same manufacturer as the air handling units.
- B. Condenser coil shall be of copper tube, aluminum fins construction and shall be circuited for subcooling.
- C. Fans shall be direct driven, propeller type fans arranged for vertical discharge. Condenser fan motors shall have inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.
- D. Compressors shall be of the serviceable hermetic design with external spring isolators and shall have an automatically reversible oil pump.
- E. Controls shall be factory wired and located in a separate enclosure. Safety devices shall consist of high and low pressure switches and compressor overload devices. Timer shall prevent compressor from restarting for approximately five (5) minutes after shutoff.
- F. Casing shall be galvanized steel, zinc phosphatized and finished with baked enamel.
- G. Units shall be capable of starting and operating at 20 degrees F.
- H. Unit shall include a five (5) year manufacturer's guarantee for replacement of motor/compressor assembly.

2.03 Other Requirements: Be horizontal or vertical (as applicable).

3.0 EXECUTION

3.01 Equipment Placement: Air handling and condensing equipment shall be located essentially as shown on drawings; however, actual placement of the unit shall be verified using field measurements and data relating to the units approved for actual installation on this project.

3.02 Duct Connections: Supply and return ducts shall be connected to their respective air handler using flexible connectors.

3.03 Piping: Connect all piping to unit as shown by flow diagram on drawings and in accordance with manufacturer's recommendations. Arrange piping to allow easy access to items for routine maintenance and to allow adequate clearances from related equipment in the space.

END OF SECTION 15717

SECTION 15786 - FAN FORCED ELECTRIC UNIT HEATERS

1.0 GENERAL

The Contractor shall furnish and install REDD-I, model gas-fired unit heater or approved equal. Submit substitutions for approval. Performance shall be as indicated on the equipment schedule in the plans.

2.0 PRODUCT

- 2.01 Cabinet:** Cabinet shall be fabricated of die formed 18 gauge steel and finished with durable powder coated paint. Stamped louver periphery inlet grill shall maintain even airflow over heating elements. Adjustable louvers and outward drawn venturi shall provide accurate control of discharge airflow. A large hinged access door shall extend the width of the heater and be locked in position by quarter turn fasteners.
- 2.02 Elements:** Elements shall be all steel tubes with highest quality nickel-chromium resistance wire embedded in compacted efficient dielectric to ensure proper heat transfer. Steel helical fins shall be machine crimped and brazed to tube for effective transfer of heat.
- 2.03 Motor:** Motors shall be totally enclosed, all angle industrial rated. Motor shall be single phase with voltage rating same as heater voltage rating.
- 2.04 Wiring:** Heaters shall be designed for a single circuit with elements, motor and control circuits wired in accordance with latest national Electric Code and UL, Inc. Standard 2021.
- 2.05 Limited Controls:** All heaters shall have built in fan purge to dissipate residual heat from elements on heater shutdown. Automatic reset thermal cutout shall shut down elements and motor if safe operating temperatures are exceeded.
- 2.06 Controls:** Contractor and control circuit transformers where required shall be factory installed and wired.

END OF SECTION 15786

SECTION 15800 - AIR DISTRIBUTION EQUIPMENT

1.0 GENERAL

- 1.01 Scope:** Provide all air distribution devices as indicated on the drawings and as specified herein for a complete and operable system.
- 1.02 Relation to Other Work:** Coordinate with work of the ceiling, drywall, and plastering trades as required to insure an orderly progression of work and a first class finished system with respect to placement, alignment, finish, general fit, and absence of conflict with lighting systems and fire protection systems.
- 1.03 Design Conditions:**
- A. Acoustical: Noise produced at each diffuser, register, grille, or other air distribution device shall not exceed a noise criteria level of NC 25 based on sound pressure levels in db re 0.0002 microbars unless otherwise indicated. Coordinate air distribution devices, sound attenuation measures, and equipment actually provided to insure that this design constraint is not exceeded by the system installed.
 - B. Pressure drop across any air distribution device shall not exceed 0.10 in w.g. static pressure unless otherwise indicated.
 - C. Guarantee: Air distribution equipment shall be guaranteed by the manufacturer to operate without excessive noise and with velocities in the five foot occupancy zone, when handling air with temperature differentials as high as 25 degrees, not to exceed 30 fpm at 2 degree difference, 50 fpm at 1-1/2 degree difference, or 75 fpm at a 1 degree difference when operating with an average 75 degree room temperature and measured no closer than 6 inches from a wall surface.
- 1.04 Shop Drawings:** Refer to Section entitled "Common Requirements for Mechanical Work".
- 1.05 Manufacturer:** Titus, Metalaire, Price or approved equal. Manufacturers style and series numbers indicated are examples of products to be provided.
- 1.06** Manufacturers must be members of the Air Distribution Council unless otherwise indicated.
- 1.07** All aluminum is to be extruded unless otherwise indicated.
- 1.08 Appearance:** Each air distribution device which has a portion thereof (frame, core, etc.) exposed to view in the finished area shall have a factory applied finish which matches and is compatible with the color of the surrounding surface on which the device is installed. Colors must be approved by Architect prior to device fabrication.
- 1.09** All louvers, dampers, and/or shutters shall be rated by their manufacturer in accordance with AMCA Standard in effect.
- 1.10 Integral Components:** All dampers, blank-off baffles and other companion devices which form an integral part of air distribution devices shall be factory made items produced by the manufacturer of air distribution device.

2.0 PRODUCTS

- 2.01 Ceiling Mounted Conditioned Air Supply Diffusers, Return Air, and Exhaust Air Registers.**
- A. Designated on drawings by the manner of indicated system function for the device.

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- B. Sponge Rubber Gaskets.
- C. Aluminum or steel, as specified.
- D. Companion adjustable volume dampers.

2.02 Ceiling Mounted Transfer Grilles:

- A. Designated on drawings by the manner of the indicated system function for the device.
- B. Aluminum or steel as specified.
- C. Sponge rubber gaskets.

2.03 Mounting Screws: Where grilles, diffusers, or registers are specified which require mounting screws visible from the face of the device, these screws shall be furnished with the air distribution equipment or register in which they are to be used.

3.0 EXECUTION

3.01 General:

- A. Install neatly where indicated in accord with manufacturer's recommendations and in accord with SMACNA recommendations and as otherwise indicated.
- B. Properly test, balance and adjust to produce quiet, draftless operating to best degree possible.
- C. Do not install blank-offs under continuous linear diffuser distribution plenums. Distribution plenums shall cover only active portion of the diffuser.

3.02 Rectangular Diffusers: Where diffusers are in lay-in type, they shall be supported by the inverted T-bar suspension system, but all ducts connected thereto shall be supported independently of the ceiling as specified under Section entitled "Ductwork". Surface mounted diffusers shall be supported by the duct runouts or drops where sheet metal ducts are indicated and by separate hangers where flex runouts are indicated. All rectangular ceiling diffusers shall be installed with their lines parallel and perpendicular to the building line and properly aligned with ceiling.

3.03 Sidewall Grilles and Registers: Mount securely to the duct system flanges using finish screws and in accordance with accepted good practice.

3.04 Ceiling Mounted Exhaust and Return Registers/Grilles: Mount as specified herein before for surface mounted ceiling diffusers except use finished screws provided and secure to duct and finished ceiling (or finished ceiling for nonducted returns) in accordance with manufacturer's instructions. Where required to provide adequate support for nonducted registers or grilles, provide appropriate mounting frame for incorporation into the ceiling system.

END OF SECTION 15800

SECTION 15850 - LOW PRESSURE SHEET METAL DUCTWORK

1.0 GENERAL

- 1.01 Scope:** Provide complete duct systems as indicated. Systems shall include, but not be limited to, the following: Outside air, exhaust air, and air conditioning supply and return air duct systems as shown on drawings. Drawing scales prohibit the indication of all offsets, fittings, and like items; however, these items shall be installed as required for the actual project conditions at no change in contract price.

A. Items Included: This section generally includes, but is not limited to, the following major items:

1. Low pressure sheet metal ductwork.
2. Low pressure flexible ducts.
3. Duct system accessories.
 - a. Flexible duct connections.
 - b. Low pressure metal turning vanes.
 - c. Manual volume dampers.
 - d. Low pressure access doors.

- 1.02 Relation to Other Work:** Coordinate shop drawings ordering, delivery, and placement of all items affecting the duct systems including, but not limited to, the following items: Air handling units, exhaust fans, supply fans, sound attenuators, duct mounted coils, access panels, air distribution devices, fire dampers, outside air louvers, hoods, filters, roof curbs, structural framing, roof construction, roofing, and the work of all trades to insure an orderly and timely progression of the work. Refer to the requirements of the Section entitled "Common Requirements for Mechanical Work".

- 1.03 Shop Drawings:** Refer to Section entitled "Common Requirements for Mechanical Work". Include complete data on: All prefabricated duct and fittings; access doors; flexible connectors; manual volume dampers including operating hardware; extractors; turning vanes; automatic shutters; duct liner including mechanical fasteners and adhesives; and all other items.

1.04 Air Handling Unit and Ductwork Configuration Shop Drawings:

- A. Air handling unit manufacturer and model or series, which has been used as the design basis for this project, is indicated. If Contractor elects to submit for approval any unit which is made by any other manufacturer which is listed as acceptable, the Contractor shall submit a shop drawing for each air handling unit for which he proposes to use a unit which is different than the design basis. Such shop drawings shall meet the following requirements:
1. Be drawn at the same scale as the unit is shown on the Drawings. Contractor may elect to use a larger scale if he desires (i.e., if drawing of unit is at 1/4" = 1'-0", 1/2" = 1'-0" may be used).
 2. Clearly show all proposed ductwork configuration changes (sizes, routing, and similar differences) which are different in any respect from the Drawings. Extent of shop drawings shall show all ductwork to and from each unit beginning with

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and terminating at those points where ductwork is intended to remain unchanged as shown on Drawings.

3. Where proposed changes affect any other work such as structure, housekeeping pads, piping, equipment, electrical work or any other work, shop drawings shall clearly show those proposed changes.
 4. Proposed changes shall be at no additional change in contract price.
 5. Where Drawings show units in plan only, shop drawings shall show proposed units in plan and also in elevation.
 6. Shop drawings shall also show exact locations of related work (such as bar joists, columns, beams, sound attenuators, and like items) which affect the proposed ductwork routing and unit location and configuration.
 7. Each section of each air handling unit shall be clearly identified (i.e., coil section, fan section, filter section, mixing box section, etc.).
- B. Failure to submit these shop drawings together at the same time with the air handling unit shop drawings will result in total disapproval of the proposed air handling units. Time delays or other reasons will not be considered.
- C. These shop drawings shall be prepared as work of this section in coordination with the work of section describing the air conditioning unit(s).

1.05 Other Requirements:

- A. Provide all ductwork and components thereof in accordance with manufacturer's instructions.
- B. All ductwork dimensions indicated are nominal free clearance internal dimensions, which do not include insulation thickness.

1.06 Definitions:

- A. "SMACNA" means "Sheet Metal and Air Conditioning Contractors' National Association, Inc."
- B. Low Pressure Ductwork: Any and all ductwork conveying air or other gases at velocities less than 2000 fpm and static pressure less than 2.0 inches w.g. This ductwork may also be referred to in these specifications as "Low Velocity Ductwork". SMACNA "HVAC Duct Construction Standards, Metal and Flexible," First Edition, 1985, shall govern construction of this ductwork unless otherwise specified; construct duct in accord therewith.
- C. Pressure and Velocity Classifications: Pressure and velocity classifications, (hereinafter called "P/VC") for ducts are defined as follows:

		Positive			
SMACNA	Static		or	SMACNA	
P/VC	Pressure	Pressure	Negative	Seal	Velocity
Designation	Class	Rating	Pressure	Class	(fpm)

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2	Low	2"	+ or -	B	2500 dn
1	Low	1"	+ or -	C	2500 dn
1/2	Low	1/2"	+ or -	D	2000 dn

Note: All seams, joints, fastener penetrations and connections to be sealed with hard cast.

2.0 PRODUCTS

2.01 Low Pressure Sheet Metal Ductwork: Systems operating at two inches of water static pressure or less, shall, unless specifically specified otherwise, conform to the following requirements:

- A. Material: Prime quality forty-eight inch wide resquare tight coat galvanized steel conforming to the requirements of ASTM A-526.
- B. Reinforcing, Cross Breaking, Seams, Joints: Be in accordance with latest SMACNA construction standard for low-pressure sheet metal duct.

2.02 Glass Fiber Low Pressure Ductwork: None allowed on this project.

2.03 Low Pressure Round

- A. Conduit: Shall be "zinc grip" steel of spiral lock-seam construction. Duct shall be made using galvanized steel as per ASTM A-527 G-90. Gauge shall be as follows:

1. Round Duct:

Size	Duct Gauge	Gauge
Up through 8" diameter	26 gauge	24 gauge
9" through 14" diameter	26 gauge	24 gauge
15" through 26" diameter	24 gauge	22 gauge
27" through 36" diameter	22 gauge	20 gauge
37" through 50" diameter	20 gauge	20 gauge
51" through 60" diameter	18 gauge	18 gauge
61" through 84" diameter	16 gauge	16 gauge

2.04 Low Pressure Flexible Ducts: Flexible duct shall consist of spiral wound Helix Coil with Trilaminate Inner Fabric. Core shall be covered with factory applied one inch, one pound per cubic foot fiberglass insulation of 0.23 thermal conductance sheathed in a seamless exterior Class 1 vapor barrier jacket reinforced aluminum foil metalized jacket. Connections shall be made using quadrant dampered twist-in type fittings with extractor scoops and volume damper. Duct shall be NFPA 90A, Class 1 (UL 181), flame spread less than 25 and smoke developed less than 50. Provide in factory finished lengths not in excess of 6'-0' to make suitable connections with minimum pressure drop. Acceptable: Flexmaster, Genflex, Clevaflex or equal with "SPIN-IN" fitting with integral damper and air scoop at connection to main duct branch.

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2.05 Duct System Accessories:

A. General:

1. Provide all necessary duct system accessories to assure proper balance, quiet and draftless distribution and conveyance, and minimization of turbulence, noise and pressure drop for all supply, return, and exhaust and ventilation air quantities indicated.
2. Be recommended by the manufacturer for the application.

B. Flexible Duct Connections:

1. Provided where air handlers, fans and blowers connect their ductwork.
2. At least 4 inches long.
3. Connected on each side to metal (either metal ductwork, air handling apparatus, or heavy gauge steel sleeves).
4. For use in low-pressure duct systems.
5. Ventfabrics, Inc., "Ventglas Metaledge".

C. Low Pressure Metal Turning Vanes: Provide in all elbows, bends and tees of all low velocity supply air ducts whether or not shown in detail; provide in all elbows, bends and tees of all other low velocity ducts where portions of such ducts convey air at greater than 700 fpm average velocity. Adequate rigidity and strength to be complete flutterproof; properly designed; permanently fixed type. Aluminum, or steel with corrosion resistant coating, or galvanized steel. Air foil type in all mitered elbows, mitered bends and mitered tees. Air foil type must be manufactured by Titus, Tuttle & Bailey, Anemostat, Waterloo, Metalaire, Barber-Colman, "Airturns", Tuttle & Bailey "Ducturns", or Dura-Dyne "VR" with 24 gauge rails and hollow vanes.

D. Manual Volume Dampers: (Other than those specified as being integral with each register, diffuser and other air outlet or inlet):

1. Provide where indicated in the complete air distribution system(s) (including ductwork, return air plenums, etc.) to allow complete balancing of the air supply, return, ventilation and exhaust system(s).
2. Opposed blade type.
3. 8" Maximum blade width.
4. Made of galvanized steel, or steel with a sprayed or dipped aluminum rust resistant finish; flutterproof.
5. Provided so that all damper adjustments can be made from outside the completed ductwork without necessity for puncturing or otherwise penetrating ductwork and/or its vapor barrier.
6. Fully adjustable and with locking device.
7. Manufactured by Titus, Metalaire, or other approved manufacturer.

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8. Provided at a point in the ductwork which is a sufficient distance upstream from an outlet (or downstream from an inlet) to attenuate objectionable noise due to damper throttling and to preclude adverse affects on the distribution characteristics (throw, drop, patter, etc.) of the air distribution device.
9. Based upon location of the duct in which the damper is to be installed, provide the following types:
 - a. Dampers in ducts which are exposed or located above "lay-in" or "accessible ceilings": Young Regulator Company Model 896.
 - b. Dampers in ducts concealed above plaster ceilings or behind dry wall construction: Young Regulator company Model 896.

E. Low Pressure Duct Access Doors:

1. Provided for: Each manual and motorized damper; fire damper; smoke damper; electric duct heater; and where access is otherwise necessary.
2. Factory prefabricated double wall insulated type of 24 US gauge galvanized steel (of same or thicker gauge than ductwork panel in, which installed whichever is greater).
3. Minimum size shall be as large as is compatible with duct size, but in no case less than the following (provide larger sizes if necessary to permit proper access operating):

<u>Maximum Duct Dimensions</u>	<u>Access Door Size</u>
11" or less	10" X 12"
12" through 16"	12" X 16"
17" and over	16" X 24"

4. Doors shall be provided with hand operated adjustable tension catches and shall be completely gasketed around their perimeters. Doors shall be Ventlock "Access Doors". Install in accordance with manufacturer's recommendations using Ventlock #360 sealant.

- F. Test Openings: Furnish and install gasketed applied test openings for test equipment (pitot tubes, etc.) on the entering and leaving sides of air handling units and other air handling equipment and heating coils. Test openings shall be Ventlock #699-2.

3.0 EXECUTION

3.01 General:

- A. Construct all ductwork and accessories in accordance with the latest indicated editions of applicable Sheet Metal and Air Conditioning Contractors' National Association construction standards.
- B. Streamline all ductwork to the full extent practical and equip with proper and adequate devices to assure proper balance and quiet draftless distribution of indicated air quantities.

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- C. Protect all ductwork and system accessories from damage during construction until Architect's final acceptance of project.
- D. Prior to ductwork fabrication, verify if all ductwork as dimensioned and generally shown will satisfactorily fit allocated spaces. Take precautions to avoid space interference's with beams, columns, joists, pipes, lights, conduit, other ducts, equipment, etc. Notify Architect if any spatial conflicts exist, and then obtain Architect's approval of necessary routing. Make any such necessary revisions, which are minor at no additional cost.
- E. Carefully correlate all duct connections to air handling units and fans to provide proper connections, elbows and bends which minimize noise and pressure drop.
- F. Provide all curved elbows with radius ratios of not less than 1.5, unless otherwise shown or approved by Architect. Provide all mitered elbows with turning vanes.
- G. Properly suspend all ductwork so that no objectionable conditions result (such as vibration, sagging, etc.).
- H. Coordinate any and all dimensions at interfaces of dissimilar type of ductwork and at interfaces of ductwork with equipment so that proper overlaps, interfaces, etc., of insulation and continuity of vapor barriers are maintained.
- I. If necessary, where ducts interface and have different types of insulation, provide transitions so that internal free-clear dimensions of duct remain unchanged.
- J. Install horizontal low pressure ductwork at a level which maximizes length of any vertical rectangular duct connections to rectangular diffuser necks; however, such vertical duct connections are not required to be over 24 inches in length.
- K. Install all flexible round duct without kinks or similar obstructions so that pressure drop is minimized. Cut and remove excess lengths as necessary.
- L. Install horizontal rigid ductwork as high as practical above suspended ceilings so that movable light fixtures may be relocated without interference to meet any future partition relocation requirements.

3.02 Special Conditions: The following duct system installation requirements shall be done to maximize flexibility of relocation of lighting systems, duct systems and fire sprinkler systems in the event of partition relocation and in order to facilitate ease of servicing components of the systems contained within the ceiling plenum. These requirements are:

- A. Install all horizontal rigid ductwork against the underside of the steel structure. Coordinate ductwork reinforcing such that standing seams angles and similar space-consuming reinforcement does not occur on the top surface of ducts where such ducts pass below steel beams.

3.03 Field Measurement: Refer to the requirements of the Section entitled "Common Requirements for Mechanical Work".

3.04 Hangers and Supports:

- A. General: Comply with latest applicable SMACNA construction standards. Where sprayed fireproofing occurs, install hangers before application of such treatment and withhold installation of ducts until after application.

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- B. Supports: Vertical risers and other duct runs where the method of support specified above is not applicable shall be supported by substantial angle brackets designed to meet field conditions and installed to allow for duct expansion.
 - C. Fasteners: Secure hangers to steel beams or metal deck with beam clamps to drop through connections from metal or concrete deck. Refer to the requirements of the Section entitled "Common Requirements for Mechanical Work".
- 3.05 Insulated Duct:** Where ducts will be insulated, make provision for neat insulation finish around damper operating quadrants, splitter adjustment clamps, access doors, and similar operating devices. A metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished shall be mounted on duct.
- 3.06 Partition and Floor Openings:** All openings in floor slabs or partitions through which ducts pass shall be filled tightly with mineral or glass wool batting.
- 3.07 Change In Shape or Dimension:** Where duct size or shape is changed to effect a change in area, the following shall apply:
- A. Where the area at the end of the transformation results in an increase in area over that at the beginning, the slope of the transformation shall not exceed one inch in seven inches.
 - B. Where the area at the end of the transformation results in a decrease in area from that at the beginning, the slope of the transformation may be one inch in four inches, but one inch in seven inches if preferable, space permitting.
 - C. The angle of transformation at connections to heating coils or other equipment shall not exceed thirty degrees from a line parallel to the air flow in the entering side of the equipment, nor fifteen degrees on the leaving side. The angle of approach may be increased to suit limited space conditions when the transformation is provided with vanes approved by the Architect.
 - D. At contractor's option, connection from low pressure rectangular ductwork to air distribution devices via flexible ductwork may be made from bottom of rectangular ductwork in lieu of side connection providing contractor makes appropriate size transitions (if necessary) to maintain same free clear internal area at connection and also allows dimensional clearance for spin-in fitting with integral damper.
 - E. At contractor's option, he may eliminate a low pressure duct transition and hold the upstream duct size to the next downstream transition and make the necessary size transition at that point.
- 3.08 Changes in Direction:** Changes in direction shall be basically as indicated on the drawings and the following shall apply:
- A. Supply ducts turns of ninety degrees in low-pressure duct shall be made with mitered elbows fitted with closely spaced turning vanes designed for maintaining a constant velocity through the elbow.
 - B. Return and exhaust duct turns of ninety degrees in low pressure duct shall be made mitered elbows, as specified herein before, for supply ducts, unless radius elbows are indicated, in which case they shall be vaned and constructed with a throat radius three-quarters the duct width and a full radius heel.

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- C. Tees in low-pressure duct shall conform to the design requirements specified herein before for elbows.
- D. Branch take-offs in low-pressure duct shall be made with extractors, splitter dampers, or 45 take-off with volume dampers, as indicated on drawings.

3.09 Other Requirements:

- A. If ductwork materials are installed which do not meet these specifications, Contractor shall remove such ductwork materials and replace them with the specified materials. Any delay in job progress will be the responsibility of the Contractor.
- B. Properly install all control related devices, which are part of the duct system. See Section(s) describing HVAC control systems.

END OF SECTION 15850

SECTION 15980 - TEST AND BALANCE - FINAL

1.0 GENERAL

- 1.01 Scope:** HVAC Contractor shall provide the services of an independent test and balance agency to test, balance and certify the performance of the complete heating and air conditioning system, including supply and makeup air systems and all exhaust systems.
- 1.02 Job Requirements:** The Contractor shall provide to the approved test and balance agency a complete set of plans and specifications and an approved copy of all heating, ventilating and air conditioning equipment shop drawings. The Contractor shall include the cost of all pulley, belt, and drive changes, as well as balancing dampers required to achieve proper system balance recommended by the test and balance agency.
- 1.03 Agency Qualifications:** The test and balance agency shall be an approved member of AABC or NEBB that specializes in testing and balancing of heating, ventilating and air conditioning systems.
- 1.04 Guarantee:** The test and balance agency shall include a warranty period of ninety (90) days after completion and acceptable of test and balance work. During the warranty period, the Architect may request a re-check or re-setting of any outlet, supply fan, exhaust fan, or pump. The test and balance agency shall provide technicians, instruments, and tools to assist the Architect in conducting any test that he may require during this time. The foregoing shall be in addition to the A.A.M.C. National Project Certification Performance Guaranty which shall be forwarded with shop drawing data specified hereinbefore.
- 1.05** Perform all testing and balancing, adjusting and data recording necessary to establish and confirm capacity, quality and completed status of work.

2.0 PRODUCTS

- 2.01** Instruments used for test and balance shall have been calibrated within a period of six (6) months prior to the testing and balancing of this project. Letter of certification listing instrumentation used and last date of calibration shall be furnished to Architect with test report.

3.0 EXECUTION

- 3.01 National Standards:** Testing and balancing shall be performed in accordance with A.A.B.C. National Standards.
- 3.02 Logs:** Shall clearly indicate the following:
- A. All inlet and outlet areas.
 - B. All applicable duct, pipe and coil sizes.
 - C. Outside, inside, mixed and supply air conditions.
 - D. All fan speeds.
 - E. All motor ampere ranges.
 - F. Descriptions of each test method used.
 - G. Use Associated Air Balance Council log and data forms.
- 3.03** Adjust and calibrate all applicable items (e.g., controls, dampers, registers, diffusers, etc.).

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- 3.04 Set all distribution devices to properly distribute conditioned air.
- 3.05 Check all safety devices for proper operation.
- 3.06 Verify adequacy, acceptable quietness and proper continuous operation of at least 24 hours duration of all motors, compressors, fans, etc.
- 3.07 Perform spot check tests or complete tests to fully reconfirm prior test results if required by the Architect as dependent upon extent, completeness and accuracy of prior tests and logs. Do in Architect's presence if called for.
- 3.08 After air distribution devices have been balanced to distribute calculated design indicated air quantities and if temperature in any area (where such area does not have the particular zone temperature control thermostat located therein) of any zone is not maintained within 2 degrees plus or minus of the zone area which does have the zone temperature control thermostat, then notify the Architect in writing of such conditions and obtain Architect's approval to rebalance devices to obtain air quantities other than those indicated so that air temperature in entire zone will be as even as possible regardless of calculated design air quantities. After obtaining Architect's written approval to rebalance, perform such necessary rebalancing.
- 3.09 When the mechanical work is in a state of readiness for test and balance work to proceed, the test and balance contractor shall proceed with his work. If, upon this proceeding, the test and balance contractor determines that there are other items of the work (control items, sheet metal items and/or other similar specialties and proper completion of which affects the ability of the test and balance contractor to properly perform his work) which have not been completed to an extent which will allow him to complete test and balance work, then he shall make a detailed written report of these items and shall send written notification to the Contractor of such incomplete work. The Contractor shall then send a copy of this report to the Architect. The test and balance work shall not proceed until these items are corrected; such correction shall be subject to approval of Architect.
- 3.10 All mechanical systems shall be balanced to optimum performance capabilities of the equipment and the design. This shall be done in accordance with the standards published by the Associated Air Balance Council unless otherwise indicated.
- 3.11 Report: Upon completion of all testing and balancing and prior to requesting final inspection and acceptance of the project, submit three (3) complete copies of the Test and Balance Report to the Architect/Engineer for approval. No final inspection will be conducted until the final Test and Balance Report has been accepted by the Engineer. Measurements shall be taken by methods recommended in the latest AABC (Associated Air Balance Council) National Standards. All reports submitted for review shall contain all of the information required in the reports shown in latest AABC National Standards.

END OF SECTION 15980

DIVISION 16 – ELECTRICAL

SECTION 16010 - ELECTRICAL WORK – GENERAL

PART 1 GENERAL

1.01 SCOPE

- A. The Scope of electrical work shall include all labor, materials, tools, equipment and services or operations necessary for or incidental to proper installation and completion of the work as called for herein and indicated on the Drawings.
- B. Unless otherwise noted, provide all materials necessary for the mounting of all electrical equipment furnished under Division 16 or other Divisions.
- C. Make final connections to all equipment.
- D. The contractor shall furnish labor as necessary for intermediate field inspections by the Engineer.
- E. Acceptance of work will be based upon tests and inspections of work. Contractor shall furnish labor to operate systems, make necessary adjustments and assist with final inspections and tests.
- F. The contractor shall notify the Engineer in writing of any field inspector directives prior to proceeding. Failure to notify the Engineer may result in forfeit of change order.

1.02 DEFINITIONS

- A. "Provide" – Furnish, install and test, complete and ready for intended use.
- B. "Furnish" – Supply and deliver to project site, ready for subsequent requirements.
- C. "Install" – Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, test complete ready for intended use and similar requirements.

1.03 DRAWINGS AND RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this Section.
- B. Contractor shall submit bid in accordance with Instructions to Bidders or any direction provided by Owner or Architect.
- C. Provisions of this Section apply to work of all Division 16 Sections.
- D. Review all project Drawings to be aware of conditions affecting work.
- E. Drawings and Specifications are intended to be complimentary. Contractor is to perform in accordance with the requirements of both. In the event of conflict, the most stringent document/requirement will apply.
- F. Where manufacturers are listed, listing is alphabetical in nature and does not indicate preference.

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1.04 LICENSES/FEES/PERMITS

- A. Contractor shall be licensed in accordance with the rules and regulations of all applicable agencies and authorities. Proof of such licensing shall be furnished upon request.
- B. Contractor shall pay for and obtain all necessary permits, fees, meters and inspections required for his work.
- C. Contractor shall obtain certificate of final inspection at the completion of the work. Deliver inspection certificates as directed.
- D. Contractor shall pay all electric, telephone and cable utility company related charges and include them in his bid. Provide receipt for identified charges upon request.

1.05 REFERENCES

- A. Installation of materials shall comply with the following:
 - 1. Local inspection department of the authority having jurisdiction.
 - 2. The National Electrical Code (NFPA 70), latest edition adopted by the local authority having jurisdiction.
 - 3. Requirements of local telecommunication company supplying telephone/data service to the project.
 - 4. Requirements of local power company supplying electrical service to the project.
 - 5. Building Code referenced in Division 1.

1.06 TEMPORARY POWER

- A. Provide temporary power including material, tools and labor. Coordinate supply point with the local electrical power company. Temporary power shall consist of the following as a minimum:
 - 1. Meet all OSHA requirements for temporary lighting in all enclosed spaces.
 - 2. Provide general purpose 120 volt outlets at intervals as required to accommodate the use of 50' extension cords.
 - 3. Provide one (1) 30 amp, 208/240 volt outlet at a central location on every second floor for multi-story buildings.
 - 4. Provide temporary construction power for crane(s) as required.
- B. Remove all temporary materials when use is no longer required and prior to final inspection.

1.07 PROJECT COORDINATION

- A. Prior to commencing work, the Contractor shall satisfy himself as to the accuracy of all data indicated on the Drawings and/or provided by the Owner. Should the Contractor discover any inaccuracies, errors or omissions in the data, he shall immediately notify the Engineer. Commencement of work by the Contractor shall be held as an acceptance of

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the data by him after which time the Contractor has no claim resulting from alleged errors, omissions or inaccuracies of the data.

- B. Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all Contract Documents and approved shop drawings to verify exact dimensions and locations. Do not scale electrical drawings; rely on dimensions shown of architectural or structural drawings.
- C. Coordinate work in this Division with all other trades in proper sequence to insure that the total work is completed within Contract time schedule and with minimum cutting and patching.
- D. Locate all equipment, materials and apparatus symmetrical with architectural elements. Install to exact height when shown on architectural drawings. When locations are shown only on electrical drawings, be guided by the architectural details and conditions existing at job site and correlate this work with that of other trades.
- E. Install work as required to fit structure, avoid obstructions and retain clearance, headroom, openings and passageways. Cut no structural members without written approval from Structural Engineer or Architect.
- F. Because of the small scale of the Drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimension and take actual measurements on the job. Locate material, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and shall not order materials or perform work without verification. No extra compensation will be allowed because field measurements vary from the dimensions on the Drawings. If field measurements show the equipment or material cannot be fitted, the Engineer shall be consulted immediately. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach upon space assigned to another use.
- G. Materials delivered to the site shall be inspected for damage, unloaded and stored with a minimum of handling. All materials shall be stored to provide protection from the weather and damage, blocked off the ground or floor.
- H. Extent of work is indicated in the Drawings, Schedules and Specifications. Singular references shall not be construed as requiring only one device if multiple devices are shown on the Drawings or are required for proper system operation.
- I. Maintain an up-to-date set of as-built drawings on the project site at all times reflecting as-constructed changes. Drawings shall be turned over to the Architect at the time of final acceptance.
- J. Carefully examine any existing conditions, piping and premises. Compare Drawings with existing conditions. Report any observed discrepancies. Written instructions will be issued by the Engineer to resolve discrepancies.

1.08 EXCAVATION FOR ELECTRICAL WORK

- A. The Contractor shall provide all excavating, boring and backfilling operations as necessary to install the electrical work.
- B. The Contractor shall coordinate this work with that of other trades working in the same area including other underground services, landscape development, paving and floor

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slabs on grade to minimize the amount of excavating, dewatering, flood protection provisions and backfilling.

- C. The Contractor shall schedule work operations with weather conditions where possible and provide temporary facilities as needed for protection of project construction, uninstalled materials, construction personnel, and public safety including but not limited to barricades, temporary access and emergency lighting.

1.09 GUARANTEE AND SERVICE

- A. The Contractor shall guarantee all labor, materials and equipment for a period of one (1) year from the date of Substantial Completion or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.
- B. Multi-year manufacturer warranties as required in selected sections of the specifications shall be transferred to the Owner after the Contractor's year of responsibility expires.
- C. The Contractor is responsible for replacement of all equipment and materials including but not limited to lighting fixture lamps and ballasts damaged or found defective during installation and until final acceptance.
- D. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond or relieving Contractor of his responsibilities during guarantee period.

1.10 CLOSE-OUT REQUIREMENTS

- A. Assemble two (2) 3-ring binders containing all operating and maintenance manuals for the equipment provided and test reports where required. Provide a list of all major equipment and replacement items. Turn binders over to Owner within thirty (30) days of final acceptance.

PART 2 PRODUCTS/MATERIALS

2.01 EQUIPMENT

- A. The following list does not limit the scope of electrical work but is a list of major equipment and systems:
 - Transformers
 - Panelboards
 - Lighting System
 - P.A. System
 - Energy Management System
- B. The following list does not limit the scope of work performed by other trades, but does list work that design standards designate as work by other trades:
 - Furnish and install electric motors.
 - Furnish motor starters unless otherwise noted.
 - Furnish and install electro-mechanical temperature, pressure, level, flow, tamper, and solenoid control devices.
 - Furnish and install HVAC control wiring unless otherwise noted.

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- C. All materials and equipment shall be new, unused, the best of their respective kinds, suitable for the conditions and duties imposed upon them. The description, characteristics and requirements of materials to be used shall be in accordance with qualifying conditions established as follows:
1. Equipment and materials furnished under this Division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three (3) years. Where practical, all of the components shall be the products of a single manufacturer in order to provide proper coordination and responsibility.
 2. Each item of equipment shall bear a name plate showing the manufacturer's name, model number, serial number if applicable, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.
 3. The label of the approving agency, such as UL, ETL, CSA or NEMA, by which a standard has been established for the particular item, shall be in full view. Materials shall be listed by UL, ETL, CSA or other testing organization acceptable to the authority having jurisdiction for the application specified or indicated on the Drawings or Specifications.

2.02 SUBMITTALS/SHOP DRAWINGS

- A. Submittals/shop drawings and/or manufacturer's data sheet requirements are noted in the individual specification section. Quantity of submittals shall be six (6) unless otherwise noted in Division 1 of the specifications.
- B. Submit shop drawings and any other drawings specifically called for in other sections. Shop drawings shall consist of plans sections, elevations, and details to scale (not smaller than 1/4" per foot) with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the contractor are not acceptable. The contractor will not be furnished electronic files of the Division 16 Drawings. The contractor shall coordinate obtaining architectural backgrounds in electronic form with the Architect.
- C. Submittals/shop drawings shall bear a stamp by the electrical subcontractor and the general contractor indicating they have been reviewed and that the equipment proposed is compatible without exception with the contract documents. Submittals/shop drawings without such stamp shall be returned without review by the Engineer.
- D. The Contractor is specifically advised that one (1) set of re-submittal/shop drawings shall be allowed.
- E. Catalog numbers and model numbers indicated in the Drawings and Specifications are used as a guide in the selection of the equipment and are only listed for the Contractor's convenience. The Contractor shall determine the actual model numbers for ordering equipment, accessories and other materials in accordance with the written description of each item and with the intent of the Drawings and Specifications.

2.03 SUBSTITUTIONS

- A. Where a particular system, product or material is specified by name, consider it as the standard basis for bidding and base proposal on the particular system, product or material specified. Other systems, products, equipment or materials may be accepted only if in the opinion of the Engineer, they are equivalent in quality and workmanship and will perform satisfactorily its intended purpose or design levels established by the

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Engineer. All such substitutions in materials or equipment shall be approved in writing by the Engineer. Decisions made by the Engineer are final and are not subject to further debate.

- B. In making requests for substitutions, the Contractor shall list the particular system, product, equipment or material he wishes to substitute and at bid time the Contractor shall state the amount he will deduct from his base bid if the substitution is approved by the Engineer.
 - C. Requests by Contractor for substitutions will be considered only when reasonable, timely, fully documented and qualifying under one or more of the following circumstances:
 - 1. Required product cannot be supplied in time for compliance with Contract time requirements through no fault of the contractor.
 - 2. Required product is not acceptable to governing authority, or determined to be non-compatible or cannot be properly coordinated, warranted or insured or has other recognized disability as certified by the Contractor.
 - 3. Substantial cost advantage is offered Owner after deducting off-setting disadvantages including delays, additional compensation for re-design, investigation, evaluation and other necessary services by the Engineer, other trades or other similar circumstances. Compensation due to re-design by the Engineer necessitated by substitutions shall be at the Engineer's standard hourly billing rates then in effect and payable upon receipt of modified documents. A signed agreement to that effect is required of the Contractor prior to re-design.
 - 4. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but not be limited to data as follows for both the specified and substitute products:
 - Principle of operation
 - Materials of construction or finishes
 - Dimensions (L, W, H) and thickness of materials
 - Weight of item
 - Deleted features or items
 - Added features or items
 - Changes in work under other divisions caused by the substitution
 - Performance and rating data
 - Manufacturer's warranty
- If the approved substitution contains differences or omissions not specifically called to the attention of the Engineer, the Engineer reserves the right to require equal or similar features to be added to the substituted products at the Contractor's expense.

2.04 TESTING

- A. Where testing of product or installation by an independent testing agency is required or selected by the contractor, the following requirements shall be met.
 - 1. The testing firm shall be an independent testing organization which shall function as an un-biased testing authority, professionally independent of the

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manufacturers, suppliers and installers of equipment or systems evaluated by the testing firm.

2. The testing firm shall be regularly engaged in the testing of electrical equipment, devices, installations and systems.
3. The testing firm shall utilize technicians who are regularly employed by the firm for testing services.
4. The testing firm shall submit proof of the above qualifications with the bid documents.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All materials, fixtures and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practices.
- B. Special attention shall be given to the appearance of electrical installations exposed to view. Any materials which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Engineer.
- C. Protect equipment and fixtures at all times during storage and construction. Contractor shall replace all equipment which is damaged as a result of inadequate protection including exposure to condensation.
- D. Pay particular attention to Specification sections for excavation, backfill, cutting, patching and painting requirements.
- E. Remove all flammable debris from the building before the end of each workday.
- F. Contractor shall repair all remodel penetrations made by his forces to original condition, paying particular attention to preservation of original fire ratings. Contractor shall submit UL Fire Resistance Directory details for all penetrations through fire rated assemblies (W-L-1001 for walls and C-AJ-1045 for floors or equivalent for new construction).
- G. Provide final connection to all equipment shown on the Drawings. The actual connections shall be made to fully suit the requirements of each location and adequately provide for servicing of the equipment.
- H. Provide local disconnecting means for all equipment except where specifically noted on the Drawings to be furnished by others.
- I. Verify all equipment ratings prior to connection and notify Engineer of any discrepancy prior to proceeding with final connection.
- J. Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Engineer and the Owner. This work shall be performed at the convenience of the Owner. Outages must be scheduled through the Engineer. Extent, length and timing of outages shall be reviewed by the engineer. Services shall be restored the same day when possible. Provide temporary service as required to maintain Owner's operation for all outages exceeding 12 hours.

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- K. Bolt equipment directly to concrete pads or foundation using hot-dipped galvanized anchor bolts, nuts and washers. Set equipment level utilizing galvanized shims where necessary.
- L. Touch-up of factory finishes on all electrical equipment shall be done under Division 16. Obtain factory matched color coatings from the manufacturer and apply as directed by manufacturer. If corrosion is discovered during inspection on the surface of any equipment, clean, prime and paint as required.
- M. Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Re-paint or touch up to look like new. Vacuum interior of all equipment.
- N. Start each piece of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specifications, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety and operating controls shall be included in start-up check.

END OF SECTION 16010

SECTION 16111 - CONDUIT

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. None required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide assembly of conduit, tubing and fittings including but not limited to conduit, connectors, couplings, offsets, elbows, straps, bushings, expansion joints, hangers and other components and accessories as required for a complete system. All products shall be of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. Metal Conduit, Tubing and Fittings: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) for each service indicated and meeting the following requirements:
 - 1. Rigid Metal Conduit (RMC – NEC. Art. 344): ANSI C80.1, UL 6. Provide hot-dipped galvanized inside and outside. Fittings shall be threaded type.
 - 2. Intermediate Metal Conduit (IMC – NEC Art. 342): ANSI C80.6, UL 1242. Provide galvanized outside and paint, zinc or enamel inside. Fittings shall be threaded type.
 - 3. Electrical Metallic Tubing (EMT – NEC Art. 358): ANSI C80.3, UL 797. Provide galvanized outside and paint, zinc or enamel inside. Fittings shall be zinc-coated steel, die-cast (interior), set-screw compression type (when exposed to weather).
 - 4. Flexible Metal Conduit (FMC – NEC art. 348): Provide zinc-coated steel, maximum allowable length of 6 feet. Minimum size 1/2". Provide positive locking type cadmium plated steel or malleable iron fittings.
 - 5. Liquid-Tight Flexible Metal Conduit (LFMC – NEC Art. 350): Provide liquid-tight flexible metal conduit with smooth-wall internal wiring channel. Conduit shall be constructed of single strip, flexible, continuous, interlocked and double-wrapped steel, galvanized inside and outside and coated with a liquid-tight, sunlight-resistant, non-metallic jacket. Maximum allowable length of 6 feet. Minimum size 1/2". Liquid-Tight Flexible Metal Conduit Fittings: Provide cadmium plated steel or malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings.
- C. Rigid Non-metallic Conduit (RNC – NEC Art 352): Provide non-metallic conduit of types, grades, sizes and weights (wall thickness) for each service indicated and meeting the following requirements:

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1. PVC: NEMA TC-2: Schedule 40 and Schedule 80. Minimum Size 3/4". Rigid Non-metallic Conduit Tubing and Fittings: Provide non-metallic fittings of types, grades, sizes and weights (wall thickness) for each service indicated.
2. HDPE: NEMA TC-7: Schedule 40 and Schedule 80. Minimum size 3/4". Rigid Non-metallic Conduit Tubing and Fittings: Provide non-metallic fittings of types, grades, sizes and weights (wall thickness) for each service indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all conduit and tubing products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Install concealed conduits in new construction work, either in walls, slabs, below slabs or above hung ceilings. Run conduits concealed in existing work where practical. Where conduits cannot be concealed in finished areas, use surface metal raceways.
- C. Provide RMC or IMC in areas where exposed conduit could be subject to physical damage and on exposed portions of service entrance. Conduits emerging from floor up to 10'-0" AFF.
- D. Provide EMT in all interior, exposed and/or concealed areas except where indicated as RMC, IMC, RNC or FMC. Minimum size 1/2".
- E. Provide MC Cable assembly in lieu of conduit at contractor's option where use is permitted by specification section 16123.
- F. Provide RNC Schedule 40 for direct buried runs below grade, in reinforced floors, concrete walls and roofs. Minimum size 3/4" for all underground conduit unless otherwise noted. Conduits larger than 1" shall be run under slab, not in slab unless otherwise noted. Do not use HDPE under slab.
- G. For direct buried conduit runs less than 50', provide PVC, Schedule 80 elbows. For conduit runs more than 50', provide rigid galvanized steel elbows coated with Bitumastic. Provide long sweep elbows for utility applications.
- H. Provide FMC for connections from outlet boxes to recessed light fixtures. 6' maximum length.
- I. Provide FMC for connections to motors and other equipment subject to movement and/or vibration. 24" maximum length.
- J. Provide LFMC where subjected to one or more of the following conditions:
 1. Exterior locations.
 2. Moist to humid atmosphere where condensate can be expected to accumulate.
 3. Corrosive atmosphere.
 4. Subjected to water spray or dripping oil, water or grease.

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- K. Provide steel compression type EMT fittings in weatherproof required areas.
- L. Provide 6" minimum separation from un-insulated hot water pipes, steam pipes, heater flues or vents.
- M. Provide 24" minimum cover for runs below finished grade outside of buildings unless otherwise noted.
- N. Provide minimum concrete cover of 1-1/2 times conduit size for conduits in poured concrete but not less than that required to maintain fire ratings.
- O. Route conduit to minimize number of elbows.
- P. Provide protection on inside of conduits against dirt, rubbish during construction by capping all openings with steel, plastic or heavy paper caps or pennies. Do not use duct tape to protect conduits.
- Q. Provide conduit bodies for exposed conduits runs at junctions, bends or offsets where required. Do not use elbows or bends around outside corners of beams, wall or equipment. All conduit body covers shall be accessible.
- R. Make all field cuts square and ream out to full size.
- S. Provide a minimum of (1) 3/4" empty conduit for every (3) single pole or fraction thereof of spare circuit breakers, spaces and not less than (2) 3/4" conduits from every flush mounted panel to an accessible space above or below.
- T. Provide watertight flashing on all conduits penetrating roof. Flashing means shall be "boot" type, sealed with stainless steel adjustable clamps and silicone sealant or pitch pan type. Provide pitch pan where not supplied by others. Coordinate allowable penetration locations and installation procedures with roofing contractor.
- U. Provide polypropylene or nylon pull-line in all empty or spare conduits. Lines are to be pulled full length and tagged at both ends designating opposite terminus.
- V. Install all exposed conduits parallel or perpendicular to structural elements or building lines. Do not install exposed horizontally on walls below 15' AFF or AFG. All vertical runs below 15' AFF or AFG shall be RMC or IMC.
- W. Provide glue-on PVC caps on all empty conduits stubbed-out underground. Mark end of conduit with flush in-ground marker.
- X. Provide expansion/deflection fittings in all raceways where structural expansion joints are crossed including exposed, concealed, in slab and underground locations. Junction boxes connected by FMC or LFMC are not acceptable.
- Y. Provide wire mesh grip style vertical conductor supports in all vertical conduit runs in accordance with NEC requirements.
- Z. Provide fire stopping materials for all rated penetrations as described on the Drawings. Refer to Specification 16010.
- AA. Provide all offsets, couplings, fittings, etc. as necessary to coordinate with structural, architectural, mechanical, etc. items.

END OF SECTION 16111

SECTION 16112 - RACEWAYS/WIREWAYS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on multi-outlet assemblies, underfloor raceways and wall/trench duct in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide assembly of raceway, and fittings including but not limited to raceway, connectors, couplings, offsets, elbows, hold-down straps, wire retainers, expansion joints, hangers and other components and accessories as required for a complete system. All products shall be of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. General Purpose Wireways: Constructed in accordance with UL standard 870. Provide materials meeting the following requirements:
 - 1. Interior Use: NEMA 1 with screw covers. Constructed of 16 gauge sheet metal for 2 1/2", 4" and 6" square sections. Constructed of 14 gauge sheet metal for 8" square and larger section. Provide with concentric knockouts. Finish shall be baked enamel over corrosion resistant coating.
 - 2. Exterior Use: NEMA 3R with drip shield cover. Constructed of 16 gauge sheet metal for 2 1/2", 4" and 6" square sections. Constructed of 14 gauge sheet metal for 8" square and larger sections. Provide with no knockouts. Finish shall be galvanized steel.
- C. Surface Metal Raceways: Constructed in accordance with UL standards. Provide materials meeting the following requirements:
 - 1. Dry locations only: Base and cover of steel material, minimum 0.040" thickness. Provide wiring compartment divider for separation of line voltage and low voltage wiring where indicated. Finish shall be minimum of baked enamel over corrosion coating and suitable for field re-painting.
- D. Multi-outlet Assemblies: Constructed in accordance with UL standards. Provide materials meeting the following requirements:
 - 1. Dry locations only. Base and cover of steel material, minimum 0.040" thickness. Provide devices, device covers and manufacturers pre-wired assemblies where/as indicated on Drawings. Provide wiring compartment divider for separation of line voltage and low voltage wiring where indicated. Finish shall be minimum of baked enamel over corrosion coating and suitable for field re-painting.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install raceway/wireway products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Install all raceway/wireway systems to form a continuous electrical conductor and connect to boxes, conduits, fittings and cabinets as to provide effective electrical continuity and rigid mechanical assembly.
- C. Provide proper fitting for change of direction in raceway/wireway. No field bends of raceway/wireway sections will be permitted.
- D. Provide proper structural supports for all raceway/wireway for their entire length. Raceways/wireways are not to span any space unsupported.
- E. Seal all joints of underfloor duct system with manufacturer's sealing compound prior to placing concrete.
- F. Make all field cuts square, file down raw edges and paint to reduce corrosion.
- G. Install all raceway/wireway system level and square with structural elements or building lines and at proper heights/elevations.
- H. Ensure adequate concrete cover for all floor/trench duct is achieved in accordance with NEC requirements.

END OF SECTION 16112

SECTION 16123 - BUILDING WIRE AND CABLE/CONNECTORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, IPCEA, ASTM, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. None required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide wire, cable assembly and connectors of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. Wire: Provide factory –fabricated wire of the size, rating, material and type as indicated for each service indicated. Provide materials meeting the following requirements:
 - 1. Copper: Provide copper conductors with conductivity rated not less than 98% at 20 deg C (68 deg F).
 - A. Insulation shall be type THHN/THWN for all power and lighting wiring.
 - 2. Aluminum: Provide aluminum compact sector conductors manufactured of AA-8000 Series aluminum alloy in accordance with UL Standard 44. Insulation shall be type XHHW-2 unless otherwise noted.
- C. Cable Assembly: Provide Metal-Clad Cable, Type MC meeting the following requirements:
 - 1. Conductors shall be copper, minimum #12 AWG and maximum of #10 AWG.
 - 2. Provide fully rated ground in cable assembly.
- D. Flexible Wiring System: Provide flexible wiring system at contractor's option when used as part of high bay warehouse lighting installation only. Product shall be equal to "Reloc" as manufactured by Lithonia lighting.
- E. Systems: Provide wiring in accordance with system specification, i.e. Fire Alarm – Section 16721. Applies to all special systems.
- F. Connectors/Terminals: Provide factory-fabricated, connectors of the size, rating, material, type and class as required for each service meeting the following requirements:
 - 1. Provide split bolt connectors for copper conductor splices, #6 AWG and larger. Tape un-insulated conductors and connector with insulating pads and electrical tape to 150 percent of insulating rating of conductor.

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2. Provide insulated spring wire connectors with plastic caps for copper conductor splices and taps, #8 AWG and smaller.
3. Provide ALUMINUM COMPRESSION TERMINALS for aluminum-alloy conductors.
4. Where aluminum wire is indicated on the drawings, apply oxide inhibiting compound prior to terminating. Any indicated taps are to be made with IlSCO type PTA taps. Aluminum split bolt connectors are prohibited. Increase conduit accordingly for 40% fill.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install building wire and cable products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. All conductors shall be copper unless otherwise noted. Minimum aluminum circuit size is 100 amps.
- C. Minimum size conductors are #12 for power and lighting functions and #14 for control functions.
- D. Use solid conductors for feeders and branch circuits #10 AWG and smaller. Use stranded conductors for all others.
- E. Use stranded conductors for control circuits.
- F. Clean conduit system to be free of dirt and moisture prior to installing conductors. Install all conductors into conduit/raceway simultaneously.
- G. Check conduit system to be complete with no loose or damaged connections or conduit sections prior to installing conductors.
- H. Provide insulated conductors in accordance with the following color code:

<u>CONDUCTOR</u>	<u>SYSTEM VOLTAGE</u>	
	<u>208Y/120</u>	<u>480Y/277</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green
Isolated Ground	Green/Yellow Stripe	Green/Yellow Stripe

For conductors #8 AWG and larger, permanent plastic colored tape may be used to mark conductor end in lieu of colored insulation. Tape shall cover not less than 2" of conductor insulation within enclosure.

- I. Provide an equipment grounding conductor in all raceways except service lateral regardless of indication of Drawings.

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- J. Do not exceed manufacturer's recommended values of allowable pulling tensions and sidewall pressures.
- K. Splices in feeders are not permitted.
- L. Provide wire mesh style vertical conductor supports on all vertical conductor runs in accordance with NEC requirements.
- M. Install exposed cable assemblies parallel and perpendicular to structural elements or building lines and follow surface contours where possible. Tie wrap to joists at intervals as required by NEC.
- N. Use manufacturer-approved pulling compound or lubricant where necessary. Compound must not deteriorate conductor or insulation or harden with time preventing the removal of conductors.
- O. Tighten electrical connectors and terminals in accordance with manufacturer's published torque values. If manufacturer's values are not indicated, follow the values published in UL 486A and 486B.
- P. Use hydraulic compression to install ALUMINUM COMPRESSION TERMINALS. Use oxidation inhibitor prior to installation.
- Q. Clean and prepare all conductor surfaces before installing lugs and connectors.
- R. Neatly train and lace wiring within panelboards, enclosures and boxes.
- S. Run all parallel feeder conductors and ground full length of all wiring troughs. Make all connections in wireway using staggered multiple tap, dual rated connectors.
- T. Check conductors, cable installation for continuity and to be free from shorts using appropriate voltage "Megger" on all feeders prior to energizing circuit. Correct malfunction when detected.
- U. When removing insulation for terminations, do not damage conductors by ringing or removing strands.
- V. Where multiple conductors are terminated with a common/single lug, lug shall be listed as suitable for application.
- W. All connections made in in-ground junction boxes or handholes shall be made with waterproof, snap-lock, gel-filled connector kits equal to CMC #DSR2/0 or Raychem #GTAP-2 and King "Dry-Conn" wirenuts for fuse to fixture connection.

END OF SECTION 16123

SECTION 16130 - BOXES/FITTINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on floor boxes and accessories in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide box or fitting assembly of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. Outlet boxes, interior locations: Provide galvanized flat rolled sheet steel outlet wiring boxes to suit each respective location and use meeting the following requirements:
 - 1. Provide boxes with pre-punched stamped knockouts in back and sides and with threaded screw holes with corrosion-resistant screws for securing box covers, extension rings and devices.
 - 2. Provide minimum of 4" square boxes unless otherwise noted.
 - 3. Provide device rings suitable for the applicable devices for boxes concealed in walls.
 - 4. Provide raised covers suitable for the applicable devices for exposed boxes.
- C. Outlet boxes, exterior locations: Provide corrosion resistant, cast-metal weatherproof outlet wiring boxes to suit each respective location and use meeting the following requirements:
 - 1. Provide boxes with threaded conduit entrances in back and ends and with adjustable mounting ears.
 - 2. Provide cast-metal faceplates/covers with spring-hinged waterproof caps suitable for the applicable device in each weatherproof location. Provide corrosion-resistant screws and faceplate/cover gaskets.
 - 3. Provide cast-metal faceplate and deep plastic cover (wet while in use) suitable for the applicable device in each "wet" location. Provide corrosion-resistant screws and faceplate/cover gaskets. Cover is equal to Taymac.
- D. Junction and Pull boxes: Provide galvanized code gauge sheet steel junction and pull boxes with welded seams. For interior locations, provide screw-on covers. For exterior locations, provide weatherproof covers conforming to NEMA 3R requirements.

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- E. Conduit Bodies: Provide corrosion resistant, cast-metal weatherproof conduit bodies to suit each respective location and use meeting the following requirements:
 - 1. Provide bodies with threaded conduit entrances and removable covers.
 - 2. Provide corrosion-resistant screws and cover gaskets.
- F. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant punched-steel knockout closures, conduit locknuts, conduit bushings and offset connectors of size and type to suit respective locations and uses.
- G. Sealing Fittings: Provide cadmium plated, malleable iron sealing fittings complete with barriers and filler material of size and type to suit respective locations and uses. Provide sealing type washers where required.
- H. In-Ground Splice Boxes: Provide polymer-concrete, open-bottom utility style box in accordance with schedule on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install boxes/fittings products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Provide a minimum of 6" horizontal separation of boxes installed in walls. Do not install boxes back-to-back.
- C. Do not install cast aluminum boxes/fittings in concrete.
- D. Arrange junction in rated partitions as required to satisfy the requirements of the UL Fire Resistance Directory.
- E. Provide sealing fittings in all conduit runs entering areas of extreme temperature differential.
- F. Do not use round boxes where conduit must enter through side of box.
- G. Rigidly fasten boxes to surfaces on which they are mounted, or solidly embed boxes in concrete or masonry.
- H. Install hinged-cover boxes, enclosures and cabinets plumb such that covers will remain in either open or closed position. Support boxes at each corner.
- I. Provide pull and junction boxes where required by code whether or not they are shown on the Drawings. All boxes shall be legibly marked to indicate circuits or contents therein.
- J. Inspect factory finished boxes after installation and repair damaged finishes.
- K. Provide bonding pigtails in all metal boxes and assure that all metal boxes are grounded.
- L. Provide horizontal framing members between studs as required to assure that multiple boxes installed in one location are arranged for a maximum of 6" spacing between boxes.

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- M. Adjust switch locations at above counter locations to match receptacle locations for appearance and uniformity.
- N. Clean all boxes free of debris prior to closing, covering or installing devices.

END OF SECTION 16130

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SECTION 16140 - WIRING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on wiring devices in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide devices of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings or meeting the following requirements:

1. Wall Switches: White unless otherwise noted.

DESCRIPTION	RATING	LEVITON	HUBBELL	P & S
SPST	20A, 277V	CS120-2W	CS120W	CS20AC1-W
DPST	20A, 277V	CS220-2W	CSB220W	CSB20AC2-W
3 WAY	20A, 277V	CS320-2W	CS320W	CS20AC3-W
4 WAY	20A, 277V	CS420-2W	CSB420W	CSB20AC4-W
SPST KEY LOCK	20A, 277V	1221-2L	HBL1221L	PS20AC1-WL

2. Wall Receptacles: White unless otherwise noted.

DESCRIPTION	RATING	LEVITON	HUBBELL	P & S
DUP	20A, 120V	BR20-W	CR20WHI	CR20-W
DUP ISO GND ORANGE	20A, 120V	5362-IG	IG5362	IG6300
DUP GFI	20A, 120V	6899-W	GF5352WA	2094-W

3. Specialty Devices: Provide devices of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings or meeting the following requirements:
- a. Timer Switch: Designer Style, adjustable, 5 min. - 12 hrs, Digital LCD display, countdown timer. 100-300 VAC, 1200 watts, 5 year warranty, white. WattStopper #TS-400-W or equal.
 - b. Fan/Light Dimmer Switch: Designer Style, 120VAC, 1.5 A fan, 360 W light. Single pole full range dimmer with 3-speed fan control, white. Lutron #S2-LFSQ-WH. or equal.

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- c. Light/Fan Delay Switch: Designer Style, 120 VAC, 500 watts light, 1/6 HP fan. Adjustable 20, 40 60 min. time delay on fan. White. P&S #DEFL44L-WH or equal.
- B. Device Plates: Provide device plates matching and coordinated with installed device meeting the following requirements:
 - 1. Plates shall be standard size, thermoset, non-combustible opaque plastic, white unless otherwise noted.
 - 2. Where plates are noted on drawings to be engraved, provide standard size, 302 grade stainless steel. Engraving shall be red enamel in-fill paint. If plates are plastic, a clear adhesive label with black 1/4" text shall be submitted for approval to the Architect.
 - 3. Provide jumbo size plates where required to cover defects in wall construction.
 - 4. Provide all plates with manufacturer's colored screws matching faceplate material.
 - 5. Provide 302 grade stainless-steel device plates on all devices located within kitchen or food prep areas.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate device installation with work of other trades. Provide protection from wall-board compound, paint, dirt, dust and other debris.
- B. Clean all outlet boxes prior to device installation and again prior to installing cover.
- C. Provide and install wiring devices after all wiring installation work is completed.
- D. Install all devices such that removal of device will not affect circuit integrity or operation.
- E. Install all grounded receptacles devices in the following manner:
 - 1. All devices installed below counter height (30") shall be installed with ground pin up unless otherwise noted.
 - 2. All devices installed at counter height (30") or above shall be installed with ground pin right (horizontal) unless otherwise noted.
 - 3. All devices locally switched shall be installed 180 degrees from defined method.
- F. Install all device plates so that they are plumb and level.
- G. Test all devices for proper grounding, wiring polarity, and that switches controlling the intended device and ground/arc fault devices are working properly.

END OF SECTION 16140

SECTION 16145 - LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on lighting control devices in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide lighting control devices from a same manufacturer.
- B. Provide photoelectric control cells and time clocks of ratings and types which comply with manufacturer's standard design, material, components and construction in accordance with published product information and as indicated on the Drawings.
- C. Provide photoelectric control cells meeting or exceeding the following:
 - 1. Enclosure shall be die-cast zinc, gasketed for weather protection and designed for stem mounting.
 - 2. Cell shall be cadmium sulfide type with built-in time delay to minimize false switching.
 - 3. Control function shall be adjustable from 1-15 fc operation.
 - 4. Cell shall have 5 year warranty, equal to Tork 2100 Series.
- D. Provide time clocks meeting or exceeding the following:
 - 1. Enclosure shall be NEMA 1 for indoor applications unless otherwise noted on the Drawings.
 - 2. Enclosure shall be NEMA 3R for outdoor applications unless otherwise noted on the Drawings.
 - 3. Time clocks shall be electronic astronomic type, single throw with contacts rated 20A-general purpose, 120/277 VAC. Intermatic ET8000C Series. See plans for model number.
- E. Provide photoelectric control cells and time clocks manufactured by one of the following:
 - 1. Intermatic
 - 2. Paragon
 - 3. Tork

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PART 3 EXECUTION

3.01 INSTALLATION

- A. Install photoelectric control cells and time clocks indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Provide all necessary mounting hardware as required for rigid mounting of each starter.
- C. Install all devices plumb.
- D. Mount photoelectric cell minimum of 12" above finished roof and aim cell towards northern sky. Adjust for approximately 5fc ON.
- E. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION 16145

SECTION 16170 - GROUNDING AND BONDING

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. None required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide assembly of ground rods, couplings, clamps, conductors, connectors and fittings as required for a complete ground or bond connection. All materials shall be of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the drawings.
- B. Wire: Provide stranded bare soft drawn copper wire for electrode grounding conductors and insulated green colored stranded copper conductors of the same type as current carrying conductors for equipment grounds and bonds. For aluminum feeders, provide copper conductors for grounding and bonding applications.
- C. Clamps: Provide Weaver style clamps, exothermic welds equal to "Cadweld" or "U" type clamps (pipe only) as required by location or as indicated on the drawings.
- D. Rods: Provide copper-clad steel type rods for all driven ground rods unless otherwise noted. Minimum size 3/4" x 10'-0", minimum of (2) rods unless otherwise noted.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all grounding and bonding products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. The grounding system shall be installed to protect against static charges and to provide personnel protection through the service ground to all electrical equipment. All parts of the electrical system shall be positively grounded in accordance with the requirements of the NEC and all other applicable local and state codes.
- C. Provide connection to the reinforcing steel (20' continuous minimum) in the foundation system and structural steel columns using exothermic methods and materials.
- D. Provide connection from the grounding electrode to the electrical service system neutral at service entrance equipment.
- E. Provide grounding connection to interior metal water piping within 5' of water pipe(s) entrance to the building.

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- F. Grounding connections to equipment, grounding bus bars, etc. shall be made using lugs and threaded stud connectors to facilitate removal for testing and maintenance.
- G. Provide grounding connection to gas piping upstream from equipment shut-off. Underground portions of gas piping system shall not be permitted to serve as a grounding electrode.
- H. Exposed grounding and bonding conductors susceptible to mechanical damage shall be protected by an adequate length of Schedule 80 PVC conduit secured with PVC straps and stainless steel screws.
- I. Surfaces where grounding connections are to be made shall be clean and dry. Steel surfaces shall be ground or filed to base metal and cleaned with abrasive cloth to remove oxides before making connections.
- J. Install equipment grounding conductors in all feeders, branch circuits and raceways (except service entrance).
- K. Install grounding bus on telephone boards. Use insulated spacer; space 1 inch from board.
- L. Route grounding conductors and connections to ground and protective devices in shortest and straightest paths possible to minimize transient voltage rises.
- M. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- N. Provide irreversible compression or exothermic weld connections where required by local codes.
- O. Do not install ground rods directly beneath switchboards. Locate grounds in accessible locations. Do not locate ground rods where they would create a "tripping" hazard. Accurately record service ground rods on as-built drawings.
- P. Provide inspection and maintenance in-ground handhole for service ground rods. Refer to handhole schedule on Drawings.
- Q. If telephone service is located greater than 20' from electrical service, provide additional grounding electrode and conductor as described by NEC 800.
- R. Connect nearest lightning protection ground terminal to service grounding electrode using lightning protection main sized buried conductor.
- S. Upon completion of installation of electrical grounding and bonding systems and prior to energizing any equipment or gear, test ground resistance with ground resistance tester using "3-point fall-of-potential" method with utility neutral disconnected. Where tests show resistance-to-ground in excess of 25 ohms, take appropriate action to reduce resistance to less than 25 ohms by driving additional ground rods. Re-test to demonstrate compliance. Submit final test report to Engineer upon request.

END OF SECTION 16170

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, OSHA, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. None required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide manufacturer's standard products of categories and types as required for each application unless otherwise noted.
- B. For each electrical conduit system indicated, provide identification of conduits that are exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. If power conduit, indicate panel and circuit numbers contained therein. Markings may be permanent marker directly on the conduit, neatly and legibly written.
 - 1. Conduit markings shall be at ends of conduit runs, near switches and/or other control devices, near items of equipment served by the conductors, at points where conduits pass through walls, or floors or enter non-accessible construction and at spacing of not more than 50' along each run of conduit.
 - 2. Switch-leg conduit and short branches for power connections need not be marked where use is obvious and except where conduit is larger than 1".
- C. For all cables and conductors installed in interior locations, provide manufacturer's standard vinyl-cloth self-adhesive markers, plastic-coated pre-numbered wrap-around style or job site printed thermal transfer type. Brady, Panduit or approved equal.
- D. For all cables and conductors installed in exterior locations such as manholes, handholes, etc., provide die-stamped, 1" brass tags.
- E. For all equipment, provide nameplates meeting the following requirements:
 - 1. Provide engraved, plastic-laminate signs at locations of major units of electrical equipment including panelboards, control centers, switches/switchgear, enclosures, transformers, safety switches/disconnects, lighting controls, exhaust fans, emergency generating units, and master units of telephone, clock program, sound, signal, alarm, fire alarm, TV and similar systems.
 - 2. Signs shall be minimum 1" wide plate with minimum 1/4" lettering as follows:
 - a. Normal Power: Black background with white letters.
 - b. Emergency Power: Red background with white letters.

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- c. Service Plaques: Red background with white letters.
- 3. Multiple mains at separate and remote locations shall be identified and reader shall be directed to location of all other mains using minimum of 5" x 7" sign. Lettering shall be in accordance with NEC 230.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all electrical identification products as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC, OSHA and complying with recognized industry practices to insure products serve intended function.
- B. Where identification is to be applied to surfaces that require finishing, install identification after completion of painting.
- C. Provide warning signs where there is a hazardous exposure or danger associated with access to or operation of electrical facilities.
 - 1. Provide text of sufficient brevity, clarity and lettering size to convey adequate information at each location.
 - 2. Signs shall be permanently secured by mechanical mounting with self-tapping, stainless-steel screws, stainless-steel rivets or 10/32 stainless-steel machine bolts with nuts and lock washers in an appropriate and effective location.
 - 3. Do not locate signs behind doors of panels, switchboards or motor controls.
- D. Wherever reasonably required to insure safe and efficient operation and maintenance of electrical systems, including prevention of misuse by unauthorized personnel, provide signs on switches, outlets and other controls, devices and covers of electrical enclosures.
- E. Provide warning signs where there is a hazardous exposure or danger associated with access to or operation of electrical facilities in or about the project.
- F. Apply cable/conductor identification at origin and termination. Match identification with marking system used in panelboards, shop drawings and contract documents.

END OF SECTION 16195

SECTION 16441 - DISCONNECTS AND SAFETY SWITCHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on disconnects and safety switches in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide disconnects and enclosed safety switches of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. Enclosures shall be surface-mounted, heavy-duty, sheet steel of the type and size indicated on the drawings.
- C. Switches shall be quick-make, quick-break type and constructed so that switch blades are visible in the OFF position with door open.
- D. Switches shall be equipped with operating handles that are lockable in both ON and OFF positions, interlocked with cover and have bypass function.
- E. Switches shall be UL listed for Service Entrance applications where indicated on the Drawings.
- F. Switches shall be equipped with bonding/grounding bar.
- G. Provide NEMA type 1 for indoor applications.
- H. Provide NEMA type 3R for applications exposed to weather.
- I. Provide NEMA type 4 for applications exposed to water spray, wash-down, etc.
- J. Provide fusible switches with rejection clips.
- K. All switches shall be 600 volt rated unless otherwise noted.
- L. Provide all switches with line side and load side lugs as required to accommodate conductors indicated on the drawings.
- M. Provide elevator motor disconnect switches with auxiliary contact kit for controller interlock.
- N. Provide switches manufactured by one of the following:
 - 1. Cutler Hammer

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2. General Electric
3. Siemens
4. Square D

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install disconnects and safety switches indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Switches shall be installed in accessible locations and mounted on or in the visible vicinity of the equipment served.
- C. Provide all necessary mounting hardware as required for rigid mounting of each switch.
- D. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION 16441

SECTION 16461 - DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on dry type transformers in accordance with Section 16010 requirements.
- B. Provide outline and support dimensions of enclosures and accessories, unit weight, voltage KVA and impedance ratings, tap configuration, insulation system type and rated temperature rise.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide dry type transformers, NEMA TP1-1 rated, of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the drawings.
- B. Provide NEMA type 1 for indoor applications.
- C. Provide NEMA type 3R for applications exposed to weather. Factory furnished rain-shield adaptors are acceptable.
- D. Provide transformers with aluminum windings unless otherwise noted.
- E. Provide transformers with Class 220 insulating system with 150 degrees C average winding temperature rise.
- F. Provide wiring connectors suitable for copper or aluminum wiring.
- G. Provide transformers with full capacity taps as follows:
 - 1. 15 KVA and below: 2-5% FCBN
 - 2. 30 KVA and above: 6-2.5%, 2+ 4-
- H. Provide transformers with sound pressure ratings in accordance with NEMA Standard Sound levels for KVA sizes.
- I. Provide manufacturer's standard brackets for transformers up to 30 KVA wall mounted units.
- J. Provide field fabricated, trapeze style mount where transformers are indicated to be ceiling/structure mounted.

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- K. Provide dry type transformers manufactured by one of the following:
 - 1. Siemens
 - 2. Square D
 - 3. Cutler Hammer
 - 4. General Electric

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install dry-type transformers indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Set transformers plumb and level.
- C. Install transformers rated 30 KVA and smaller, wall mounted.
- D. Install transformers rated larger than 30 KVA, floor mounted unless otherwise noted.
- E. Coordinate transformer installation work with electrical raceways and wire/cable work as necessary for proper interface and to avoid unnecessary lengths, crossovers, etc.
- F. Use flexible metal conduit, 2 feet minimum length for connections to transformers enclosure. Make conduit connections to side panel of enclosure.
- G. Install floor mounted transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
- H. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- I. Upon completion of installation, energize primary circuitry at rated voltage and frequency from normal power source and test transformer to demonstrate compliance with requirements. Adjust transformers taps to provide optimum voltage conditions at utilization equipment throughout normal operating cycle of facility. Record primary, secondary voltage and tap setting and submit with close-out documentation.

END OF SECTION 16461

SECTION 16470 - PANELBOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data on panelboards and enclosures, dimensions of which shall not exceed those as shown on the Drawings or as called out in this section. Indicate voltage, main bus arrangement and rating, circuit breaker and/or fusible switch arrangement and sizes. Include applicable series short circuit ratings information where it is applied.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide panelboards of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by the manufacturer and as indicated on the Drawings.
- B. Power distribution panelboards shall be dead-front, safety type power distribution with protective devices in quantities, ratings, types and with arrangement as shown on the Drawings. Bussing shall be tin-plated aluminum. Circuit Breaker power distribution panelboards shall be equal to Square D "I-Line" or equal.
- C. 277/480 volt Lighting panelboards shall be dead-front, safety type lighting panelboards with circuit breakers as shown on the Drawings. Circuit breakers shall be bolt-on type. Bussing shall be tin-plated aluminum. Panelboards shall be Square D "NF" or approved equal.
- D. 120/208 volt Lighting and appliance panelboards shall be dead-front, safety type lighting panelboards with circuit breakers as shown on the Drawings. Circuit breakers shall be bolt-on type. Bussing shall be tin-plated aluminum. Circuit breakers are location specific and shall be arranged as indicated in the panel schedules on the Drawings. Tandem or twin circuit breakers are not allowed. Panelboards shall be Square D "NQOD" or approved equal.
- E. Panel trim shall be surface or flush as indicated on the Drawings.
- F. Provide all panelboards with hinged door with flush lock, keyed alike.
- G. Provide each panelboard with an engraved plastic-laminate nameplate and typewritten directory card in plastic pocket.
- H. Provide a ground bus in all panelboards.
- I. Provide an isolated ground bus in special panelboards as indicated in the panelboard schedule on the Drawings.

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- J. Provide all panelboards with provision for connecting feeders at top of panel unless otherwise noted.
- K. Provide NEMA type 1 for indoor applications.
- L. Provide NEMA type 3R for applications exposed to weather.
- M. Provide NEMA type 4 for applications exposed to water spray, wash-down, etc.
- N. All panelboards shall be furnished without factory knockouts. All knockouts shall be field punched for specific purpose.
- O. Where circuit breakers serve HID lighting loads, circuit breakers shall be manufacturer self certified for that purpose.
- P. Where circuit breakers serve HVAC equipment requiring HACR rated circuit breakers, U.L approved HACR rated breakers shall be used.
- Q. Multi-section panelboards shall be matched dimensionally.
- R. Load centers are not acceptable.
- S. Provide panelboards manufactured by one of the following:
 - 1. Cutler Hammer
 - 2. General Electric
 - 3. Siemens
 - 4. Square D

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Install panelboards plumb and rigid without distortion as follows:
 - 1. Height: 6' to top of panelboard unless otherwise noted.
 - 2. Install panel taller than 6' with bottom no more than 4 inches above floor.
- C. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them including electrical and other types of equipment, raceways, piping and encumbrances to workspace clearance requirements.
- D. Provide all necessary mounting hardware as required for rigid mounting of each panelboard. Fasten enclosures firmly to walls and structural surfaces, ensuring they are permanently and mechanically anchored.
- E. Mount all recessed panelboards with fronts uniformly aligned and flush with wall finish.

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- F. Install filler blanks/plates in all unused spaces.
- G. Provide a minimum of (1) 3/4" empty conduit for every (3) single pole or fraction thereof of spare circuit breakers, spaces and not less than (2) 3/4" conduits from every flush mounted panel to an accessible space above or below.
- H. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- I. Touch up scratched or marred surfaces to match original factory finishes.
- J. Vacuum all panelboards free of debris.

END OF SECTION 16470

SECTION 16477 - FUSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on fuses including time current curves in accordance with Section 16010 requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide fuses of types, sizes, ratings and time current and peak let-thru current characteristics which comply with manufacturer's standard design, material, components and construction in accordance with published product information and as indicated on the Drawings.
- B. Class L Time-Delay Fuses: Provide Class L time delay, current limiting fuses rated 600 volts, 60 hertz, with 200,000 RMS symmetrical interrupting current rating for protection of transformers, motors, circuit breakers and switchboards. Bussmann Low-Peak KRP-C or approved equal.
- C. Class RK1 Dual Element Time-Delay Fuses: Provide Class RK1 dual element, time delay, current limiting fuses rated for the applicable voltage, 60 hertz, with 200,000 RMS symmetrical interrupting current rating for protection of transformers, motors, and circuit breakers. Bussmann Low-Peak LPN-RK/LPS-RK or approved equal.
- D. Non-Time Delay Fuses: Provide non-time delay, single element fuse rated 300 volts, 60 hertz for protection of fluorescent light fixture ballasts. Bussmann GLR with type HLR fuse holder or approved equal.
- E. Miscellaneous Fuses: Provide time delay fuse rated for the applicable voltage, 60 hertz, with 10,000 RMS symmetrical interrupting current rating for protection of exterior, non-fluorescent, ballasted light fixtures. Bussmann FNM/FNQ with HEB fuse holder or approved equal.
- F. Fuse Cabinet: Provide spare fuse cabinet. Bussmann SFC or approved equal.
- G. Provide fuses manufactured by one of the following:
 - 1. Bussmann
 - 2. Littelfuse
 - 3. Shawmut/Gould

PART 3 EXECUTION

3.01 INSTALLATION

- A. Maintain and store all fuses in dry environment until ready to use.
- B. Clean and tighten all electrical connections prior to installing fuses. Do not install fuses until ready to energize equipment.
- C. Furnish and install interior fluorescent light fixture fuses only when required by local code. Size fuses in accordance with light fixture manufacturer's recommendations.
- D. Furnish and install exterior ballasted light fixture fuses as shown on Drawings.
- E. Furnish 10% spare fuses (3 minimum) of every size and type fuse installed on this project.
- F. Where fuses are current limiting type, contractor shall assure that all corresponding devices are equipped with rejection clips to insure that the fuse cannot be replaced with an incorrect type.

END OF SECTION 16477

SECTION 16485 - CONTACTORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on contactors in accordance with Section 16010 requirements.
- B. Contactor submittal data shall include but not be limited to voltage ratings, phase ampere ratings, number of poles and dimensions.
- C. Submit Lighting Contactor Cabinet layout drawing showing accurately scaled basic components.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide contactors of ratings, classes, types and characteristics which comply with manufacturer's standard design, material, components and construction in accordance with published product information and as indicated on the Drawings.
- B. General Description:
 - 1. Configuration: Electrically Held.
 - 2. Configuration: Mechanically Held.
 - 3. Enclosure: Open, NEMA 1 or NEMA 3R as indicated on the Drawings.
 - 4. Finish: Manufacturer's standard gray enamel finish where applicable.
- C. Magnetic Contactor: AC general purpose, lighting rated, magnetically operated, full-voltage contactor with the following characteristics:
 - 1. Coil operating voltage: Select coil voltage based upon controlling function indicated on the Drawings.
 - 2. Auxiliary Contacts: Provide (1) each NO and NC auxiliary contacts in addition to phase contacts.
 - 3. Control Transformer: Provide line voltage control transformer where indicated and sized to coil characteristics plus 125% additional capacity minimum. Secondary voltage of transformer based upon controlling function indicated on the drawings. Provide primary and secondary fuses and bond un-fused leg of secondary to enclosure.
 - 4. Indicating Lights: Provide red indicating light in cover.

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- 5. Pushbuttons: Provide shrouded reset button in cover.
- 6. Selector Switches: Provide rotary style, oil-tight type in cover. Type as indicated on Drawings.
- D. Combination Contactors: Combine contactors with thermal magnetic circuit breakers, on-fusible switches or fusible switches in a common enclosure as indicated on the Drawings.
- E. Provide contactors as manufactured by one of the following:
 - 1. Cutler Hammer
 - 2. General Electric
 - 3. Siemens
 - 4. Square D

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install contactors indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices to insure products serve intended function.
- B. Provide all necessary mounting hardware as required for each contactor.
- C. Provide typed label on inside of contactor cover indicating load served.
- D. Tighten electrical connections and terminals in accordance with manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION 16485

SECTION 16510 - INTERIOR LIGHTING FIXTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on lighting fixtures in accordance with Section 16010 requirements.
- B. Lighting fixtures submittal data shall include but not be limited to housings, reflectors, lenses, ballasts, voltage rating, lamps, lamp holders, mounting accessories and photometric data.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide lighting fixtures of types and characteristics which comply with manufacturer's standard design, material, components and construction in accordance with published product information and as indicated on the Drawings. Ship fixtures factory-assembled, with parts required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated sounds.
- B. Fluorescent lamp ballasts shall be electronic type capable of operating lamp types indicated, high power factor, rapid-start, and low-noise features; Type 1; Class P; sound-rated A. Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label. Provide fusing where required by local code.
- C. High-Intensity-Discharge-Lamp Ballasts: Provide HID lamp ballasts, of ratings, types and makes as recommended by lamp manufacturer, which properly mates and matches lamps to electrical supply by providing appropriate voltages and impedances for which lamps are designed. Provide fusing where required by local codes.
- D. Lamps.
 - 1. Provide incandescent lamps of wattage and styles indicated and as manufactured by Sylvania or Philips.
 - 2. Provide fluorescent lamps of energy saving types as indicated and as manufactured by Sylvania or Philips.
 - 3. Provide clear metal halide in wattages indicated and as manufactured by Sylvania, Philips, or Venture.
 - 4. Provide high-pressure sodium lamps in wattages indicated and as manufactured by Sylvania or Philips.

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5. Provide specialty lamps in types and wattages indicated and as manufactured by Sylvania or Philips.
- E. Provide interior lighting fixtures as manufactured by one of the following and subject to conformance with features of units specified on the Drawings.
 1. Cooper Industries
 2. Hubbell
 3. Lithonia
 4. Thomas

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lighting fixtures at locations and heights as indicated in accordance with manufacturer's written instructions.
- B. Provide fixtures and/or fixture outlet boxes with hangers at diagonal corners to properly support fixture weight. Support from structural elements independent of ceiling system.
- C. Install flush mounted fixtures to eliminate light leakage between fixture frame and finished surface.
- D. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- E. For air supply type fixtures, retain side slot closures in place for adjustment by Balancing Contractor.
- F. Fasten fixtures securely to indicated structural supports; and ensure that pendant fixtures are plumb and level. Provide individually mounted pendant fixtures longer than 2' with twin stem hangers. Provide stem hanger with ball aligners and provision for minimum 1" vertical adjustment. Mount continuous rows of fixtures with an additional stem hanger than number of fixtures in the row.
- G. Support surface mounted fixtures greater than 2' in length at a point in addition to the outlet box fixture stud.
- H. Recessed fixtures shall be connected with a maximum 6', 1/2" flexible conduit whip. Flexible conduit shall be of sufficient length to allow relocation of fixtures one tile in any direction without modifications to wiring.
- I. Open area (no ceiling) track lighting shall be mounted via 3/8" all thread rod and factory provided female threaded mounting clips. Supports shall be provided at a rate of (2) per four-foot sections and (3) per eight-foot sections. Contractor shall provide Kindorf (or Unistrut) bridging as required to accommodate indicated track and support locations. Hang track at elevation indicated on the drawings. Install reinforcement plates and couplings at all track junctions to assure even alignment of track runs.

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- J. High Bay fixture mounting shall be by factory hooks via 3/8" machine eye bolts installed with double nuts and washers through holes drilled in structural components. Ballasts shall be integrally fused if required by local code.

3.02 ADJUSTING AND CLEANING

- A. Clean lighting fixtures of dirt and debris including fingerprints from reflectors, etc. upon completion of installation.
- B. Protect installed fixtures from damage during remainder of construction period.
- C. Replace burned-out lamps upon completion prior to turning building over to owner.

END OF SECTION 16510

SECTION 16511 - EXTERIOR LIGHTING FIXTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. Provide manufacturer's data sheets on lighting fixtures in accordance with Section 16010 requirements.
- B. Lighting fixtures submittal data shall include but not be limited to housings, reflectors, lenses, ballasts, voltage rating, lamps, lamp holders, poles, bases, mounting accessories and photometric data.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide lighting fixtures of types and characteristics which comply with manufacturer's standard design, material, components and construction in accordance with published product information and as indicated on the Drawings. Ship fixtures factory-assembled, with parts required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated sounds.
- B. Fluorescent lamp ballasts shall be electronic type capable of operating lamp types indicated, high power factor, rapid-start, and low-noise features; Type 1; Class P; sound-rated A. Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label. Provide fusing where required by local code.
- C. High-Intensity-Discharge-Lamp Ballasts: Provide HID lamp ballasts, of ratings, types and makes as recommended by lamp manufacturer, which properly mates and matches lamps to electrical supply by providing appropriate voltages and impedances for which lamps are designed. Provide ballasts with ballasts factor which produces Sylvania published lamp lumens. Provide fusing where required by local codes.
- D. Lamps.
 - 1. Provide incandescent lamps of wattage and styles indicated and as manufactured by Sylvania or Philips.
 - 2. Provide fluorescent lamps of energy saving types as indicated and as manufactured by Sylvania or Philips.
 - 3. Provide clear/phosphor coated metal halide lamp in wattages indicated and as manufactured by Sylvania, Philips, or Venture.

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4. Provide high-pressure sodium lamps in wattages indicated and as manufactured by Sylvania or Philips.
 5. Provide specialty lamps in types and wattages indicated and as manufactured by Sylvania or Philips
- E. Accessories and Finishes:
1. Metal poles shall be factory equipped with metal grounding studs.
 2. All poles shall be provided with factory standard hand holes, full base cover and pole cap where applicable.
 3. Aluminum poles in excess of 20' in length shall be furnished with vibration dampeners.
 4. Aluminum poles shall have an anodized finish.
 5. Fiberglass poles shall be furnished with additional stiffeners as required to reduce deflection for the loadings indicated on the Drawings to less than 5% of the above ground length.
 6. Fiberglass poles shall be constructed of ultraviolet resistant resins.
 7. Pre-stressed, reinforced concrete poles shall be constructed of 6,500 PSI concrete.
 8. Provide all poles with hardware necessary to complete the intended installation.
 9. Contractor is required to submit calculations from the pole manufacturer, sealed by a structural engineer licensed in the State of Florida, certifying conformance of the entire pole and base assembly (where applicable) in accordance with calculations dictated in the Florida Building Code, 1606-1.6 and ASCE 7-98.
- F. Provide exterior lighting fixtures as listed in the light fixture schedule on the drawings. The listed manufacturers are the only approved manufacturers. Substitutions will not be considered.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lighting fixtures at locations and heights as indicated in accordance with manufacturer's written instructions.
- B. Fasten wall mounted fixtures securely to structural supports. Provide structural backing material to ensure fixture does not sag or warp wall.
- C. Install anchor bolts as provided by pole manufacturers and in accordance with manufacturer's recommendations.
- D. Provide #4 bare copper equipment ground bond from branch circuit ground and installed ground rod to metal grounding stud.

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- E. Install all poles plumb and straight. In the case of tapered poles, use a plumb bob on the center of the pole and plumb in both major axis. Tighten all anchor bolt connections in accordance with manufacturer's published torque tightening values.

3.02 ADJUSTING AND CLEANING

- A. Clean lighting fixtures of dirt and debris including fingerprints from reflectors, etc. upon completion of installation.
- B. Protect installed fixtures from damage during remainder of construction period.
- C. Replace burned-out lamps upon completion prior to turning site or building over to owner.

END OF SECTION 16511

SECTION 16741 - TELEPHONE AND DATA SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS/QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI, NEMA, NEC, UL and CSA standards pertaining to the items specified herein. Provide products and components which have been UL, CSA listed and labeled.

1.02 SUBMITTALS

- A. None required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Outlet Boxes: Outlet boxes shall consists of 4" square box with depth as required per field conditions with single gang tile ring.
- B. Conduits: Telephone instrument conduits shall consist of ¾" minimum EMT interior and 1" minimum PVC exterior.
- C. Backboards: Backboard shall consist of (1) 4' x 8' x ¾" Grade AC plywood sheet.
- D. Ground Bus: Ground bus shall consist of (1) ¼" x 4" x 10" drilled copper bus bar. Equal to Newton Instrument Company system 3057.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In insulated walls and fire-rated walls, install (1) ¾" conduit from telephone outlet box to the accessible ceiling space and terminate with insulated bushing.
- B. In non-insulated walls and non-fire-rated walls, eliminate the outlet box and install a single gang tile ring and pull string up through the top plate and tied off.
- C. Paint telephone backboard with (2) coats of white, fire retardant paint.
- D. Install ground bus assembly adjacent to electrical outlet on backboard.
- E. Clean all conduits after installation install pull string and secure at each terminus.
- F. Route all conduits to minimize quantity of ells.
- G. Install long-sweep, 90-degree rigid galvanized steel ells on all PVC telephone service conduits.

END OF SECTION 16741