DIVISION 11

Equipment

Section	Description	Sheet
11 68 00	Play Field Equipment and Structures	

DIVISION : 11

SECTION 11 68 00 - PLAY FIELD EQUIPMENT AND STRUCTURES

PART 13 - GENERAL

13.1 RELATED DOCUMENTS

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

13.2 SUMMARY

A. Section includes playground equipment as follows:

1. Freestanding playground equipment.
2. Composite playground equipment.

13.3 DEFINITIONS

A. Definitions in ASTM F 1487 apply to Work of this Section.

B. IPEMA: International Play Equipment Manufacturers Association.

13.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

13.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of exposed finish on the following products:

1. Include Samples of accessories to verify color and finish selection.
2. Posts and Rails: Minimum 6 inches long.
3. Platforms: Minimum 6 inches square.
4. Molded Plastic: Minimum 3 inches square.

13.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturer and testing agency.

B. Product Certificates: For each type of playground equipment.

C. Material Certificates: For the following items:

1. Shop finishes.

D. Field quality-control reports.

E. Sample Warranty: For manufacturer's special warranties.

13.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

13.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

13.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 14 - PRODUCTS

14.1 MANUFACTURERS

A. Source Limitations: Obtain playground equipment from manufacturers indicated.

B. Playground equipment and components shall have the IPEMA Certification Seal.

C. The following playground equipment and components shall have the IPEMA Certification Seal:

1. As indicated on plans.

14.2 PERFORMANCE REQUIREMENTS

A. Safety Standard: Provide playground equipment according to ASTM F 1487.

14.3 FREESTANDING PLAYGROUND EQUIPMENT

A. As indicated on plans.

14.4 MATERIALS

A. Aluminum: Material, alloy, and temper recommended by manufacturer for type of use and finish indicated.

B. Steel: Material types, alloys, and forms recommended by manufacturer for type of use and finish indicated, hot-dip galvanized.

C. Stainless-Steel Sheet: Type 304; finished on exposed faces with No. 2B finish.

D. Opaque Plastics: Color impregnated, UV stabilized, and mold resistant.

E. Transparent Plastic: Abrasion-resistant, UV-stabilized polycarbonate sheet; clear, colorless; not less than 3/16 inch thick.

F. Suspension Chain and Fittings: ASTM A 467/A 467M, Class CS, 4/0 or 5/0, welded-straight-link coil chain; hot-dip galvanized zinc plated or PVC coated; with commercial-quality, hot-dip galvanized or zinc-plated steel connectors and swing or ring hangers.

G. Suspension Cable: Manufacturer's standard hot-dip galvanized zinc-plated or PVC-coated cable; with commercial-quality, hot-dip galvanized or zinc-plated steel connectors and swing or ring hangers.

H. Iron Castings and Hangers: Malleable iron, ASTM A 47/A 47M, Grade 32510, hot-dip galvanized.

I. Post Caps: color-impregnated, UV-stabilized, mold-resistant polyethylene or polypropylene; color to match posts.

J. Platform Clamps and Hangers: Cast aluminum or zinc-plated steel, not less than 0.105-inch-nominal thickness.

K. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a vandal-resistant design.

L. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or zinc-plated steel and iron, or stainless steel; permanently capped; and theft resistant.

14.5 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" ACI 301/for normal-weight, air-entrained concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.

B. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C 387/C 387M and mixed at site with potable water, according to manufacturer's written instructions, for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.

14.6 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils, medium gloss. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 80 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

14.7 IRON AND STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for pretreatment, applying, and baking.

B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 100 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

14.8 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 15 - EXECUTION

15.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

15.2 INSTALLATION

A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.

1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.

C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.

D. Post Set with Concrete Footing: Comply with Section 03 30 00 "Cast-in-Place Concrete" ACI 301 dry-packaged concrete-mix manufacturer's written instructions for measuring, batching, mixing, transporting, forming, and placing concrete.

1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.

a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

2. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
3. Finishing Footings: Smooth top, and shape to shed water.

15.3 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Perform inspection and testing for each type of installed playground equipment according to ASTM F 1487.

C. Playground equipment items will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

E. Notify Owner 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 11 68 00

DIVISION 12

Furnishings

Section	Description	Sheet
12 93 00	Site Furnishings	

DIVISION 12

Furnishings

Section	Description	Sheet
12 93 00	Site Furnishings	

DIVISION : 12

SECTION 12 93 00 - SITE FURNISHINGS

PART 16 - GENERAL

16.1 RELATED DOCUMENTS

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

16.2 SUMMARY

A. Section Includes:

1. Seating.
2. Tables.
3. Trash receptacles

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing anchor bolts cast in concrete footings.
2. Section 31 20 00 "Earth Moving" for excavation for installing concrete footings.

16.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.

E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

16.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

16.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 17 - PRODUCTS

17.1 SEATING: As indicated on plans.

17.2 TABLES: As indicated on plans.

17.3 TRASH RECEPTACLES: As indicated on plans

A. Trash Receptacles:

1. Receptacle Shape and Form: Round cylinder; with opening for depositing trash in side of lid or top.
2. Lids and Tops: HDPE secured by cable or chain, hinged, swiveled, or permanently secured.
3. Inner Container: Rigid plastic container with lift-out handles; designed to be removable and reusable.
4. Disposable Liners: Provide receptacle designed to accommodate disposable liners.
5. Service Access: Removable lid or top.

B. Graphics: copy, content, and style as indicated on Drawings.

17.4 MATERIALS

1. Finish: Manufacturer's standard.

B. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Polyethylene: Fabricated from virgin plastic HDPE resin.

17.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

PART 18 - EXECUTION

18.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

18.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 12 93 00

SECTION 12 93 00 (S) - SITE FURNISHINGS

PART 19 - GENERAL

19.1 RELATED DOCUMENTS

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

19.2 SUMMARY

A. Section Includes:

1. Seating.
2. Tables.
3. Trash receptacles

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing anchor bolts cast in concrete footings.
2. Section 31 20 00 "Earth Moving" for excavation for installing concrete footings.

19.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.

E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

19.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

19.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 20 - PRODUCTS

20.1 SEATING: As indicated on plans.

20.2 TABLES: As indicated on plans.

20.3 TRASH RECEPTACLES: As indicated on plans

A. Trash Receptacles:

1. Receptacle Shape and Form: Round cylinder; with opening for depositing trash in side of lid or top.
2. Lids and Tops: HDPE secured by cable or chain, hinged, swiveled, or permanently secured.
3. Inner Container: Rigid plastic container with lift-out handles; designed to be removable and reusable.
4. Disposable Liners: Provide receptacle designed to accommodate disposable liners.
5. Service Access: Removable lid or top.

B. Graphics: copy, content, and style as indicated on Drawings.

20.4 MATERIALS

1. Finish: Manufacturer's standard.

B. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Polyethylene: Fabricated from virgin plastic HDPE resin.

20.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

PART 21 - EXECUTION

21.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

21.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 12 93 00

DIVISION 13
Special Construction

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DIVISION 13
Special Construction

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SECTION 13 01 11 - OPERATIONS AND MAINTENANCE OF SPLASH PAD

PART 1 – GENERAL

1.01 WORK INCLUDED

Provide start-up and operation instructions to Owner and properly balance splash pad chemistry upon start-up, until the Owner takes occupancy.

1.02 QUALITY ASSURANCE

A. Retain a qualified chemistry consultant, familiar with operation and maintenance of aquatic facilities, to supervise and properly balance splash pad chemistry. Contact California Waters at (949) 528-0900.

B. Demonstrate to the Landscape Architect, Owner and appropriate officials that all systems are fully operational and that calcium hardness, chlorine residual and pH levels are within specified limits.

C. Standards: Contractor shall furnish labor and chemicals as required to condition the water properly to the following specifications:

1. Calcium Hardness: 150 to 300 ppm

2. Total Alkalinity: 100 ppm

3. Chlorine Residual: 1.00-1.50 ppm

4. pH Factor: 7.2 to 7.8

5. Cyanuric Acid: Below 100 ppm

1.03 EQUIPMENT ACTIVATION

A. All water chemistry and filtration mechanical equipment shall be operational upon filling of splash pad surge tank. Chemicals and other related support items as supplied by the Contractor, shall be in supply at start-up.

B. Start-up and provide qualified personnel to operate splash pad equipment for a period not less than fourteen (14) days after the splash pad is placed in operation, or until the Owner takes occupancy of the facility or letter of substantial completion. During which time instruct and supervise the Owner's personnel in the various operating and maintenance techniques involved. Splash Pad Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to Owner, chemical storage tanks shall be full. (And Owner's personnel fully trained and capable of assuming splash pad maintenance tasks, training may begin before Owner takes occupancy).

PART 2 – PRODUCTS

Not Applicable

PART 3 – EXECUTION

Not Applicable

END OF SECTION 13 01 11

SECTION 13 11 10 - SPLASH PAD SUBMITTALS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Submit to the Landscape Architect shop drawings, product data and samples required under the various Sections of these Specifications.

B. Prepare and submit with Construction Schedule, a separate schedule listing dates for submission and dates reviewed shop drawings, product data and samples will be needed for each product.

1.02 PRODUCT HANDLING

Make all submittals of Shop Drawings, Samples, and requests for substitution in accordance with the provisions of these Specifications.

PART 2 – PRODUCTS

2.01 SCHEDULE OF SUBMITTALS

Compile a complete schedule of all submittals required for the project, complete with major division and subdivision headings and broken into individual trades. Format shall be 8-1/2" x 11". The schedule shall be in such a form as to allow for notations next to each required submittal including, but not necessarily limited to, submission dates, action taken, approvals and re-submittals. Submit such a schedule to the Landscape Architect for his comments and approval. The approved Schedule of Submittals shall be kept current at all times and an updated copy shall be kept in the Project Field Office for review.

2.02 SHOP DRAWINGS & PRODUCT INFORMATION SUBMITTALS

A. Unless otherwise specifically directed by the Landscape Architect, make all Shop Drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection and interface to the Work.

B. Submit all Shop Drawings in the form of four (4) blueline prints of each Shop Drawing. In the case of Product Information, submit no less than four (4) copies for review. Where contents of submitted product information include data not pertinent to the submittal, clearly indicate which portion is being submitted for review.

C. Submittals are required on all items to ensure the latest and most complete manufacturer's data is available. The Contractor assumes full responsibility for problems which could have been noted on valid submittals not furnished.

D. In the event that an item or items specified by the Landscape Architect will not be available in time for installation during orderly progress of the Work, so notify the Landscape Architect prior to receipt of bids. Verify that all items specified will be available. Costs of delays because of non-availability of materials will be back-charged as necessary and shall not be borne by the Owner.

E. Of the four (4) bluelines required; two bluelines will be returned to the Contractor upon completion of the Landscape Architect's review, one will be sent to the Owner and the other will be kept on file in the Landscape Architect's office.

2.03 SAMPLES

A. Unless otherwise specifically directed by the Landscape Architect, all Samples shall be of the precise article proposed to be furnished.

B. Submit all Samples in the quantity which is required to be returned, plus one (1) which will be retained by the Landscape Architect.

2.04 CALCULATIONS

Where required, structural calculations shall be performed by a licensed Civil or Structural Engineer, and shall be sufficient to show the adequacy of all members and connections to be reviewed.

2.05 COLORS

A. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product submit accurate color charts and pattern charts to the Landscape Architect for his review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities and are identically suitable for the installation, completely describe the relative costs and capabilities of each.

2.06 MANUALS

A. Where manuals are required to be submitted upon completion of the installation, prepare all such manuals in durable plastic binders approximately 8-1/2" x 11" in size and with at least the following features:

1. Identification readable through the outside of the cover, stating the general nature of the manual and the project to which it pertains.

2. Neatly typewritten Index near the front of the manual, furnishing immediate information as to location in the manual of all data regarding the installation.

3. Complete instruction regarding operation and maintenance of all equipment involved.

4. Complete nomenclature of all replaceable parts, their part numbers, current cost and name and address of the Vendors of the parts.

5. Copy of all guarantees and warranties issued on the installation.

6. Copy of the approved Shop Drawings with all data concerning changes made during construction.

B. Where contents of manuals include manufacturer's catalog, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.

C. Unless otherwise specifically directed by the Landscape Architect, deliver two (2) copies of the manual to the Owner and one (1) copy to the Landscape Architect.

2.07 RECORD DRAWINGS

Where required by the Contract Documents or where changes to the Contract Documents have been made by change order, revision to clarification drawings, or where minor changes to the Contract were required because of unforeseen conditions or as may be required by the Landscape Architect, prepare accurate Record Drawings indicating all pertinent data and dimensions necessary to adequately describe the contract deviations to the Owner for his future use.

2.08 SUBSTITUTIONS

A. Reference in the Contract Documents to any material, product, or process by name, make or catalog number shall be interpreted as establishing a standard of quality and design intent and not construed as prohibiting substitutions of any other such material, product, or process, provided such substitution is specifically approved by the Landscape Architect prior to receipt of bids. Requests for substitutions shall be submitted no later than ten (10) working days prior to bid date.

B. Acceptance of substitutions will not relieve the Contractor from responsibility for complying with the Contract Documents.

C. At the discretion of the Landscape Architect, testing of samples of materials proposed for substitutions may be required. The testing shall be done by an independent testing laboratory selected by the Owner, the costs of which shall be borne by the Contractor.

D. At the discretion of the Landscape Architect, the Contractor may be required to furnish a written guarantee, in addition to that already required, ensuring the satisfactory performance of the proposed substitutes.

E. All additional labor and materials which may be required for the proper installation of any substitution, or required as a consequence of any substitution, will be provided at no additional cost to the Owner.

F. Bids shall be based upon the data given in the Contract Documents, or upon previously approved items or techniques as "approved equals" by the Landscape Architect. Where calculations or shop drawings are required for approval, allowance shall be made for meeting the requirements of the Contract Documents and all applicable codes and ordinances.

G. Bidders may, in addition, submit separate bids using materials and equipment of other manufacturers, providing the difference in cost is stated for each item proposed to be substituted.

H. Provide to the Landscape Architect all information necessary and required to evaluate proposed substitutions. Do not base bid on the assumptions that a material will be approved as equal by the Landscape Architect unless the item has been specifically approved for this Work by the Landscape Architect prior to the receipt of bids.

I. The Contractor assumes full responsibility that substituted items or procedures will meet the job requirements and is responsible for the cost of redesign and of modifications to this and all other parts of the work caused by substituted items.

J. Submittals will be checked for general conformance with the design concept of the project, but acceptance does not guarantee quantities shown and does not supersede requirements to properly install work. Submittals for proposed alternatives will be judged not only for the acceptability of the items themselves, but of the items as they are used under the conditions of this particular project.

PART 3 – EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS OR SUBSTITUTIONS

Completely identify each submittal and re-submittal by showing at least the following information:

A. Name and address of entity submitting information, plus name and telephone number of individual who may be contacted for further information.

B. Name of project for this Work.

C. Drawing number and Specification Section number to which the submittal applies.

D. Number of all submittals sequentially, whether this is an original submittal or a re-submittal, and if a re-submittal, what number re-submittal.

3.02 COORDINATION

Prior to submittal for Landscape Architect's review:

A. Fully coordinate all submittals by determining and verifying all field dimensions and conditions, materials, catalog numbers, and similar data.

B. Coordinate as required with all other trades and with all public agencies involved.

C. Secure all necessary prior approvals and signify by stamp, or other means, that they have been secured.

D. Clearly indicate all deviations from Contract Documents.

3.03 TIMING OF SUBMITTALS

Make all submittals within thirty (30) days of the date of the award of the contract for the Work, and far enough in advance of scheduled dates of installation to provide adequate time for all required reviews, both by the Landscape Architect and his consultants, for securing necessary approvals, for possible revision and re-submittal, and for placing of orders and securing delivery. In scheduling, allow a minimum of ten (10) full working days for the Landscape Architect's review. Cost of delays occasioned by the tardiness of submittals will be back-charged as necessary.

3.04 LANDSCAPE ARCHITECT'S REVIEW

The Landscape Architect's review will be only for conformance with the design concept and with the information given in the Contract Documents. The Landscape Architect's review and approval of Shop Drawings and Samples shall not relieve the Contractor of responsibility for deviation from the requirements of the Contract Documents unless the Contractor has informed the Landscape Architect and Owner in writing of such deviation at the time of submittal and the Landscape Architect has given written approval to the specific deviation, nor shall the Landscape Architect's approval relieve the Contractor from responsibility for errors and omissions in the Shop Drawings and Samples. Should the Landscape Architect be required to

review any submittal more than three (3) separate times due to the inadequacy of the submittal and due to no fault of the Landscape Architect, the Contractor shall render to the Landscape Architect the Landscape Architect's direct cost for review of all subsequent re-submittals.

3.05 COMPLIANCE WITH APPROVALS

Do not commence any portion of the Work requiring approval of Shop Drawings or Samples by the Landscape Architect until the submittal has been approved by the Landscape Architect and Owner. All such portions of the Work shall be in accordance with the approved Shop Drawings and Samples.

END OF SECTION 13 11 10

SECTION 13 11 11 - SPLASH PAD CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 WORK INCLUDED

Furnish and install all reinforcement required and/or indicated on the Drawings for all cast-in-place concrete associated with the splash pad.

1.02 QUALITY ASSURANCE

A. All Work of this Section shall be performed by the splash pad Contractor/Subcontractor.

B. Qualifications of Workers: Provide at least one person who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed and the best methods for the installation and who shall direct all Work performed under this Section.

C. Standards

1. In addition to complying with all local codes and regulations, comply with all pertinent recommendations contained in "Manual of Standard Practice for Detailing Reinforced Concrete Structures," Publication ACI 315-74 of the American Concrete Institute.

2. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent shall govern.

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 131110.

B. Samples and Certificates

1. Provide all data and access required for testing as described in these Technical Specifications.

2. All material shall bear mill tags with heat number identification. Mill analysis and report shall be made available upon request.

3. Material not so labeled and identifiable may be required by the Landscape Architect to be tested by the testing laboratory selected by the Owner and at no additional cost to the Owner, in which case random samples will be taken for one series of tests from each 2-1/2 tons or fraction thereof of each size and kind of reinforcement steel.

1.04 PRODUCT HANDLING

A. Protection

1. Use all means necessary to protect concrete reinforcement before, during and after installation and to protect the installed Work of other trades.

2. Store in a manner to prevent excessive rusting and fouling with dirt, grease and other bond breaking coatings.

3. Use all necessary precautions to maintain identification after bundles are broken.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and Landscape Architect.

PART 2 – PRODUCTS

2.01 BARS

Bars for reinforcement shall conform to "Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," ASTM A-615, Grade 60.

2.02 WIRE FABRIC

Wire fabric shall conform to "Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete," ASTM A1064.

2.03 TIE WIRE

Tie wire for reinforcement shall conform to "Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete," ASTM A1064, black annealed 16 gauge tie wire.

2.04 OTHER MATERIALS

All other materials, not specifically described but required for proper completion of the work of this Section, shall be new, first quality of their respective kinds, and subject to the advance approval of the Owner and Landscape Architect.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all 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 reinforcement, when placed, will permit placement of concrete in the design indicated on the Drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Owner and Landscape Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Owner and Landscape Architect and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive his work.

3.02 BENDING

A. General

1. Fabricate all reinforcement in strict accordance with the Drawings.

2. Do not use bars with kinks or bends not shown on the Drawings.

3. Do not bend or straighten steel in a manner that will injure the material. (When opposite end is already encased in concrete.)

B. Design

1. Bend all bars cold.

2. Make bends for stirrups and ties around a pin having a diameter of not less than two (2) times the minimum thickness of the bar.

3. Make bends for other bars, including hooks, around a pin having a diameter of not less than six (6) times the minimum thickness of the bar.

3.03 PLACING

A. General: Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacers, or by metal hangers.

B. Clearance

1. Preserve clear space between bars of not less than 1-1/2 times the nominal diameter of the round bars.

2. In no case let the clear space be less than 1-1/2 inches nor less than 1-1/3 times the maximum size of the aggregate.

3. Provide the following minimum concrete covering of reinforcement:

a. Concrete deposited against earth: 3 inches.

b. Concrete below grade deposited against forms: 2 inches.

c. Concrete elsewhere: As indicated on Drawings or otherwise approved by the Landscape Architect.

C. Splicing

1. Horizontal Bars

a. Place bars in horizontal members with minimum lap at splices sufficient to develop the strength of the bars.

b. Bars may be wired together at laps except at points of support of the member, at which points preserve clear space described above.

c. Whenever possible, stagger the splices of adjacent bars.

d. Splice 40 bar diameters minimum.

2. Wire Fabric: Make all splices in wire fabric at least 1-1/2 meshes wide.

3. Other Splices: Make only those other splices that are indicated on the Drawings or specifically approved by the Landscape Architect.

D. Dowels: Place all required steel dowels and securely anchor them into position before concrete is placed.

E. Obstructions: In the event conduits, piping, inserts, sleeves and other items interfere with placing reinforcement as indicated on the Drawings or otherwise required, immediately consult with the Landscape Architect and Owner, and obtain approval of a new procedure prior to placing concrete.

3.04 CLEANING REINFORCEMENT

Steel reinforcement, at the time concrete is placed around it, shall be free from rust scale, loose mill scale, oil, paint and all other coatings which will destroy or reduce the bond between steel and concrete.

3.05 CLEAN-UP

Upon completion of the Work of this Section, immediately remove all concrete reinforcement materials, debris and rubbish occasioned by this Work to the approval of the Owner and Landscape Architect.

END OF SECTION 13 11 11

SECTION 13 11 12 - SPLASH PAD CONCRETE FORM WORK

PART 1 – GENERAL

1.01 WORK INCLUDED

Forming for cast-in-place concrete and pneumatically placed concrete (shotcrete) as indicated on the Drawings and subsequent removal of all such forms except those earthforms as described in this Section.

1.02 QUALITY ASSURANCE

A. All Work of this Section shall be performed by the splash pad Contractor/ Subcontractor.

B. Qualifications of Workers: Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this Work, and who shall direct all Work performed under this Section.

C. Standards

1. In addition to complying with all applicable codes and regulations, comply with all pertinent recommendations contained in "Recommended Practice for Concrete Formwork," Publication ACI 347-78 of the American Concrete Institute.

2. Where provisions of applicable codes and standards conflict with the requirements of this Section, the more stringent provisions shall govern.

1.03 SUBMITTALS

Provide submittals in accordance with the requirements of Section 131110.

1.04 PRODUCT HANDLING

A. Protection: Use all means necessary to protect concrete formwork materials before, during and after installation and to protect the installed Work of other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Landscape Architect.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Form Lumber: All form lumber in contact with exposed concrete shall be new except as allowed for reuse of forms in Part 3 of this Section, and all form lumber shall be one of the following, a combination thereof, or an equal approved in advance by the Landscape Architect.

1. "Plyform," Class I or II, bearing the label of the Douglas Fir Plywood Association; "Inner-Seal" Form as manufactured by Louisiana-Pacific.

2. Douglas Fir-Larch, number two grade, seasoned, surfaced four sides.

B. Form Release Agent: Colorless, non-staining, free from oils; chemically reactive agent that shall not impair bonding of paint or other coatings intended for use.

2.02 TIES AND SPREADERS

A. Type: All form ties shall be a type which do not leave an open hole through the concrete and which permits neat and solid patching at every hole.

B. Design: When forms are removed, all metal reinforcement shall be not less than one (1) inch from the finished concrete surface.

C. Wire Ties and Wood Spreaders: Do not use wire ties or wood spreaders.

2.03 ALTERNATE FORMING SYSTEMS

Alternate forming systems may be used subject to the advance approval of the Landscape Architect.

2.04 OTHER MATERIALS

All other materials not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the advance review by the Landscape Architect.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all 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 forms may be constructed in accordance with all applicable codes and regulations, the referenced standards, and the original design.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Owner and Landscape Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Owner and Landscape Architect and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive work.

3.02 CONSTRUCTION OF FORMS

A. General: Construct all required forms to be substantial, sufficiently tight to prevent leakage of concrete paste, and able to withstand excessive deflection when filled or shot pneumatically with wet concrete.

B. Layout

1. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.

2. Exercise particular care in the layout of forms to avoid necessity for cutting concrete after placement.

3. Make proper provisions for all openings, offsets, recesses, anchorages, blocking and other features of the Work as shown or required.

4. Perform all forming required for Work of other trades and do all cutting and repairing of forms required to permit such installation.

5. Carefully examine the Drawings and Specifications and consult with other trades as required relative to providing for openings, reglets, chases and other items in the forms.

C. Imbedded Items: Set all required steel frames, angles, grilles, bolts, inserts and other such items required to be anchored in the concrete prior to concrete being placed.

D. Bracings

1. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to workmen.

2. Construct all bracing, supporting members and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.

3. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tieing and accurate spreading.

E. Tolerances: Construct all forms straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 500.

F. Wetting: Keep forms sufficiently wetted to prevent joints from opening up before concrete is placed.

3.03 PLYWOOD FORMS

A. Design: Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.

B. Joints: Make all panel joints tight butt joints with all edges true and square.

3.04 FOOTING FORMS

A. Wood Forms: All footing forms shall be wood unless otherwise specifically approved by the Landscape Architect, or as specified in Section 3.04(B).

B. Earth Forms

1. Side walls for footings may be of earth provided the soil will stand without caving and the sides of the bank are made with a neat cut to the minimum or greater dimensions indicated on the Drawings.

2. Make all provisions necessary to prevent cave-ins during placement of concrete.

3.05 REUSE OF FORMS

A. General: Reuse of forms shall be subject to advance approval of the Landscape Architect.

B. Requirements

1. Except as specifically approved in advance by the Landscape Architect, reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.

2. Except as specifically approved in advance by the Landscape Architect, reuse of forms shall in no way impart less structural stability to the forms nor less acceptable appearance to finished concrete.

3.06 REMOVAL OF FORMS

A. General

1. In general, side forms of footings may be removed seven (7) days after placement of concrete, but time may be extended or reduced if deemed necessary by the Landscape Architect/Engineer.

2. Forms for walls, columns, slabs, beams and other formed concrete may be removed fourteen (14) days after placement of concrete, but time may be reduced if approved by Engineer.

B. Removal

1. Use all means necessary to protect workers, passersby, the installed Work of other trades and the complete safety of the structure.

2. Cut nails and tie wires or form ties off flush, and leave all surfaces smooth and clean.

3. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.

4. Flush all holes resulting from the use of spreader ties and sleeve nuts using water, and then solidly pack throughout the wall thickness with cement grout applied under pressure by means of a grouting gun; grout shall be one part Portland Cement to 2-1/2 parts sand; apply grout immediately after removing forms.

3.07 CLEAN-UP

Upon completion of the Work of this Section, immediately remove all forming materials, debris and rubbish occasioned by this Work to the approval of the Owner and Landscape Architect.

END OF SECTION 13 11 12

SECTION 13 11 13 - SPLASH PAD WATERPROOFING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide all labor, materials, equipment and supervision as necessary to install an Acrylic Modified Latex Cement Waterproofing over (new and/or existing) horizontal, interior or exterior structures, as shown on the project drawings and as outlined in this specification.

B. Following all applicable manufacturer's guidelines and application instructions shall be considered a requirement of this specification.

C. Related Sections:

1. Section 131115 – Splash Pad Cast-in-Place Concrete
2. Section 131111 – Splash Pad Concrete Reinforcement
3. Section 131112 – Splash Pad Concrete Form Work

1.02 REFERENCES

A. ASTM C 109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

B. ASTM C 348 - Standard Test Method for Flexural Strength of Hydraulic Cement Mortars.

C. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.

D. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials.

E. ICRI Technical Guideline No.03732: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.03 SUBMITTALS

A. Provide submittals in conformance with the requirements of Section 131110.

B. Product Data: Submit manufacturer's technical data sheets, any applicable installation guidelines or recommendations, and material safety data sheets for each product included in this specification.

C. Samples: For initial selection, submit manufacturer's standard color charts for review by the specification authority and owner's representative. For final selection, submit sample

boards (specification writer shall specify sample size) to exhibit pattern, texture, color and finish of the decorative stampable concrete overlay system.

D. Material certificates signed by the manufacturer certifying that the system complies with all requirements specified herein.

E. Warranty: Submit a sample of the manufacturer's standard material warranty.

F. Contractor Project Reference List: Contractor shall submit a minimum of 5 recently completed projects of a similar nature and include total contract value of completed work.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: The manufacturer of the products specified in this section shall have a minimum of 5 years' experience in the production of these types of products.

B. Contractor Qualifications: The contractor installing the products specified in this section shall have a minimum of 3 years' experience and have successfully completed no less than 5 projects similar in scope and complexity, and is acceptable to and has been trained by the manufacturer.

C. Substitutions: Requests for the approval of any product other than those specified in this section must be submitted to the specifying authority two weeks prior to the bid, and shall include complete application specifications and physical characteristics. Any request after this date will not be accepted. Failure of performance requires immediate removal and replacement of unapproved substituted material with those originally specified at no cost to the owner, Architect, construction manager, or general contractor.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name, batch or lot numbers, and directions for storage and mixing with other components.

B. Store materials to comply with manufacturer's directions to prevent from damage and/or deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.06 PROJECT CONDITIONS

A. Environmental Conditions: Comply with all the manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect completed work. In hot and cold weather conditions or when high evaporation rates or adverse conditions may be expected, the contractor will be responsible for the quality of the completed installation.

Follow all recommendations and guidelines of the American Concrete Institute, as published in ACI Committee 305 for Hot-Weather Concreting and ACI Committee 306 for Cold-Weather Concreting.

B. Lighting: Permanent lighting will be in place and working before installing the system.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

Approved Manufacturer: Miracote Division of Crossfield Products Corp., 3000 E. Harcourt Street, Rancho Dominguez, CA 90221, (310) 886-9100; also 140 Valley Road, Roselle Park, NJ 07204, (908) 245-2800, www.miracote.com.

2.02 MATERIALS

Waterproofing Material - Acrylic Modified Cement Waterproofing: Cementitious, two-component, acrylic emulsion based, highly flexible, crack bridging waterproof membrane barrier against positive water pressure, with the following characteristics:

2.03 PHYSICAL PROPERTIES

A. Product: Miracote MiraFlex Membrane C

B. Color: Gray, White or Pigmented

C. Dry Component-A: Unique blend of cementitious material

D. Liquid Component-B: White polymer emulsion and admixtures

E. Working Time: Approximately 30 minutes

F. Shore A Hardness: (ASTM D-2240) ~ 85

G. VOC: 0 g/L

H. Bond/Adhesion: (ASTM C-321) 215 psi (1.5 MPa) @ 28 days

I. Tensile Strength: (ASTM D-638) 750 psi

J. Elongation: (ASTM D-638) 65%

K. Crack Bridging: (ASTM E-836) 1/8" opening @ 77°F.....Pass (No Rupture)

L. Vapor Permeability: (ASTM E-96) .75 perm/inches

M. Waterproofing: (CRD C 48-92) Withstands 200 psi = 460 feet (14 bar = 140 m) hydrostatic pressure (positive side) at 3/32" (2.4 mm) thickness.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine all construction substrates and conditions under which waterproofing materials are to be installed. Do not proceed with the waterproofing application until unsatisfactory conditions are corrected.

3.01 EXAMINATION (CONTINUED)

B. Do not proceed with the work until all such deficiencies have been corrected by the Contractor in an acceptable manner, and as approved by the Specifying Authority.

3.02 PREPARATION

A. Protect all surrounding areas, walls, window glass, landscaping and other adjacent surfaces from the execution of each item of work including, but not limited to, surface preparation and all application steps.

B. Substrate preparation:

1. Remove oil, grease, dirt, loose particles, remains of form oils, water repellents, rust or other coatings by high-pressure water blasting (>3000 psi), wet or dry sand blasting, or other mechanical means to produce surfaces suitable for application of waterproofing.

2. Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.

3. Voids in concrete substrates: 1/4-inch (6 mm) diameter and larger, pre-treat with patching compound. Less than 1/4-inch (6 mm) diameter can be filled with a scratch coat of one-component waterproofing material.

C. Rinse surfaces to be waterproofed (excluding drywall or similar) with clean water to saturated surface dry (SSD) condition, with no standing water on horizontal surfaces.

D. Contractor shall perform tensile bond tests, as directed by the Specification Authority, in accordance with International Concrete Repair Institutes (ICRI) Technical Guideline 03739, Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials.

3.03 APPLICATION

A. Mix two-component waterproofing material in proportions recommended by manufacturer.

B. Cavity fill, honeycombs & formtie holes:

1. Fill voids at cleaned and prepared faulty construction joints, cracks, formtie holes, etc. with patching compound in mortar consistency flush to surface.

2. Laminate patching compound in 2 to 3 layers as per manufacturer's instructions for larger, spaulled or honeycombed areas.

C. Detailing horizontal and vertical construction joints and cracks (positive side waterproofing only):

Install joint and crack sealing Fabric, embedded in waterproofing material as follows:

1. Apply two-component waterproofing material by brush in a six to seven inch (15 – 18 cm) wide strip coat centered over all joints, cracks, penetrations and changes of plane to be fabric.

2. While this coat is still wet, unroll joint sealing fabric into the coating and apply a coat of two-component waterproofing material over the fabric, smoothing out wrinkles and fish mouths.

D. Positive Side Waterproofing:

Apply two-component waterproofing material in quantities and number of coats as per manufacturer's specifications and recommendations:

1. Apply at 60 mils or 1/16" (1.5 mm) total thickness for all standard applications (i.e. foot traffic, balconies (non-tiled), etc.) and waterproofing up to 13 ft (4.0 m) water head.

2. Apply at 80 - 90 mils (2.0 - 2.4 mm) total thickness for applications exposed to hydrostatic pressure (>13 ft (>4.0 m) water head), under tiles, plaza decks, etc.

E. Alternative I: Negative Side Waterproofing:

Follow manufacturer's specifications and instructions for below grade structures (i.e. water and waste water tanks, swimming pools and gutters, basement and retaining walls) where infiltration from ground water is expected:

1. Apply 1st (base) coat one-component waterproofing material at 60 mils (1.6 mm)

2. After 24 hrs waiting period, apply 2nd (top) coat two-component waterproofing material at 60 mils (1.6 mils) as soon as base coat has reached initial set.

F. Alternative II: Horizontal surfaces with protective clear acrylic sealer:

1. 1 coat application: 200 – 300 sq.ft./gal (4.9 – 7.4 m2/L.

2. 2 coat application: 350 – 450 sq.ft./gal (8.6 – 11.0 m2/L.

G. Application considerations:

1. Apply, using stainless steel trowel, brush, short nap roller, or appropriate compressed-air spray equipment.

2. Apply only when surface and ambient temperatures are 40° F (5° C) and rising. At high temperatures (i.e. 86° F (30° C) and above) protect application from direct sun and wind to prevent premature surface drying and shrinkage cracks. Apply material in two coats minimum.

3. Application thickness should not exceed 1/8-inch (120 mils (3 mm)).

4. If needed, such as in zones posed to movement or cracking, plaza decks, etc., the waterproofing material can be additionally reinforced with a reinforcing fabric (supplied by waterproofing manufacturer), embedded between two waterproofing layers.

5. Do not bridge cracks greater than 1/16-inch (1.5 mm).

6. Bridge dynamic cracks or joints with elastomeric joint sealing fabric, as supplied by waterproofing manufacturer.

7. Do not overcoat waterproofing material with solvent-based materials.

G. Application Considerations (Continued)

8. Where a uniform color is desired (i.e. balconies, walkways, etc.), use of ColorPax LIP or MiraGard Colorbond XL is recommended.

9. Prime and protect alkali sensitive metals such as copper, aluminum, galvanized or zinc treated metal first with a primer, before over-coating with waterproofing material. Follow manufacturer's recommendations for primer material.

3.04 CLEANING

Clean work area and remove/discard all debris resulting from the application of the system to the acceptance of the specifying authority or the owner.

3.05 PROTECTION

Protect all completed work of the application during the specified cure time of the material from vehicular or pedestrian traffic, or any exposure to solid or liquid spillage or any other form of contamination.

END OF SECTION 13 11 13

SECTION 13 11 14 - SPLASH PAD COMPONENTS

PART 1 – GENERAL

1.01 WORK INCLUDED

Splash pad equipment items required for this Work as indicated on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Qualifications of Workers:

1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.

2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years' experience with the materials and methods specified.

3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years' experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.

B. All equipment supplied or work performed shall comply with regulations governing public splash pads as contained within Chapter 31 of California Building Code, latest edition.

1.03 SUBMITTALS

A. Provide submittals in conformance with the requirements of Section 131110.

B. Required submittals include:

1. Fittings as specified in Article 2.01 of this Section.

2. Maintenance Equipment as specified in Article 2.02 of this Section.

C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.03 SUBMITTALS (CONTINUED)

D. The equipment shown on the plans represent the first listed items in the technical specifications. The Contractor shall be responsible for all required field coordination and installation of any approved equal product to provide a fully working and warranted system. The Contractor shall submit detailed shop drawings for any products used other than the first listed specified items. Contractor provided shop drawings shall include details and quality equal to the original plans and construction documents. The Contractor shall provide any and all required engineering including but not limited to structural and anchorage requirements for any proposed equipment other than the first listed specified equipment. The Contractor is responsible to provide a factory certified representative(s) to start-up and provide on-site training for all Splash Pad mechanical equipment provided.

1.04 PRODUCT DELIVERY

A. Protection: Use all means necessary to protect splash pad equipment items before, during and after installation and to protect the installed work specified in other Sections.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.

PART 2 – PRODUCTS

2.01 FITTINGS

A. Drain covers or grates

1. Upper Splash Pad: 'Grate Technologies' Gray FRP grate with vandal-proof screws.

2. Lower Splash Pad: 'Grate Technologies' 1" vinyl, UV grating with non-slip surface.

3. Curved grates: 'Lawson Aquatic' Drain-the-Deck Curved Grate System.

B. Foaming Geyser N° 1 interactive water feature: 'Vortex' VOR 7020; 10 x 10 x 13 inches, 8-20 GPM, 2-5 psi. Two (2) required.

C. Aqua Dome N° 1 interactive water feature: 'Vortex' VOR 0555; 14 x 14 x 45 inches, 10-18 GPM, 5-10 psi. Two (2) required.

2.02 MAINTENANCE EQUIPMENT

Water Quality Test Kit, Professional Grade, 'Taylor Technologies' model #1741C, LaMotte Model #PRO250-NJ or approved equal. One (1) required.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to installing the items 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 the splash pad equipment items may be installed in strict accordance with original design, pertinent codes and regulations, and the manufacturers' recommendations.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Owner and Landscape Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies are fully resolved.

3. Failure to notify the Owner and Landscape Architect and give written notice of discrepancies shall constitute acceptance by the Installer of existing conditions as fit and proper to receive its Work.

3.02 INSTALLATION

Supply and install items of splash pad equipment in strict accordance with pertinent codes and regulations, the original design, and the manufacturer's published recommendations, anchoring firmly and securely for long life under hard use. Coordinate with other trades to insure all imbedded items are set plumb and flush. Be certain that fittings are properly bonded prior to imbedding.

3.03 INSTRUCTION

Upon final inspection and approval of the Owner and Landscape Architect, carefully instruct the Owner's maintenance and operations personnel in the proper operation and maintenance of installed equipment.

END OF SECTION 13 11 14

SECTION 13 11 15 - SPLASH PAD CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 WORK INCLUDED

Provide labor, materials, and equipment as required to install cast-in-place concrete as indicated on the Drawings and herein specified.

1.02 QUALITY ASSURANCE

A. All Work of this Section shall be performed by the splash pad Contractor/ Subcontractor.

B. Qualifications of Workers

1. The Contractor/Subcontractor for this portion of the Work shall have been successfully engaged in the business of cast-in-place concrete for at least five (5) years immediately prior to commencement of this work, and shall demonstrate to the approval of the Owner and Landscape Architect that its' record of workmanship is satisfactory.

2. For actual construction operations, use only thoroughly trained and experienced workers completely familiar with the materials and methods specified.

3. Provide at least one person who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly familiar with the materials and methods specified, and who shall direct all Work performed under this Section.

1.03 SUBMITTALS AND SUBSTITUTIONS

Provide submittals in conformance with requirements of Section 131111.

1.04 PRODUCT HANDLING

A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.

B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.

C. Protection: Use all means necessary to protect the cast-in-place concrete before, during, and after installation and to protect the installed Work and materials of all other trades.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and Landscape Architect.

PART 2 – PRODUCTS

2.01 CONCRETE

A. All concrete, unless otherwise specifically permitted by the Engineer, shall be transit-mixed in accordance with ASTM C94.

B. The control of concrete production shall be under the supervision of a recognized testing agency, selected by the Owner.

C. Quality: All concrete shall have the following minimum compressive strengths at twenty-eight (28) days and shall be proportioned within the following limits:

1. 3,000 psi minimum compressive strength.

2. 1" maximum size aggregate.

3. 6.00 minimum sacks of cement per cubic yard. (For estimate only: to be determined by mix design.)

4. 4" maximum slump.

D. Cement

All cement shall be Portland cement conforming to ASTM C-150, type II and shall be the product of one manufacturer.

2.01 CONCRETE (CONTINUED)

E. Aggregates

1. Shall conform to "Standard Specifications for Concrete Aggregates," ASTM C33, except as modified herein.

2. Coarse Aggregate: Clean sound washed gravel or crushed rock. Crushing may constitute not more than 30% of the total coarse aggregate volume. Not more than 5% flat, thin, elongated or laminated material nor more than 1% deleterious material shall be present. 1" aggregate graded from 1/4" to 1", fineness modulus 6.90 to 7.40. 1-1/2" graded from 1/2" to 1-1/2", fineness modulus 7.80 to 8.20.

3. Fine Aggregate: Washed natural sand of hard, strong particles and shall contain no more than 1% of deleterious material, fineness modulus 2.65 to 3.05.

F. Water

Clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the concrete (potable).

G. Admixtures

Admixtures shall be used upon approval of the Landscape Architect.

1. Air-entraining admixture: Conform to ASTM C260.

2. Water-reducing admixture: Conform to ASTM C494.

2.02 FORMING MATERIALS

Use no less than 2"x 4" lumber for forming concrete decks.

2.03 CURING COMPOUND MATERIALS

A. Liquid Membrane (covered slab): Chlorinated rubber membrane forming, curing-sealing compound conforming to ASTM C309.

B. Liquid Membrane (exposed slab): Clear methyl and butyl methacrylate non-staining, membrane forming, curing-sealing compound conforming to ASTM C309.

2.04 CONSTRUCTION JOINTS

Use keyform for slab pour joints. Either preformed galvanized or PVC construction joint forms of a standard manufacturer may be used. Install per manufacturer's recommendations and tool edges of slabs.

2.05 CEMENT GROUT AND DRYPACK

A. Cement Grout: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make mixture flow under its' own weight.

B. Drypack: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make a stiff mix that will mold into a ball. Mix no more than can be used in 30 minutes.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all 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 all items to be imbedded in concrete are in place and that concrete may be placed to the lines and elevations shown on the Drawings, with all required clearance from reinforcement.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Owner and Landscape Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Owner and Landscape Architect and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.02 CONVEYING AND PLACING CONCRETE

A. Before placing concrete, mixing and conveying equipment shall be well cleaned, and the forms and space to be occupied by concrete shall be thoroughly cleaned and wetted. Ground water shall be removed until the completion of the work.

B. No concrete shall be placed in any unit of work until all formwork has been completely constructed, all reinforcement has been secured in place, all items to be built into concrete are in place, and form ties at construction joints tightened.

C. Concrete shall be conveyed from mixer to place of final deposit in such a way to prevent the separation or loss of ingredients. It shall be placed as nearly as practicable in its' final position to avoid rehandling or flowing. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six (6) feet. Use tremies, spouts and dump boxes in deep sections. Vibrators are not acceptable for facilitating concrete transport.

D. Concrete shall be tamped and spaded to insure proper compaction into all parts of forms and around reinforcement. A mechanical vibrator shall be used to thoroughly compact the concrete. Vibration must be by direct action in the concrete and not against forms or reinforcement.

3.03 CONSTRUCTION JOINTS

Construction joints shall be provided at locations and in the manner shown on the Drawings.

3.04 SLAB FINISHES

A. General: Concrete slabs shall be compacted and screeded uniformly to grades shown. Push large aggregates below the surface with a screen tamper, screed and bull float. As soon as the surface becomes workable, it shall be wood floated, then steel troweled to a uniform smooth, true surface in a neat and workmanlike manner.

B. Finishes

Floor Slabs: Medium broom finish.

3.05 PROTECTION AND CURING

A. Concrete shall be protected from injurious action of the elements and defacement of any nature during construction.

B. All forms must be kept wet to prevent drying out of the concrete.

C. All concrete surfaces including footings must be kept wet for at least seven (7) days after concrete is placed unless cure compound is used after Engineer's approval.

D. Apply the appropriate curing materials, as specified in 2.03 of this Section, immediately after finishing slabs. Application shall be as specified by the manufacturer.

3.06 FORM REMOVAL

A. Take care in removing forms so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.

B. No steel spreaders, ties or other metal shall project from or be visible on any concrete surfaces.

3.07 DEFECTIVE WORK

A. Cut out, remove and replace, or repair to the satisfaction of the Engineer, concrete not meeting minimum strength, not formed as indicated, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris or with honeycombs or voids.

B. Promptly perform work required to repair, patch, replace, render properly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective concrete, at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective concrete.

3.08 CLEAN-UP

Upon completion of cast-in-place concrete remove all debris, materials and equipment occasioned by this Work to the approval of the Owner and Landscape Architect.

END OF SECTION 13 11 15

CSI Specifications

DIVISION 22 and 26

DIVISION/Section	Description	Sheet
DIVISION 22: PLUMBING		
22 51 13	**Splash Pad Mechanical Piping**	
22 51 16	**Splash Pad Mechanical Equipment**	
DIVISION 26: ELECTRICAL		
26 05 00	**Common Work Results for Electrical**	
26 05 19	**Low Voltage Electrical Power Conductors and Cables**	
26 05 26	**Grounding and Bonding for Electrical Systems**	
26 05 33	**Raceways and Boxes for Electrical Systems**	
26 05 53	**Identifications for Electrical Systems**	
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26 56 00	**Exterior Lighting**	

CSI Specifications

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Division 22

Pluming

Section	Description	Sheet
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DIVISION 22

SECTION 22 51 13 - SPLASH PAD MECHANICAL PIPING

Division 22

Pluming

Section	Description	Sheet
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DIVISION 22

SECTION 22 51 13 - SPLASH PAD MECHANICAL PIPING

SECTION 22 51 13 SPLASH PAD MECHANICAL PIPING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Provide splash pad mechanical piping as indicated on the Drawings for filtration, circulation systems, and all appurtenances.

B. Furnish and install domestic water system from points of connection within splash pad surge tank area to the make-up water system, hose bibs and miscellaneous items as required.

C. Furnish and install filter backwash to the existing backwash funnel connected to sanitary sewer within splash pad equipment area as required.

1.02 QUALITY ASSURANCE

A. All Work of this Section shall be performed by the splash pad Contractor/Subcontractor.

B. Qualifications of Workers/Work

1. Employ only experienced, competent and properly equipped workers on Project.

2. Use only new materials in perfect condition. Inspect all materials and immediately remove defective items from the Project Site.

C. Standards

1. Work shall be performed in accordance with the applicable editions of all National, State and local codes, laws, regulations and ordinances, including the following:

American National Standards Institute (ANSI)
American Society for Testing Materials (ASTM)
American Waterworks Association (AWWA)
American Welding Society

2. Do not construe anything in the Drawings or Specifications to permit Work not conforming to these requirements.

1.03 SUBMITTALS

Provide submittals and substitutions in accordance with Section 131110.

1.04 PRODUCT HANDLING

A. Protection: Use means necessary to protect the splash pad mechanical piping items before, during and after installation and to protect the installed Work of other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Landscape Architect and at no additional cost to the Owner.

1.05 JOB CONDITIONS

Cooperation: Cooperate with other trades in coordinating their respective Work, so that no conflict of new construction or occupied space may occur. Should any installation Work be done without such craft coordination, that Work so installed shall be removed and re-installed.

PART 2 – PRODUCTS

2.01 PRODUCT QUALITY

Materials and equipment shall be new, of the best quality for the purpose intended, and shall be clearly marked with the manufacturer's name and nameplate data or stamp and rating. As far as practicable, materials and equipment shall be of one manufacturer.

2.02 PIPE AND FITTINGS

A. PVC Schedule 40: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be white. Spears, Lasco.

B. PVC Schedule 80: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Spears, Lasco.

2.03 VALVES

A. Gate Valves: 150 PSI PVC body, thermoplastic valve and Teflon coated stainless steel stem, EPDM seat material, on 1-1/2" to 4" pipe lines. Per Nibco, Kitz, or approved equal.

B. Butterfly Valves: 150 PSI PVC body, thermoplastic disc and Teflon coated stainless steel stem, EPDM seat material, furnish hand wheel/gear operators on all valves 6" and larger. Per Nibco, Kitz, or approved equal.

C. Wafer Check Valves: 150 PSI PVC body, thermoplastic plates and Teflon coated stainless steel shaft, EPDM seat material. Per Nibco, Kitz, or approved equal.

D. Swing Check Valve: 150 PSI PVC body, thermoplastic disc and Teflon coated stainless steel stem, EPDM seat material, furnish hand wheel/gear operators on all valves 6" and larger. Per Techno.

2.04 PRESSURE GAUGES

4-1/2" dial, bottom connection, chrome ring and shut-off cock, w/ snubbers. Ranges shall be selected to indicate between mid-point and two-thirds of maximum range under design conditions. Wika, DuraChoice.

2.05 PIPE HANGERS AND SUPPORTS

A. Use Kin-Line, Grinnel.

B. Support all pipe line individually with hangers, each branch having at least one hanger. Lateral brace as noted and required.

C. Support piping near floor with steel stanchions welded to end plates secured to pipe and floor.

D. Support vertical piping at each floor level. Install coupling in piping at each support. Coupling shall rest on and transmit load to support. Isolate copper from steel supports with vinyl electrician's tape around pipe and coupling.

E. Use Stoneman "Trisolator," Unistrut, or approved equal, isolators at each hanger and other support points on bare copper tubing system.

2.05 PIPE HANGERS AND SUPPORTS (CONTINUED)

F. For PVC pipe, space hangers four (4) feet apart for pipe sizes 1" and under, five (5) feet apart for pipe sizes 1-1/4" to 2", and six (6) feet apart for pipe sizes over 2". Space hangers for horizontal pipes at a maximum of six (6) feet for copper 2" and smaller and for steel 1-1/4" and smaller; ten (10) feet for copper 2-1/2" and larger and for steel 1-1/2" and larger.

G. Size hanger rods, screws, bolts, nuts, etc., according to manufacturer's sizing charts.

H. Trapeze hangers may be used for parallel lines.

I. Use galvanized or cadmium-plated hangers, attachments, rods, nuts, bolts, and other accessories in mechanical room, high humidity areas, or where exposed to

weather. Hot-dip galvanize all items which are not factory furnished. Plating for hinged movements must be done at the factory.

J. Lateral Bracing: To prevent swaying of the piping systems, provide angle iron bracing and anchor into wall or overhead framing. Piping shall be braced or anchored in such a way as to resist a horizontal force of 50% of its operating weight in any direction.

K. Do not use wire or other makeshift devices for hangers.

2.06 SLEEVES AND WATERSTOPS

A. Provide sleeves where work of this Section passes through fire rated partitions, floors and ceilings, concrete slabs or exterior of structure. Caulk clearance space using sealant appropriate for application in conformance with manufacturer's recommendations and Title 24 of California Code of Regulations. 3M, Dow Corning. In lieu of sleeves and caulking, "Link Seal Century Line" products may be used.

B. Provide prefabricated waterstops as indicated on the Drawings at all pipe penetrations through structures containing stored water (i.e., splash pads, balance/surge tanks, etc.) to insure leak-proof seals.

2.07 JOINTS

A. PVC / CPVC: PVC / CPVC pipe shall be joined using solvent welded PVC / CPVC couplings joints, unless otherwise noted. PVC / CPVC fittings shall be solvent welded.

B. Differing materials: Joints between different materials shall be flanged, unless otherwise noted. All flanges shall be Van Stone (2 pieces).

C. Special Joints: Special joints shall be as noted on the drawings.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such work is complete to the point where this installation may properly commence.

2. Verify that items of this Section may be installed in accordance with the original design and referenced standards.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Landscape Architect and Owner.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Landscape Architect and Owner, and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive his work.

3.02 ABBREVIATIONS AND SYMBOLS

Abbreviations and symbols on the Drawings are those most commonly used. Obtain clarification from the Landscape Architect on any questionable items before bid.

3.03 GENERAL PIPING REQUIREMENTS

A. Size any section of pipe for which size is not indicated or any intermediate section erroneously shown undersized the same size as the largest pipe connecting to it. Sizes listed are nominal.

B. Cut pipe accurately to job measurements and install without springing or forcing, true to line and grade, generally square with building and/or structures and adequately supported to prevent undue stress on pipe, fittings and accessories.

C. Make changes of direction with manufactured fittings. Street ells, bushings, reducing flanges, close nipples or bending of pipe is not allowed.

D. Use great care to install piping in accordance with best practice. Plastic pipe shall be "snaked" in trenches to allow for thermal expansion.

E. All above grade, below grade and buried or imbedded PVC shall be installed using solvent weld fittings. Also, each and every fitting and pipe end shall be prepared with solvent primer. Fittings shall be joined individually and with enough time between assembly of adjacent joints to allow them to seal solidly. After joining, an even ring of primer must be visible around the entire fitting. If any fittings are installed without visible primer, the fitting shall be removed and discarded and piping recut, rechamfered, and joint made up again using a new fitting. All procedures, methods and techniques used to make up solvent weld joints shall be in strict accordance with manufacturer's recommendations.

F. Arrange pipe and hangers to allow for expansion, contraction and structural settlement. No pipe shall contact structure except penetrations as shown on the Drawings.

G. Provide dielectric connections between copper and dissimilar metals. In copper systems, threaded piping including connections to equipment shall be brass pipe and fittings. Install dielectric connections in vertical sections of piping only.

H. Run pipe full size through shut-off valves, balancing valves, etc. Change pipe size within three (3) pipe diameters of final connection to control valves, fixtures and other equipment.

I. Provide unions or flanges at connections to equipment, on service side of valves and elsewhere as required to facilitate ease of maintenance.

3.03 GENERAL PIPING REQUIREMENTS (CONTINUED)

J. Locate equipment shut-off valves as close to equipment as possible maintaining easy valve access.

K. Make all connections between domestic water systems and equipment or face piping with approved backflow prevention devices as required.

3.04 TRENCH EXCAVATION AND BACKFILL

A. Excavation

1. Excavate and backfill trenches as required for the Work of this Section. Conform to requirements of Section 131110.

2. The Contractor shall perform all excavation of every description and of whatever materials encountered, to the depths indicated on the Drawings or as necessary. The Contractor shall dispose of the excavated materials not required or suitable for backfill as directed, and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate in the excavated areas.

B. Trenching

1. Excavate trenches to lines and grades as indicated on the Drawings and with banks as nearly vertical as practicable.

2. Bottoms of trenches shall be accurately graded to provide uniform bearing on undisturbed soil for the entire length of each section of pipe.

3. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not

exceed 8" on either side of the pipe. The width of trench above the top of pipe may be wider if necessary.

4. Over-depth excavations shall be filled with tamped sand to required grades.

5. Excavations of 5 feet or more in depth shall be shored or supported in conformance with rules, and regulations of State and Federal Governments. Shoring shall be constructed, maintained and removed in a manner to prevent caving of the excavation walls or other load on the pipe.

3.04 TRENCH EXCAVATION AND BACKFILL (CONTINUED)

C. Backfilling

1. Material for backfilling of pipes shall be approved granular material less than 2" in diameter obtained from the excavation. No material of a perishable, spongy or otherwise unsuitable nature shall be used as backfill.

2. Backfilling of pipe trenches shall commence immediately after installation and testing to preclude damage to the installed pipe. Backfill around pipe shall be carefully placed so as not to displace or damage the pipe, and shall be carried up symmetrically on each side of the pipe to one foot above the top of the pipe. The material shall be carefully compacted or consolidated before additional backfill is placed.

3. Backfill above an elevation of one foot above the top of pipe in conformance with standard excavation best practices. Material for balance of backfill shall be approved granular material less than 6" in diameter taken from the excavation.

4. Unless otherwise indicated on the Drawings, all pipes shall have a minimum of 18" of cover.

3.05 GENERAL EQUIPMENT REQUIREMENTS

A. Position equipment to result in good appearance and easy access to all components for maintenance and repairs.

B. Install piping, flues, breeching and ducts so that they do not interfere with equipment access.

C. Install level, secure and out of moisture. Provide shims, anchors, support straps, angles, grouted bases, or other items as required to accomplish proper installation.

D. All screws, nuts, bolts and washers shall be galvanized, cadmium plated or stainless steel. After fabrication, hot-dip galvanized unfinished ferrous items for outdoor, below grade or other use subject to moisture.

E. Extend 1/2" Schedule 40 black steel pipe lubrication tubes from all hard to reach locations to front of equipment or to access points. Terminate with proper type of lubrication fitting.

3.06 VALVES AND STRAINERS

A. If no shut-off is indicated, provide gate valves at inlet connections and balance valves at outlet connections to fixtures and equipment. Provide proper valve trim for service intended.

B. Use no solder end valves unless noted otherwise; provide adapters in copper tubing systems.

C. Locate valves with stems above horizontal plane of pipe. In general, locate valves within six (6) feet of floor, out from under equipment, in accessible locations with adequate clearance around hand wheels or levers for easy operation.

D. Provide all valves, cocks and strainers, full pipe size unless indicated otherwise.

E. Provide hand wheel operators on all valves 6" and larger, under 6" lever operators may be used.

3.07 IDENTIFICATION OF PIPING

A. Identify each valve by a numbered brass tag with hole and brass chain mounted on valve stem or handle. Tag to be a minimum of 1-1/2" in diameter and numbers at least 1/4" high stamped into tag.

B. Install an identification chart in a plastic or glass framed enclosure which schematically illustrates the proper operation of all piping systems and indicates number and location of all valves and control devices within the system.

3.08 TESTS

A. Perform tests in presence of Owner and Landscape Architect with no pressure loss or noticeable leaks.

B. Do not include valves and equipment in tests. Include connection to previously tested sections if systems are tested in sections.

3.08 TESTS (CONTINUED)

C. Perform tests as follows:

System	Test Pressure	Test Medium	Duration
Splash Pad Piping	50 psig	Water	4 hours
Domestic Water	150 psig	Water	4 hours
Gas Piping	50 psig	Air	4 hours

All concrete anchor blocks shall be allowed to cure a sufficient time to develop adequate thrust resistance prior to testing and the pipeline shall not be tested until it has been filled with water for a minimum or 24 hours. Before testing, the pipe shall be backfilled with 2 1/2 feet of material or center loaded to hold the pipe in place while testing. The water necessary to maintain this pressure shall be measured through a meter. Any noticeable leaks shall be stopped and any defective pipe shall be replaced with new sections prior to commencing with the test.

The test shall be made prior to connecting the new line with the existing pipes and main. The test shall further be conducted with the open ends of pipe, valves and fittings suitably closed. Valves shall not be operated during the testing procure.

D. Field Testing Procedure:

The test shall be conducted in the following manner. All air shall be expelled from the pipe. To accomplish this, if air valves or other outlets are not available, taps shall be made at the high points to expel the air and these taps shall be tightly plugged afterwards. The pressure in the pipeline shall then be pumped up to the specified test pressure. When the test pressure in the line has dropped to 10 PSI, at which time the pressure shall again be pumped up to the specified test pressure. This procedure shall be repeated until four hours have elapsed from the time the specified test pressure was first applied. At the end of the four hour period, the pressure shall be pumped up to the test pressure for the last time.

E. Leakage Allowance:

The leakage shall be considered as the total amount of water pumped into the pipeline during the four hour period including the amount required to reach the test pressure for the final time. Leakage shall not exceed the rate of 24 gallons per inch of diameter, per mile, per 24 hours.

3.08 TESTS (CONTINUED)

E. Leakage Allowance (Continued)

The following table indicates the leakage allowance for various sized pipes and is equal to the number of gallons per the four hour test period per 1,000 feet of pipe being tested:

Leakage Allowances: Gallons Per Four Hours per 1,000 Feet of Pipe

Pipe Size (Inches)	Test Pressure (PSI)	Allowable Leakage (Gallons)
1	50	0.8
1 1/2	50	1.2
2	50	1.5
2 1/2	50	1.9
3	50	2.3
4	50	3.0
6	50	4.6
8	50	6.0
10	50	7.6
12	50	9.0
15	50	11.4
18	50	13.6
21	50	16.0
24	50	18.2
27	50	20.4

Any noticeable leak shall be stopped and all defective pipes, fittings, valves and other accessories discovered in consequence of the test shall be removed and replaced by the Contractor with sound material. The test shall then be repeated until the total leakage during a test of four hours duration does not exceed the rate specified above. All testing shall be inspected by the Owner's representative.

3.09 PIPE MATERIAL APPLICATION

A. PVC Schedule 40: Below grade pool piping and domestic water piping up to 12" line size; use standard solvent weld fittings.

B. PVC Schedule 80: Above grade pool piping up to 12" line size; use flanged Schedule 80 or epoxy coated cast iron fittings or standard solvent weld fittings per plans.

3.09 PIPE MATERIAL APPLICATION (CONTINUED)

C. Type L Hard Copper: Above grade domestic water piping.

D. Schedule 40 Steel: Natural gas piping.

E. CPVC: Above grade pool heater piping.

3.10 CUTTING AND DRILLING

Cutting or drilling necessary for installation of Work of this Section shall be done only with Landscape Architect's approval.

3.11 CLOSING-IN OF UNINSPECTED WORK

Do not cover or enclose Work before testing and inspection. Re-open Work prematurely closed and restore all Work damaged.

3.12 QUIETNESS

Quietness is a requirement. Eliminate noise, other than that caused by specified equipment operating at optimum conditions, as directed by Landscape Architect and Owner.

3.13 FLUSHING OF LINES

Flush or blow out pipes free from foreign substances before installing valves, stops or making final connections. Clean piping systems of dirt and dust prior to initial start-up.

3.14 CLEAN-UP

A. After all Work has been tested and approved, the Contractor shall thoroughly clean all parts of the equipment installations. Exposed parts shall be cleaned of cement, plaster and other materials and all grease and oil spots removed with solvent.

B. The Contractor shall remove debris from the Project site. Cartons, boxes, packing crates and excess materials not used, occasioned by this work shall be disposed of to the satisfaction of the Owner and Landscape Architect.

C. If the above requirements of clean-up are not performed to the satisfaction of the Owner and Landscape Architect, the Owner reserves the right to order the work done, the cost of which shall be borne by the Contractor.

END OF SECTION 22 51 13

SECTION 22 51 16 - SPLASH PAD MECHANICAL EQUIPMENT

PART 1 – GENERAL

A. 1.01 WORK INCLUDED

Provide labor, materials, and equipment as required to install splash pad mechanical equipment as detailed on the Drawings and herein specified.

B. 1.02 QUALITY ASSURANCE

A. All Work of this Section shall be performed by the splash pad Contractor/ Subcontractor.

B. Qualifications of Workers

1. The Contractor/Subcontractor for this portion of the Work shall have been successfully engaged in the business of splash pad mechanical equipment for at least five (5) years immediately prior to commencement of this work, and shall demonstrate to the approval of the Owner and Landscape Architect that its' record of workmanship is satisfactory.

2. For actual construction operations, use only thoroughly trained and experienced workers completely familiar with the materials and methods specified.

3. Provide at least one person who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly familiar with the materials and methods specified, and who shall direct all Work performed under this Section.

1.03 SUBMITTALS

Provide submittals in conformance with requirements of Section 131110.

1.04 PRODUCT HANDLING

A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.

B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.

C. Protection: Use all means necessary to protect splash pad mechanical equipment before, during and after installation and to protect the installed Work of all other trades.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and Landscape Architect.

PART 2 – PRODUCTS

2.01 SURGE TANK SUBMERSIBLE PUMP

'Goulds' Model 1DW51C0EA, submersible dewatering pump; 115V 1PH; 3500 RPM; rated at 110 GPM at 66 ft. TDH.; 1/2 HP, One (1) total.

2.02 SPLASH PAD RAIN DIVERTER VALVE

4" PVC normally open actuated valve per Spears Manufacturing, 24 VAC, w/ EPDM seal and seat, NEMA 4x weatherproof enclosure. Or approved equal. One (1) total.

2.03 SURGE TANK FILL VALVE

'Cla-Val' Hytrol #1246-01 wet pit valve, flanged with CFI-CIKX stainless steel and brass float in stilling well.

2.04 ULTRAVIOLET UNITS

Upper Splash Pad: Delta UV Model #ELP68-HDPE, 4" Inlet/Outlet, 259 GPM (max.), 108-120V, 0.574 kW rated power. One (1) total.

Lower Splash Pad: Delta UV Model #ELP58-HDPE, 4" Inlet/Outlet, 254 GPM (max.), 108-120V, 0.478 kW rated power. One (1) total.

Waterfall: Delta UV Model #ELP48-HDPE, 4" Inlet/Outlet, 158 GPM (max.), 108-120V, 0.383 kW rated power. One (1) total.

2.05 SPLASH PAD FILTER

"Neptune-Benson" Horizontal Stacked Dual Tank Fiberglass Sand Filter, Model #3448SHFFG. One (1) required. See detailed specification below.

A. The system shall be supplied complete by the manufacturer and shall include: internals, face piping and valves, gauge panel with tubing and petcocks, sight glass, air relief connection, bottom drain connection with internal strainer.

B. System shall be fabricated and fully assembled at the manufacturer's plant for pressure testing and dimensional verification. System shall be knocked down for shipping purposes in subassemblies for minimum field assembly. Internal manifold and lateral piping shall be factory installed and shipped in place.

C. The system capacity, size, performance and model number shall be as shown on the drawings.

D. Horizontal Fiberglass Filter Tank

1. The equipment described herein shall be products of a manufacturer regularly engaged in the fabrication of pressure vessels for at least 15 years.

2. The filter tank shall be suitable for 50 psi working pressure, hydrostatically tested to 1.1 x working pressure and designed with a 4:1 safety factor.

3. Saddle style bases (2) shall be provided for tank support. Systems which incorporate stacked tanks shall include similar bases and mounting saddles for the upper vessel. Access to the tank shall be provided by a 14" x 18" manhole with a two bolt, 4 point yoke. Manhole seal shall be complete with one piece ¼" neoprene gasket and positioned so that internal pressure from the filter will augment the seal. Externally mounted bolt-on covers will not be accepted.

4. Drain out system shall consist of one (1) 3/4" fiberglass coupling mounted to the tank bottom. Each coupling to be fitted with a slotted PVC sand retainer. Air relief connection shall be one (1) 3/4" coupling provided on top of the tank. Bulkhead fittings will not be accepted.

D. Horizontal Fiberglass Filter Tank (Continued)

5. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping. Connections shall be comprised of 1" minimum thickness fiberglass flanges with ANSI standard 150 lb. bolt pattern. Connections requiring bolt-thru hardware will not be accepted.

6. The resin used shall be a commercial grade, premium corrosion resistant vinylester that has been evaluated in a laminate by test in accordance with ASTM C-581 in service comparable to the intended service and recommended for this service by the manufacturer. Other generic types of resin such as isophthalics or general purpose polyester resins shall not be acceptable.

7. Ultraviolet absorbers shall be added to the exterior surface for improved exterior resistance.

8. Chopped strand mat shall be constructed from commercial grade E- type glass strands bonded together using a binder. The strands shall be treated with a sizing that is chemically compatible with the resin system used. Continuous roving shall be a commercial grade of E-type glass fiber with a sizing that is chemically compatible with the resin system used.

9. The inner surface exposed to the corrosive environment shall be followed with a layer composed of vinylester resin, reinforced only with non-continuous glass fiber strands applied to a minimum thickness of 0.100 inches. The combined thickness of the inner surface and interior layer shall be 0.110 to 0.130 inches and in no case less

than 0.100 inches. The exterior laminate shall consist of filament winding and unilateral construction so as to create a modulus of elasticity to maintain no more than 0.1% strain in any direction.

10. Resin used in these layers shall be Hetron 922 incorporating a Cobalt/MEKP cure system or equal as recommended by the manufacturer.

E. Filter Piping – Internal

1. The internal distribution system shall be a horizontal header/lateral arrangement. The header shall be Schedule 80 PVC construction, capped on one end and flanged on the other end. Lateral connections shall be spaced no more than 6" on the centers and shall be 1½" FPT connections.

2. Underdrain laterals shall consist of 1½" Schedule 80 PVC pipe with 0.012" wide machined double slotted openings on 1/8" centers. Machined openings shall be designed to retain all media particles as small as .30 mm particle size. Molded or drilled openings or retainer screens will not be acceptable. Each lateral shall be fabricated complete with a socket cap on one end and male adapter on the other. 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 cover the entire cross sectional area of the filter. Laterals shall be fitted with a rubber 0-ring to allow for proper positioning of the machined openings.

3. Overdrain laterals shall consist of 1½" Schedule 80 PVC pipe with 1/2" wide machined slotted openings on 1 1/4" centers. Overdrain laterals shall be designed and sized at the factory so as to provide uniform distribution and unrestricted flow during filter and backwash cycles.

4. All hardware in wetted areas shall be stainless steel or non-metallic.

F. Face Piping

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" – 12" shall be constructed with cast aluminum ASTM S12A housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and T304 stainless steel shaft. Valves 14" and larger shall be constructed with cast iron housing epoxy coated and with nylon coated ductile iron disc.

F. Face Piping (Continued)

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.

5. Face piping shall be fully factory assembled, knocked down and crated for shipment. The warranty of the face piping shall be provided by the filter manufacturer. Field gluing or assembly of the face piping by anyone other than the filter manufacturer will not be accepted.

6. Face piping arrangement shall be as indicated on the drawings.

G. Automatic Air Relief Valve

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 shall not be acceptable.

H. Single Lever Linkage

1. A clevis and rod linkage shall connect the four butterfly valves provided with the face piping. Assembly shall be designed so that filter and backwash cycles can be accomplished by simply raising or lowering the operating handle.

2. Connecting pieces shall vary with size of face piping in order to operate with suitable mechanical advantage.

3. All linkage parts shall be T304 stainless steel.

4. Linkage shall be designed so that all valves operate simultaneously eliminating the possibility of water hammer action. Each valve shall be adjustable to provide for accurate positioning and tight shut off.

5. All linkage components shall be grit blasted to a 1.2 mil profile. Blast media shall be completely non-ferric.

6. All linkage components shall be finish coated with 3-4 mils DFT of Type 316 pigmented stainless steel paint.

I. SLM Actuator

1. An electromechanical actuator shall activate the single lever linkage. Actuator shall consist of 115 volt AC totally enclosed motor attached to a worm drive and 1½" diameter telescoping tube with 12" stroke length. Cycle time shall be fifteen (15) seconds with a load capacity of five hundred (500) pounds. Unit shall be complete with built-in, adjustable limit switches and clevis end fittings.

2. Actuator shall be factory wired with a 10' cable with molded connector. Cable shall be type STD #16 AWF 6 conductor rated for 600 v/8 amps.

3. Cable shall be moisture, oil and dirt resistant with threaded male connector providing strain relief low risk for wire breakage and connection integrity.

J. Three (3)-Way Valve Control Assembly

1. A mechanical linkage shall connect two (2) valves in order to create simultaneous movement.

2. Connecting pieces shall vary with the size of face piping in order to operate with suitable mechanical advantage.

3. All linkage parts shall be T304 stainless steel.

4. Linkage shall be designed so that filter and backwash cycles can be accomplished by repositioning a pair of valves.

5. Each pair of valves shall be operated as specified with lever, gear or electric actuation.

6. All linkage components shall be grit blasted to a 1-2 mil profile. Blast media shall be completely non-ferric.

7. All linkage components shall be finish coated with 3-4 mils DFT of Type 316 pigmented stainless steel paint.

K. Valve Operators

1. Lever Operators Dominion™

a. Valves shall be provided with 6 position latch lock handles.

b. Latch lock handles shall be constructed of epoxy coated cast aluminum and shall include a spring loader lever for position lock.

c. Lever shall be capable of holding the disc in any of the locking positions with no movement up to the full pressure rating of the valve.

2. Gear Operators

a. Valves shall be provided with infinite position gear operators.

b. Gear case (body) shall be constructed of cast iron painted internally and externally for maximum protection.

c. Enclosure shall be sealed to IP65 and maintenance free.

d. Self-locking gearing shall be capable of holding the disc in any position with no movement up the full pressure rating of the valve.

e. Gear operator shall provide 90° of travel with ± 5° adjustment in closed position.

f. Gear operator shall include a non-corrosive sealed indicator for remote visibility.

g. Gear operator shall include manual adjustment capabilities.

K. Valve Operators (Continued)

3. Model MFP 2 Automatic Controller

a. The controller shall govern the operation of the filter system by means of a programmable logic controller. All power to the controller and valves shall be 120 VAC or 230 VAC – single phase.

b. The controller shall be housed in a Nema 4X fiberglass polyester enclosure with padlockable stainless steel snap latch hinges.

c. The controller shall include a 4-row x 24 character LCD display with a 16 button numeric tactile feedback keypad and programmable function keys with LEDs. The unit shall display system operation and status functions.

d. The controller shall include (5) miniature plug-in double pole/double throw (DPDT) relays and (4) quick disconnect fuse holders fully integrated to manage the system functions.

e. A pressure switch shall be installed to sense and signal for backwash actuation based on a preset pressure drop.

f. ½" strain relief connections shall be provided in the bottom of the enclosure for all of the necessary input connections.

g. The controller shall provide the following operational features:

i. Manual backwash initiation

ii. Automatic backwash initiation (pressure and/or time options)

iii. Timer for time clock backwashing

iv. Fixed backwash duration and delay features

v. Real time clock with battery backup of data entry to maintain time during power failure.

vi. Capable of controlling up to (4) filters and (1) one priority valve

h. All controller programming shall be accomplished using on-screen instructions.

K. Valve Operators (Continued)

4. Electric Operators

a. Electric service shall be 110 VAC.

b. Operator housing shall be corrosion resistant NEMA 4X (IP65).

c. Electrical connectors shall be four-pole industrial style and meet DIN 43650 standards. Plug connection shall be gasketed and mechanically secured with a stainless steel screw. Harness assemblies from operator to control panel shall be factory fabricated. No field wiring shall be required.

d. Drive assembly shall include hardened steel and polyamide reduction gears with permanent lubrication.

e. Operator shall be equipped with a manual override.

f. Operator shall have a visual position indicator.

g. Electric drive motor minimum duty cycle rating to be 35%. Overloading protection shall be selfresetting.

h. Limit switches shall be provided to allow adjustment of cycle.

i. Two additional limit switch contacts shall be provided for indication or auxiliary.

5. Pneumatic Operators

a. The actuators shall be double acting with valve mounted drilling to ISO 5211.

b. The actuators shall include (2) 1/4" FPT ports for open / close connections. Flow control valves with quick connect fittings shall be provided at each port to allow speed control adjustment for the open / close function of the actuators.

K. Valve Operators (Continued)

5. Pneumatic Operators (Continued)

c. Materials of Construction

i. Body: aluminum alloy, extruded acc. to ASTM 6063, anodized acc. To UNI 4522

ii. Ends: Die-cast in aluminum alloy acc. To ASTM B179, epoxy-polyester coated

iii. Pistons: Die-cast in aluminum alloy acc. To ASTM B179

iv. Pinion: Nickel-plated steel

v. Slideways: Acetal resin (LAT LUB 731320T)

vi. Fasteners: AISI 304 Stainless steel

vii. Springs: Epoxy coated steel, pre-compressed

viii. Seals: NBR Nitrile rubber

ix. Lubricant: MoS2

d. The actuators shall be factory lubricated to allow for 1,000,000 maneuvers.

e. The actuators shall have adjustable travel stops for both directions.

f. Working temperature limits: 4°F to 186°F.

g. A tool kit for adjustment of pneumatic actuators shall be provided by the filter manufacturer.

L. Filter / Regulator

Each filter shall include a combination filter / regulator. The regulator shall be adjustable from 0 – 120 p.s.i. 1/2" F.P.T. connections shall be provided for field installation of air lines.

2.05 SPLASH PAD FILTER (CONTINUED)

M. Water Separator

One water separator with automatic drain shall be included for each air compressor supplied. 1/2" F.P.T. connections shall be provided for field installation of air lines.

N. Air Compressor

The system will require (1) air compressor per mechanical room. The following is the minimum requirement: 30 gallon tank, 2 HP 120v, 1 phase, 15 amp, 5.5 CFM @ 90 psi, air pressure gauge, pressure relief valve, belt guard, pressure switch, air filter.

O. Solenoid Valves

1. Each filter shall include the required number of single solenoid, 4-way valves mounted on a multistation manifold for operation of the pneumatic actuators.
2. The solenoids valves shall include lighted DIN connectors.
3. The solenoid valves shall be factory lubricated and shall not require any field lubrication.
4. The solenoid valves with multi-station manifold shall be located on the gauge panel, factory wired and include quick connect fittings for attachment to the pneumatic actuators.
5. The solenoid valves shall be SMC Series SY 7000.

P. Media

1. Gravel support media of a hard coarse aggregate with a subangular grain shape with a particle size of 1/8" x 1/4" shall be used on the inside of the bottom head to the elevation where the filter media commences. The specific gravity shall not be less than 2.5. Support media shall be placed by hand to avoid damage to the underdrain system and leveled before the addition of the upper layer of filter media. Concrete underfill is not recommended. Support gravel shall be delivered and stored in 100 pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media shall be free from minerals which may precipitate onto pool surfaces.
2. Sand shall be a carefully selected grade of hard, uniformly graded silica material. Media shall be naturally rounded particles of silica or milled angularly shaped particles of silica quartz. Sand shall have a particle size between 0.45mm and 0.55 mm (#20). No more than 1.5% shall be allowed to pass through a #40 sieve (.0164"). Uniformity coefficient shall not exceed 1.53. Specific gravity to be not less than 2.5. Filter shall contain a minimum bed depth as shown on the drawings. Systems which do not provide a minimum bed depth as shown on the drawings will not be

acceptable. Sand shall be delivered and stored in 100 pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media shall be free from minerals which may precipitate onto pool surfaces.

3. Each filter tank shall be provided with media quantities as shown on the drawings.

Q. Filter System Packaging

1. All filter piping and valves shall be factory assembled and knocked down into sub-assemblies for shipment.

2. The components shall be carefully packaged in a totally enclosed wooden crate to prevent damage during transport.

R. Warranties

1. Filter

a. Filter tanks shall carry a 15 year fully rated warranty as regularly offered by the tank manufacturer.

b. Internal and external face piping shall carry a fully rated 3 year warranty.

2. Valves

a. Valve bodies shall carry a 5 year fully rated warranty.

b. Valve operators shall carry one (1) year warranty as provided by the product manufacturer.

3. System Accessories

System accessories including sight glass, pressure gauges, pumps and air relief valve shall carry one (1) year warranty as provided by the product manufacturer.

2.06 SPLASH PAD FLOWMETER(S)

'Blue-White' F300 flowmeters per line size.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to installing the items of this Section, carefully inspect the Work of other trades and verify that such Work is complete to the point where this installation can properly commence.

2. Verify that splash pad mechanical equipment can be installed in accordance with the original design and all referenced standards.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Landscape Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Landscape Architect and Owner, and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.02 INSTALLATION

A. Supply and install all items of wading pool mechanical equipment in strict accordance with all applicable codes and regulations, the original design, and the manufacturer's published recommendations, anchoring firmly and securely for long life under hard use.

B. All equipment shall be braced and/or anchored to resist horizontal force acting in any direction using the criteria shown on the Drawings.

3.03 INSTRUCTION

Upon final inspection and approval of the Owner's Representative, carefully instruct the Owner's maintenance and operations personnel in the proper operation and maintenance of installed equipment.

3.04 CLEAN-UP

Upon completion of splash pad mechanical equipment, remove all debris, materials and equipment occasioned by this Work to the approval of the Landscape Architect and Owner.

END OF SECTION 22 51 16

Division 26

Electrical

Section	Description	Sheet
26 05 00	Common Work Results for Electrical	4
26 05 19	Low Voltage Electrical Power Conductors and Cables	5
26 05 26	Grounding and Bonding for Electrical Systems	5
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Division 26

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26 27 26	Wiring Devices	4
26 56 00	Exterior Lighting	4

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.

1.3 CODES, STANDARDS AND REFERENCES

A. American Society for Testing and Materials (ASTM) – ASTM C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).

B. American Society for Testing and Materials (ASTM) – ASTM A53/A53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ANSI/NFPA 70 – National Electrical Code (NEC), with California amendments (CEC).

D. International Electrical Testing Association - NETA ATS: The NETA Acceptance Testing Specifications.

E. National Electrical Contractors Association (NECA) - NECA 1: Good Workmanship in Electrical Construction.

F. National Electrical Manufacturers Association (NEMA) –

G. National Electrical Manufacturers Association (NEMA) – NEMA WC26: Bi-national Wire and Cable Packaging Standard.

H. National Electrical Manufacturers Association (NEMA) – NEMA WC70: Non-Shielded Power Cable 2000 V or Less.

1.4 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

A. Product Data: For sleeve seals.

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water-stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:
   a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
   b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM, or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. A. Non-metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, non-metallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with fire-stop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations. type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 26 05 00

SECTION 26 05 19 - LOW VOLTAGE ELECTRIAL POWER CONDUCTORS & CABLES

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

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

B. Related Sections include the following:
1. Section 260500, "Common Work Results for Electrical".
2. Section 262726, "Wiring Devices".

4.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.

4.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

4.4 CODES, STANDARDS, AND REFERENCES

A. American Society for Testing and Materials (ASTM) – ASTM A53/A53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).

C. California Code of Regulations (CCR) Title 24, Part 6, California Energy Code.

D. National Electrical Contractors Association (NECA) - NECA 1: Good Workmanship in Electrical Construction.

E. National Electrical Manufacturers Association (NEMA) – NEMA WC26: Bi-national Wire and Cable Packaging Standard.

F. National Electrical Manufacturers Association (NEMA) – NEMA WC70: Non-Shielded Power Cable 2000 V or Less.

G. International Electrical Testing Association (NETA) – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

H. Occupational Safety and Health Administration (OSHA) – 29 CFR 1910.7: OSHA Occupational Safety and Health Standards.

I. Underwriters Laboratories – UL 83 – Thermoplastic Insulated Wires.

J. Underwriters Laboratories – UL 467 – Grounding and Bonding Equipment.

K. Underwriters Laboratories – UL 486A – Wire Connectors and Soldering Lugs for Use with Copper Conductors.

4.5 SUBMITTALS

A. Product Data: Provide data for building wire and each cable assembly type. Select each length to complete set of manufacturer's markings. Attach tag indicating cable size and application information. Provide record documents showing actual locations of components and circuits.

B. Qualification Data: For testing agency.

C. Field quality-control test reports: Indicate and interpret test results for compliance with performance requirements.

D. Provide manufacturer's instructions for use of ground megger with proposed method indicated.

4.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Manufacturers: Shall be specialized in manufacturing products specified in this section with minimum ten years (documented) experience.

D. Comply with CEC.

E. Comply with CCR Title 24, Part 6, California Energy Code.

4.7 DELIVERY, STORAGE, AND HANDLING

A. Product Requirements: Products storage and handling requirements.

B. Deliver wires and cables according to NEMA WC 26.

4.8 COORDINATION

A. Division 1 "Project Management and Coordination": As required for coordination.

B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

C. Coordinate layout and installation of wiring and cables with other installations.

D. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 5 - PRODUCTS

5.1 CONDUCTORS AND CABLES

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. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Conductors: Copper. Comply with NEMA WC 70.

C. Conductor Insulation: Types THHN-2/THWN-2, XHHW2. Comply with NEMA WC 70.

D. Type MC or AC Cable shall not be used.

5.2 CONNECTORS AND SPLICES

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. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.

3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 6 - EXECUTION

6.1 CONDUCTOR MATERIAL APPLICATIONS

A. Copper: solid for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

6.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Feeders & Branch Circuits: Type THHN/THWN-2 in raceway.

B. Class 1 Control Circuits: Type THHN-THWN-2 in raceway.

C. Class 2 Control Circuits: Type THHN-THWN-2 in raceway.

6.3 INSTALLATION OF CONDUCTORS AND CABLE

A. Conceal raceways in finished columns, ceilings, and below grade, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary. Compound used must not deteriorate conductor insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

6.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

6.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Perform tests and inspections and prepare test reports.

C. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding critical equipment and services, as indicated on drawings, for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

    a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    b. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action. Furnish original and four copies of the complete report to the Architect in accordance with requirements of Contract Documents

D. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
4. Furnish original and four copies of the complete report to the Architect in accordance with requirements of Contract Documents

E. Remove and replace malfunctioning cables and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

PART 7 - GENERAL

7.1 RELATED DOCUMENTS

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

B. Related Sections include the following:
1. Section 260543, "Underground ducts and Raceways for Electrical Systems".
2. Section 260553, "Identification for Electrical Systems".

7.2 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Common ground bonding with lightning protection system.

7.3 CODES, STANDARDS AND REFERENCES

1.

B. ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).

C. ANSI/IEEE C2: National Electrical Safety Code (NESC)

D. American Society for Testing and Materials (ASTM) - ASTM B3: Standard Specification for Soft or Annealed Copper Wire.

E. American Society for Testing and Materials (ASTM) - ASTM B8: Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

F. American Society for Testing and Materials (ASTM) - ASTM B33: Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes.

G. Institute of Electrical and Electronic Engineers (IEEE) - IEEE 142 – Recommended Practice for Grounding of Industrial and Commercial Power Systems.

H. Institute of Electrical and Electronic Engineers (IEEE) - IEEE 81: IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.

I. National Fire Protection Association (NFPA) - NFPA 70B: Recommended Practice for Electrical Equipment Maintenance.

J. National Fire Protection Association (NFPA) - 780: Standard for the Installation of Lightning Protection Systems.

K. Occupational Safety and Health Administration (OSHA) – 29 CFR 1910.7: OSHA Occupational Safety and Health Standards.

L. Underwriters Laboratories – UL 83 – Thermoplastic Insulated Wires.

M. Underwriters Laboratories – UL 467 – Grounding and Bonding Equipment.

N. Underwriters Laboratories – UL 486A – Wire Connectors and Soldering Lugs for Use with Copper Conductors.

7.4 DEFINITIONS

A. UFER – As defined by Article 100 of the CEC.

7.5 REGULATORY REQUIREMENTS

A. The Contractor shall conform to requirements of the California Electrical Code.

7.6 PERFORMANCE REQUIREMENTS

A. Grounding system resistance shall be 25 ohms or less unless otherwise indicated.

7.7 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:

1. Test well
2. Ground rods.

C. Qualification Data: For testing agency and testing agencies field supervisor.

D. Field quality-control test reports.

7.8 WARRANTY

A. Warranty shall comply with the provisions of Divisions 1 of these specifications.

7.9 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International. Electrical Testing Association to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 8 - PRODUCTS

8.1 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V, unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: comply with ASTM B3.
2. Stranded Conductors: comply with ASTM B8.
3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

8.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Rods, Conductors and Pipes: Copper or copper alloy, bolted pressure- type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

8.3 GROUNDING ELECTRODES

A. Ground Rods: Sectional copper-clad, 3/4 inch diameter by10 feet in length. Provide driving pins. Provide threaded couplings where necessary to extend rods.

PART 9 - EXECUTION

9.1 APPLICATIONS

A. Conductors: Install green insulated, solid conductors for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.

9.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

9.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by CEC:

1. All Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle Circuits.

C. Metal Poles Supporting Outdoor Sports Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

9.4 INSTALLATION

A. Make mechanical and electrical contact at all panelboards, outlet boxes, junction boxes, and wherever the conduit run is connected. Permanently and effectively ground all conduits and other equipment as required by all applicable codes, regulations, and standards.

B. Grounding Conductors: Install a code sized insulated ground wire in all conduits unless a larger size is indicated on plans. Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

4. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.

5. Bury ground ring not less than 24 inches from building foundation.

9.5 FIELD QUALITY CONTROL

A. Testing Agency: An independent, qualified testing and inspecting agency shall perform the following field tests and inspections and prepare test reports.

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
3. Documentation:
   a. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
   b. Furnish original and four copies of the complete report to the Architect in accordance with requirements of Contract Documents.

B. Report measured ground resistances that exceed the following values:

1. Electrical system maximum ground-resistance value: 25 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified value, extend rod(s) or drive additional rods to meet specified resistance.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAYS & BOXES FOR ELECTRICAL SYSTEMS

PART 10 - GENERAL

10.1 RELATED DOCUMENTS

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

B. Raceways, Fittings, Equipment Racks, Equipment Cabinets and Enclosures for Data, Communication, and Low Voltage Control Systems are covered under applicable Division 27 and 28 Sections.

C. Related Sections include the following:

1. Section 260519, "Low Voltage Electrical Power Conductors and Cables".
2. Section 260526, "Grounding and Bonding for Electrical Systems".
3. Section 260543, "Underground Ducts and Raceways for Electrical Systems".
4. Section 260553, "Identification for Electrical Systems".

10.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

10.3 CODES, REFERENCES AND STANDARDS

A. American National Standards Institute (ANSI) – ANSI C80.1: Electrical Rigid Steel Conduit (ERSC).

B. American National Standards Institute (ANSI) – C80.3: Specification for Electrical Metallic Tubing, Zinc Coated (EMT).

C. American National Standards Institute (ANSI) – OS1: Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

D. ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).

E. American Society for Testing and Materials (ASTM) - ASTM A53/A53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

F. National Electrical Contractors Association (NECA) - NECA 1: Good Workmanship in Electrical Construction.

G. National Electrical Contractors Association (NECA) - NECA 101: Standard for Installing Steel Conduits (Rigid, IMC, EMT).

H. National Electrical Manufacturers Association (NEMA) – NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).

10.4 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. LFMC: Liquid-tight flexible metal conduit.

D. LFNC: Liquid-tight flexible non-metallic conduit.

E. PVC: Polyvinyl Chloride.

F. RMC: Rigid metallic conduit.

G. RNC: Rigid non-metallic conduit.

10.5 SUBMITTALS

A. Product Data: For surface raceways, wire ways and fittings, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.
2. For handholes and boxes for underground wiring, including the following:
   a. Duct entry provisions, including locations and duct sizes.
   b. Frame and cover design.
   c. Grounding details.
   d. Joint details.

C. Coordination Drawings: Conduit routing 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. Structural members in the paths of conduit groups with common supports.
2. Existing Plumbing items and landscape features in the paths of conduit groups with common supports.

D. Qualification Data: For professional engineer and testing agency.

E. Source quality-control test reports.

10.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with CEC.

PART 11 - PRODUCTS

11.1 METAL CONDUIT AND TUBING

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. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Manhattan/CDT/Cole-Flex.
6. O-Z Gedney; a unit of General Signal.

B. Rigid Steel Conduit: ANSI C80.1.

1. Standard weight rigid galvanized steel (RGS) conduit shall be hot dipped galvanized or sheradized. All fittings shall be of the screw thread type. Couplings, locknuts, bushings, etc., shall be hot dipped galvanized or sheradized.

C.

D. EMT: ANSI C80.3.

1. Electric Metallic Tubing (EMT) shall be galvanized or sheradized. Couplings and connectors shall be galvanized or sheradized.

E. FMC: Zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket.

G. Fittings for Conduit (Including all Types and Flexible and Liquid-tight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed. Indent or drive-on fittings shall not be permitted.
1. Fittings for EMT: Steel, compression type.
2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

H. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

11.2 NON-METALLIC CONDUIT AND TUBING

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. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. CertainTeed Corp.; Pipe & Plastics Group.
4. Lamson & Sessions; Carlon Electrical Products.
5. Manhattan/CDT/Cole-Flex.
6. RACO; a Hubbell Company.
7. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Type EPC-40-PVC, EPC-80-PVC, unless otherwise indicated.

C. Underground bends or sweeps in PVC conduits for vertical risers for feeders and branch circuits shall be according to the following formula, as a minimum: For conduits 2" diameter and smaller, sweep radius shall be six times the diameter; for conduits larger than 2" diameter, sweep radius shall be ten times the diameter.

D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

11.3 CONDUIT SIZES

A. The minimum conduit size shall be ¾ inch for lighting and power branch circuit wiring. The minimum "Homerun" conduit size to any panelboard, load center, switchboard, or motor control center shall be ¾ inch. For concrete encased duct structures the minimum size shall be 4 inches unless otherwise indicated.

B. Minimum size for conduit installed below grade is 1".

C. Condulets for conduits larger than 1-1/2 inch I.D. shall be of the mogul design secured to the building structure within 6 inches each of conduit connection.

11.4 BOXES, ENCLOSURES, AND CABINETS

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. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Hoffman.
3. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
4. O-Z/Gedney; a unit of General Signal.
5. RACO; a Hubbell Company.
6. Thomas & Betts Corporation.
7. Walker Systems, Inc.; Wiremold Company (The).
8. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Manufacturer for the custom exterior enclosure shall be Pacific Electric, Inc. Temecula Contact Don Cartwright ph# 951-296-1562

C. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy Type FD, with gasketed cover.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

H. Custom Enclosure:

1. NEMA 3R, galvanized-steel with hinged removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Pad lockable.
4. Supports pre-installed for mounting of equipment.
5. Paint to match existing white finish of electrical room.

11.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Description: Comply with SCTE 77.

1. Color of Frame and Cover: Gray concrete in custom enclosure, galvanized diamond plate metal elsewhere.
2. Configuration: Units shall be designed for flush burial unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant stainless steel hex nuts.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering stamped " Electrical".
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

B. Polymer-Concrete Handholes and Boxes: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. 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:
   a. Brooks Products.

b. Christy.
c. BES.
d. Jensen.

PART 12 - EXECUTION

12.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: EMT.
3. Underground Conduit: Schedule 40 or 80 PVC, direct buried, as indicated.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
5.

B. Comply with the following applications, unless otherwise indicated:
1. Damp or Wet Locations: Rigid steel conduit.
2. Interior Walls Ceiling cavities: EMT
3. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 3R in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location. EMT Raceway fittings shall be steel, compression type.

1. EMT: Compression Type.
2. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
3. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

12.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. All conduits shall contain an insulated ground wire whether indicated or not. The ground wire shall be sized in accordance with CEC, unless otherwise noted. All conduit systems shall be mechanically and electrically continuous.

C. Complete raceway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.