ECONOMIC DEVELOPMENT AGENCY – COUNTY OF RIVERSIDE

ADDENDUM NO. 001

TO BIDDING DOCUMENTS, CONTRACT, BASIC SPECIFICATIONS, AND SPECIAL REQUIREMENTS
FOR
RANCHO JURUPA REGIONAL SPORTS COMPLEX

Bidders are advised that the Contract Documents for the above referenced contract are hereby amended in the following manner and in the following manner only:

A. GENERAL ITEMS

1. All provisions of this Addendum No. 001 are hereby incorporated into the contract documents, and bidders shall account for all provisions pursuant to this Addendum No. 001 in submitting their bid proposals. Each bidder shall include a dated and signed copy of this Addendum No. 001 with his sealed bid proposal.

2. Mandatory Job Walk will take place on Wednesday, October 13, 2010 at 10:00 am. The location of the job walk will be at 4800 Crestmore Road, Riverside CA 92509-6839. Follow the directional signs into the Park. The meeting location will be at the Pecan Shade Shelter.

3. Plans and specifications are available at OCB Reprographics of Riverside. Please contact them for cost of plans and specifications.

B. PLAN & SPECIFICATION ITEMS

1. Replace the following specification sections with the specifications attached.
   02441, 02461, 02740, 02763, 02783, 02890, 09860, 16000

2. Add the following specification sections attached.
   13000, 13120

3. Turf shall be SOD only. Remove reference to hydroseed turf on planting plans.

4. Construction Plan item 24 on sheets CP-1 and CP-2 shall be changed to item 15 and item 15 shall be changed to item 24.

5. Construction Plan item 24b on sheet CP-2 shall be changed to item 24a.

6. Contractor shall note the requirement of providing for turnover to the County a synthetic turf sweeper and groomer as part of the base bid cost as noted on page 9 of specification section 02890.

7. Contractor shall note that the drainline shown on sheets C5 and C9 shall NOT be installed under the concrete paving as shown. Drainline shall be installed as shown on sheet TD-1.

8. The **County will provide** all site survey services. Section 8.9.1 under "LAYOUT OF WORK" shall be modified accordingly.

9. The attached "Contractor's Proposal" shall be used in place of the one in the original bid specifications.

DATED: October 7, 2010

By: _____
Jason Plotkin, Project Manager

_____
Date Received by Bidder

By: _____
Bidder's Signature

_____
Typed or Printed Name

CONTRACTOR'S PROPOSAL
Rancho Jurupa Regional Sports Complex

TO THE GOVERNING BOARD OF THE REDEVLOPMENT AGENCY FOR THE COUNTY OF RIVERSIDE:

Date: _____

Bidder: _____

The undersigned, having carefully examined the proposed site and the Plans and Specifications, the Notice Inviting Bids, the Instructions to Bidders, the Agreement Form, the Bond Forms, the General Conditions for the Construction of the Rancho Jurupa Regional Sports Complex, hereby proposes and agrees to furnish all tools, equipment, services, apparatus, facilities, transportation, labor and materials necessary to complete the work in strict conformity with the Plans and Specifications, including all work specified in Addenda numbered and dated:

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

BASE BID

Clear and Grub/Demolition: $ _____

Grading and Drainage: $ _____

Water and Sewer: $ _____

Electrical: $ _____

Site Construction: $ _____

Irrigation: $ _____

Planting: $ _____

For the total Base Bid _____dollars
(in words)

($_____)

including all applicable taxes, permits, licenses, **AND Course of Construction Insurance.**

ALTERNATE BID ITEMS

(Add or Deduct state which)

Alternate Bid Synthetic Turf "FieldTurf Prestige XM50"
(refer to specifications section 02890.05 A)

$ _____ _____

Alternate Bid Synthetic Turf "Mondo Green Ecofill MF4563"
(refer to specifications section 02890.05 B)

$ _____ _____

Alternate Bid Synthetic Turf "Sprinturf Ultrablade DF"
(refer to specifications section 02890.05 C)

$ _____ _____

And,
Cost of Contractor's Course of Construction Insurance _____dollars ($_____) and deductible $_____.

Bids must be submitted on all items. Failure to bid on all items may result in the bid being rejected as non-responsive. The basis for award will be the qualified bidder with the lowest total of the Base Bid WITH COURSE OF CONSTRUCTION INSURANCE. Alternates may be awarded in any order after determination of the lowest responsible and responsive bidder.

SECTION 02441
IRRIGATION SYSTEM

PART I - GENERAL REQUIREMENTS

1.1 DESCRIPTION

A. Work Included: Unless otherwise specified, the construction of irrigation systems shall include the furnishing, installing and testing of mains, laterals, risers and fittings, quick couplers, gate valves, back flow preventers, furnishing and installing of irrigation controllers, booster pumps, excavation and backfill, and all other work in accordance with the plans and specifications for a complete operating system.

(1) The intent of the drawings and specification is to indicate and specify a complete and efficient irrigation system ready for use in accordance with the manufacturer's recommendations and meeting the recommended approval of the Landscape Architect. All work shall be in accordance with applicable County and County codes, and these plans/specifications.

(2) Irrigation systems shall be constructed to the sizes and grades and at the location shown on the drawings. Lines shown on the plans are essentially diagrammatic. The Landscape Architect shall review locations of all heads, valves, etc., at the time of construction. Do not exceed spacing of the heads as shown on plans.

(3) The applicable provisions of the General Conditions and the Special Conditions of these specifications shall govern the work of this section as if herein written in full.

(4) The Contractor shall maintain, continuously, a competent superintendent or foreman, satisfactory to the Owner, during the progress of work, with authority to act for him in all matters pertaining to the work.

(5) Work noted as "N.I.C.", "existing" or "to be supplied and/or installed by others" is not a part of this section.

(6) The work in this section shall be coordinated with all underground utilities and trades responsible for their installation.

B. Field Conditions: Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Landscape Architect all conditions which prevent proper execution of this work.

C. Permits and Fees: The contractor shall apply and pay for all necessary fees and permits required in the pursuit of his work as required by governing codes.

D. All assemblies specified herein shall be installed in accordance with the respective details. In the absence of detail drawings or specifications pertaining to the specific items required to complete the work, the Contractor shall perform such work in accordance with the best standard practice and to the satisfaction of the Landscape Architect.

E. Irrigation Contractor is responsible for replacing or repairing any acts of theft or vandalism during construction and the maintenance period.

F. Permission to shut off any water lines must be obtained from the Owner. Disruption of existing systems shall be kept to a minimum.

G. Contractor shall maintain irrigation system throughout plant establishment and maintenance period.

H. Contractor shall provide one-year guarantee.

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Planting: Section 02800

1.3 QUALITY ASSURANCE

A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code and the Electrical Safety Orders of the State of California, Division of Industrial Safety, for all electrical work and materials.

B. Qualifications of Installers: 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 and the materials manufacturer's recommended methods of installation, and who shall direct all work performed under this Section.

1.4 SUBMITTALS

A. Product Data: Within 45 days after award of the Contract, and before any materials of this Section have been delivered to the job site, submit to the County:

(1) A complete materials list of all items proposed to be furnished and installed under this Section.

(2) The manufacturer's recommended methods of installation which, when recommended for approval by the County, shall become the basis for review and accepting or rejecting actual installation methods used on the work when not otherwise specified or detailed.

B. Materials and Samples: If materials are to be employed, other than designated on the plans, the Contractor shall, prior to the installation of any irrigation work, submit for recommended approval by the Landscape Architect, a list of materials and equipment he proposes to use. The material and equipment list shall include, but not be limited to, polyvinyl chloride pipe, automatic controllers and control valves, quick coupling valves and irrigation heads.

(1) Should the Contractor propose to use materials or equipment other than those listed on the plans, he shall submit samples of the make and type proposed. Samples shall be submitted a sufficient time in advance of the start of construction to allow a period of not less than seven (7) days for testing and recommended approval.

(2) Recommended approval of irrigation equipment and materials shall depend on the following:

(a) Conformance to specification requirements.

(b) Acceptable test results and/or field performance.

(c) Durability and low maintenance.

(d) Availability of parts and service.

(e) Compatibility with owner's materials inventories.

C. Project Record Drawings: Provide separate and complete Project Record Drawings prepared in accordance with the provisions of these Specifications, Sub-section 3.8, following.

1.5 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

B. Delivery: Polyvinyl chloride pipe shall be delivered to the work site in unbroken bundles or rolls packaged in such a manner as to provide adequate protection for the pipe ends, threaded or plain.

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

PART 2 – PRODUCTS

2.1 "OR APPROVED EQUIVALENT" PRODUCTS

This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The County's and Landscape Architect's approval is required as to whether or not a product meets the County's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract**

2.2 PIPE

A. Plastic Pipe:

(1) Unless otherwise specified, the construction of lateral lines and main lines shall include excavation and backfill, the furnishing, installing and testing of pipe, tube and fittings, the furnishing and installing of anchors, thrust blocks and location wire, the improvements, line flushing and testing, and all other work in accordance with the plans and specifications.

(2) Main supply pressure lines shall be as called for on plans and manufactured by Lasco Industries, or approved equal.

(3) Lateral non-pressure lines shall be as called for on plans and manufactured by Lasco Industries, or approved equal.

(4) Irrigation Lines Sleeves shall be as called for on plans and manufactured by Lasco Industries, or approved equal.

(5) Low Voltage Control Wire Sleeves (valve wires) shall be PVC Schedule 40 polyvinyl chloride, as manufactured by Lasco Industries, or approved equal. All exposed wires shall be sleeved in PVC Schedule 40 ULV electrical conduit with ULV Schedule 40 fittings.

B. Identification: All pipe shall be continuously and permanently marked with the following information: The normal pipe size, the type and schedule or class of material, the working pressure or pressure rating at 73.4 degrees F., the manufacturer's name or trade mark, and the National Sanitation Foundation (N.S.F.) seal of approval.

(1) All plastic pipe shall be guaranteed by its manufacturer to have passed, or be capable of passing, the Anhydrous Acetone Immersion Test and to be free from manufacturing defects.

C. Polyvinyl Chloride Pipe Fittings and Connections:

(1) Polyvinyl chloride pipe fittings and connections approved for irrigation systems shall be polyvinyl chloride, Type II, Grade I, Schedule 40, high impact molded fittings, manufactured from virgin compounds.

(2) The Schedule 40 fittings shall be tapered socket type, or molded thread type, suitable for either solvent weld or screwed connections.

(3) Machine threaded fittings will be acceptable only if thread-stripping resistance test results are submitted and approved.

(4) In line fittings, such as couplings, unions and bushings may be machined from extruded stock.

(5) Plastic saddle and flange fittings will not be acceptable.

(6) All fittings shall be permanently marked with the following information: The normal pipe size, the type and schedule of material, and the National Sanitation Foundation (N.S.F.) seal of approval.

D. Galvanized Pipe and Fittings:

(1) All galvanized steel pipe shall be Schedule 40, threaded, coupled and hot-dip galvanized, and shall comply with ASTM A120 and A53.

(2) All fittings for galvanized steel pipe shall be 150 PSI rated galvanized malleable iron, banded pattern.

(3) Pipe sizes indicated on the drawings are nominal inside diameter unless otherwise noted.

2.3 VALVES

A. Ball Valves:

(1) All ball valves shall be all bronze construction full port; 1/2" thru 2", as called for on plans.

(2) Working Pressure Rated: 150 PSI stem, 400 PSI W.O.G.

(3) Ball valves installed underground shall be housed in a valve box as called for on plans.

B. Butterfly Valves:

(1) All butterfly valves shall be 2 1/2" and larger, as called for on plans.

(2) Butterfly valves installed underground shall be housed in a valve box as called for on plans.

C. Automatic Control Valves (Electric):

(1) All automatic control valves (electric) shall be as called for on plans, electrically controlled, hydraulically operated, single seat, normally closed no equivalents or equals.

(2) The valves shall be actuated by a normally closed solenoid valve operator using 24 volts, 60 cycle alternating current. The wires in the coil of the solenoid shall be embedded in an epoxy resin. The entire solenoid shall be enclosed in Spears dry splice DS-400 water proof connectors. Valves shall automatically close in event of electrical power failure.

(3) All automatic control valves shall have a flow control device for manually adjusting the amount of flow of water through the valve. The flow control device shall be adjusted so that the pressure at the nozzle of the sprinkler head farthest from the automatic control valve shall be that as specified in the irrigation legend per plan. The pressure at the sprinkler head shall be measured by means of a pilot pressure gauge while the sprinkler head is operating.

(4) Automatic control valves shall be constructed of brass or stainless steel springs and screens, and composition material (neoprene) seals and seat washers.

(5) Valve stems shall have a brass cross handle.

(6) All automatic control valves shall be equipped with an all brass pet clock for manual operation control.

(7) The Contractor shall furnish one valve box key for each six or less valve boxes installed.

(8) All valves shall have a T.C. Christie valve marking metal tag.

2.4 CONTROLLERS & WIRE

A. Automatic Controllers (Electric):

(1) Controller shall as called for on plans.

(2) All automatic controllers treated in this specification shall be for use with solenoid operated (24-volt electric), normally closed, control valves.

(3) Automatic controllers shall meet the following requirements:

Be completely automatic in operation with remote control.

Shall electrically start the sprinkling cycle.

Shall electrically time the individual stations.

Shall operate on single phase, 120 volt, 60 cycle, alternating current.
Shall contain electrical circuits for pump and master valve operations.

Shall have complete operating instructions and charts indicating controller station to valve locations mounted inside the controller in full view when controller is open.

B. Control Wire:

(1) All control wire shall be of the Underwriter's Laboratory type UF (underground feeder), single conductor, solid copper, plastic insulated, 600 volt rated, for direct burial applications. Maximum conductor operating temperature, 60 degrees C. for both wet and dry locations. Wire composition is as follows:

(a) Conductor - The conductors shall be solid annealed uncoated copper meeting the applicable requirements of the latest revisions of A.S.T.M. B-3.

(b) Insulation - The insulation shall be colored plastic which meets the test requirements of I.P.C.E.A. (The Insulated Power Cable Engineer's Association) Pub. No. S-61-402, dated July 1961, Section 3.7 for 60 degrees C. polyvinyl chloride insulation. The insulation shall be flame retardant, resistant to fungus, resistant to corrosive fumes, suitable for wet locations and furnish some degree of inherent protections against mechanical abuse. Insulation thickness shall be 47 mils for AWG #14, 12 & 10, and 62 mils for AWG #8.

(c) Color Coding - The conductor insulation shall be color coded as follows:

(1) All common ground wire shall be white.

(2) All pilot (valve control) wire shall be black.

2.5 VALVE BOXES

A. Valve Boxes: Remote control valve boxes shall be as called for on plans. Valve station number shall be cast or tooled in the cover in two-inch-high (2") numerals. Ball valve boxes shall be as called for on plans marked either "Ball Valve" or "G. V." with letters cast or tooled in the cover in two-inch-high (2") numerals.

2.6 SPRINKLER HEADS

A. Sprinkler Heads:

(1) Sprinkler heads shall be as called for on plans. Sprinkler heads shall be of the types and sizes, with the diameter (or radius) of throw, pressure, discharge and any other designations necessary to determine the types and sizes, as indicated on the plans.

(2) All sprinkler heads of a particular type of function in the system shall be of the same manufacture and, with the exception of shrubbery heads, shall be marked with the manufacturer's name and model number. This identification shall be visible without having to remove the sprinkler head from the system.

(3) Unless otherwise specified, all irrigation heads & body shall be constructed of cycolac with the following exceptions: bearings, washers, gaskets, seals, spray pins and rocker arms.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

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

(2) Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the reference standards and the manufacturer's recommendations.

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.

3.2 FIELD MEASUREMENTS

A. General:

(1) Trenches and other excavations for irrigation pipe and appurtenances shall be excavated true to alignment and grade, and shall be of ample size for the proper performance of installation work, review, testing and backfill.

(2) Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots.

(3) Protect all existing utilities and repair any damage to existing utilities with matching new materials, at no increase in contract price.

(4) Generally, piping under concrete shall be installed by jacking, boring or hydraulic driving. Where any cutting or breaking of sidewalks and/or concrete work is necessary, it shall be removed and replaced by the Contractor. Permission to cut or break sidewalks and/or concrete shall be obtained from the Landscape Architect. No hydraulic driving will be permitted under asphaltic concrete paving.

(5) Coordinate with planting operations, cross-ripping is required prior to irrigation systems installation. (cross-ripping is part of the planting work).

B. Plastic Pipe Trenches:

(1) Minimum trench width shall be six (6) inches.

(2) Minimum trench depth below bottom of pipe shall be two (2) inches.

(3) Minimum cover shall be based on finished grades, unless otherwise noted on Drawings.

a. Lateral Line minimum cover shall be twelve (12) inches.

b. Main Line minimum cover shall be eighteen (18) inches.

c. Pipe and Wire Sleeves minimum cover shall be twenty-four (24) inches.

C. Backfill Material:

(1) All plastic pipe shall be bedded and encased with approved backfill material free of rocks and clods as indicated in the following table and/or shown on the plans.

Thickness Under Pipe Minimum	Thickness Above Pipe Minimum	Thickness at Side of Pipe Minimum
Two (2) inches	Four (4) inches	Two (2) inches

(2) The balance of backfill material shall be approved soil. Unsuitable material, including clods and rocks over 2 to 2-1/2 inches in size, shall be removed from the premises and disposed of legally at no cost to the Owner.

(3) Backfill material shall be sufficiently compacted under and on each side of the pipe to provide support free of voids. On slope areas over 3:1 gradient compaction shall be 85% (min) or equal to the requirements of the grading plans, which ever is greater. Pipe joints shall remain exposed until the completion of pressure and leakage test, unless authorized by the Landscape Architect. The top six (6) inches of backfill shall be free of rocks over one (1) inch, subsoil, rubbish and debris.

(4) The remainder of the backfill material shall contain no lumps or rocks larger than two and one-half (2-1/2) inches, nor contain rubbish and debris.

(5) Backfill shall be tamped or puddled to the dry density of adjacent soil. Backfill within areas of structurally compacted soils shall be returned to the original relative density as before trenching.

D. Location Wire:

(1) Location wire shall be placed on top of the four-inch select backfill over all mainline (pressure bearing) pipes, except copper pipe. Wire shall be No. 12 gauge copper, new or used or an approved substitute, and shall provide a continuous electrical conductor between gate valves and control valves. Each end shall be brought to the valve sleeve and two feet of wire looped free in the trench beside the valve body. This location wire may be omitted where copper hydraulic control tubing or electric control wire follows the water main.

3.3 INSTALLATION OF POLYVINYL CHLORIDE PIPE

A. Polyvinyl chloride pipe shall be installed in such a manner so as to provide for expansion and contraction as recommended by the manufacturer.

B. All polyvinyl chloride pipe shall lay free in the trench with no induced strain. Where there is evidence of induced pipe strain, the Contractor shall be required to make pipe cuts and install angle fittings as necessary to eliminate the strain.

C. When a connection is plastic to metal, a female adapter shall be used. The metal nipple shall be hand-tightened, plus one turn with a strap wrench. Joint compound shall be Permatex, Type 2, or Teflon Tape.

D. The Contractor will be required to remove and replace any fitting which induces a torque strain to the pipe.

E. Polyvinyl chloride pipe shall be cut with a PVC. pipe cutter, hand saw or hack saw with the

assistance of a square and sawing vise or in a manner so as to ensure square ends. Burrs at cut ends shall be removed prior to installation so that a smooth unobstructed flow will be obtained.

F. All plastic to plastic joints shall be solvent-weld joints. Only the solvent recommended by the pipe manufacturer shall be used.

G. The solvent-weld joints shall be made in the following manner:

- Thoroughly clean the mating pipe and fitting with a clean dry cloth.
- Try the parts for fit. The parts should "dry-mate" between one-third and two-thirds the depth of the socket. If adequate insertion is not obtained, or bottoming occurs, try another part until a satisfactory "dry-fit" is obtained.

- Apply a uniform coat of solvent to the outside of the pipe with a non-synthetic bristle brush.

NOTE: *For PVC. Type I, 1120-1220, pipe-mating surface shall first be cleaned with the application of Methyl Isobutyl Ketone (MIBK) solvent. This cleaning shall be accomplished by applying MIBK solvent to the full mating surface area and wiping off with a clean cloth, repeating the process, if necessary, until no trace of shine remains (neither streaks nor spots). The use of commercial PVC, solvent-cement thinners as a substitute of MIBK is not allowed.*

- Apply a uniform coat of solvent-weld to the fitting socket.

- Re-apply a light coat of solvent-weld to the pipe and quickly insert it into the fitting.

- Give the pipe or fitting a quarter turn to ensure even distribution of the solvents and make sure that the pipe is inserted to the full depth of the fitting socket.

- Hold in position for at least 15 seconds.

- Wipe off excess solvent that appears at the outer shoulder of the fitting.

3.4 INSTALLATION OF CONTROL WIRE

A. Unless otherwise specified, the installation of control wire shall include excavation and backfill, the furnishing, installing and testing of the wires, the removal and/or restoration of existing improvements and all other work in accordance with the plans and specifications.

B. Unless otherwise specified all neutral (common ground) wire shall be AWG #12 and all pilot (valve control) wire shall be AWG #14.

C. Tape and bundle all control wires at 10' o/c maximum; place wiring with 18" minimum cover. When wiring is placed in common trenches with piping, set wiring 2" from any piping.

D. All wire splicing shall take place in the valve boxes and/or pull boxes. All splices shall be made with a mechanical connector encased in a self-curing epoxy resin, which provides a permanent watertight connection.

E. All direct burial control wires shall be identified as to their respective valve number and controller clock letter in all pull boxes and at all wire termination. Spare wires and "future valve" wires, if any, shall also be identified. Labels and tags shall be used for identification which are not affected by moisture or temperatures between minus 30 degrees F. and plus 200 degrees F. The labels and tags shall be resistant to abrasion, dirt, grease, and chemicals used in lawn fertilizers and

conditioners. The labels and tags shall be firmly attached to the wire in every case. The Contractor shall submit samples of the labels or tags to be used, to the Landscape Architect for recommended approval, prior to the installation of the control wire. Examples of nomenclature of tags or labels are as follows:

Neutral (common ground) wire =	"Neutral" Clock "A"
Pilot (valve control) wire =	"A.V. #1." Clock "A"
Spare Wire =	"Spare" Clock "A"

G. The final operating sequence of the remote control valves, within each individual controller clock, shall be as called out on drawings.

H. Testing:

(1) All direct burial control wire installed shall be tested in the following manner.

- Before any backfill material is placed over the control wires in the trench, the wires shall be tested with a meter for insulation resistance. Minimum insulation resistance to ground shall be fifty (50) megohms. Any conductor not meeting this requirement shall be replaced.

- After backfill encasement, the wires shall again be tested with a meter. The minimum acceptable insulation resistance to ground on this test shall be one (1) megohm. Any conductor not meeting this requirement shall be replaced.

I. Provide separate common wire for each controller installed.

3.5 INSTALLATION OF VALVES

A. General: Unless otherwise specified, the installation of the valves shall include excavation and backfill, the furnishing, installing and testing of risers, fittings and valves, the furnishing and installing of appurtenances, accessories, anchors and thrust blocks, the removal and/or restoration of existing improvements and all other work in accordance with the plans and specifications.

3.6 INSTALLATION OF AUTOMATIC CONTROLLERS

A. Unless otherwise specified, the installation of automatic controllers shall include the furnishing, the installing, making necessary electrical connections, the testing of controllers and connection, and all other work as called for on the plans and/or in the specifications.

B. All electrical conduit shall be P.V.C. Sunstop ULV Schedule 40 pipe & fittings.

C. Install controllers at 5' min. away from 3 phase power.

D. Unless otherwise specified the installation of controllers shall be as detailed on plan.

E. Controllers shall be tested for fourteen (14) calendar days after complete installation of the sprinkler system. System shall operate automatically in the manner shown on the drawings and/or specified herein.

3.7 INSTALLATION OF SPRINKLER HEADS

A. Unless otherwise specified, the installation of sprinkler heads shall include excavation and backfill, the

furnishing, installing and testing of risers, fittings and heads, the furnishing and installing of anchors and thrust blocks, the furnishing and installing of cone shaped screens at base of each head, the removal and/or restoration of existing improvements and all other work shall be in accordance with the plans and specifications.

B. Flushing: All water lines shall be thoroughly out before heads are installed.

C. Location and arc of heads shall be adjusted, if required to eliminate any dry spots, over water or spillage on adjacent areas.

D. All seeded area sprinkler heads shall be installed adjacent to existing walks, curbs, or other paved areas, shall be set to the grade of the improvements. Sprinkler heads which are to be installed in areas where the turf has not yet been established shall be set one (2) inches above the proposed finished grade. Heads installed in this manner shall be lowered by the Contractor prior to final acceptance. In established lawn areas the sprinkler heads shall be set to existing grade.

E. All shrubbery heads to be installed within three (3) feet of curbs shall be set to a maximum height of six (6) inches above the grade of the curb. Shrubbery heads installed in all other areas shall be twelve (12) inches above finished grades unless otherwise indicated on the plans. Pop-up shrub heads shall be installed as detailed.

3.8 DRAWINGS OF RECORD & TURNOVER ITEMS

A. Record Drawings: The Contractor shall provide and keep up to date, a complete record set of blue line ozalid prints which shall be corrected daily and show every change from the original drawings and specifications and the exact locations, sizes and kinds of equipment. Prints for this purpose may be obtained from the Owner. This set of drawings shall be kept on the site and shall be used only as a record set.

B. The drawings shall also serve as work progress sheets, and the contractor shall make neat and legible annotations thereon daily as the work proceeds, showing the work as actually installed. These drawings shall be available at all times for inspections and shall be kept in a location designated by the Owner.

C. In order to complete the record drawings in a neat, legible manner, the contractor shall employ a competent draftsman, satisfactory to the Owner's authorize representative, to indicate the necessary changes on mylar tracings procured from the Owner and deliver same to the Owner two weeks prior to the final review by the Landscape Architect.

D. The contractor shall dimension from two (2) permanent points of reference, building corners, sidewalks, or road intersections, etc., the location of the following items:

The routing of the sprinkler main lines
Connections to the existing water lines
Control valves and Butterfly valves
Hose Bibs
Any other pertinent underground item, if so deemed by the Landscape Architect.

E. Controller Charts:

(1) Provide one controller chart for each controller supplied.

(2) Record drawings shall be recommended for approval by the Landscape Architect before charts are prepared.

(3) These charts shall be completed and reviewed prior to final observation of the irrigation system, and prior to final payment.

(4) Update and prepare new controller charts at end of the 1 year maintenance period.

(5) The chart shall show the area controlled by automatic controller and shall be no larger than the 24" x 36" original.

(6) The chart is to be a reduced drawing of the actual system. However, the chart shall only be reduced to a size which is completely legible.

(7) Chart shall be black line print and shall be colored with a different color for each station.

(8) The chart shall be mounted using Velcro, or an approved equal type of tape.

(9) When completed and recommended for approval, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils thick.

F. Turnover Items:
Supply as part of this contract the following items:

(1) Four (4) additional sprinkler heads of each type and spray pattern shown on plans.

(2) Two (2) wrenches for disassembly and adjustment of each type of sprinkler head shown on plans.

(3) Two (2) keys for each automatic controller.

(4) Two (2) quick couplers with a 3/4" bronze hose bib, bent nose type with hand wheel and two (2) quick coupler keys to match quick couplers shown on plan.

(5) Two (2) valve box cover keys or wrenches.

(6) One (1) 5-foot tee wrench for operating butterfly valves 3 inches or larger.

(7) Backflow device valve handles and Water Department inspection documentation.

3.9 TESTS

A. Pressure Tests:

(1) All pressure lines shall be tested under hydrostatic pressure of 125 pounds per square inch, and all non-pressure lines shall be tested under the existing static pressure and both be proved watertight. Contractor shall provide all equipment for hydrostatic tests at no cost to the Owner.

(2) Pressure shall be sustained in the lines for not less than two (2) hours. If leaks develop, the joints shall be replaced and the test repeated until the entire system is proved watertight.

(3) Tests shall be observed and recommended for approval by the Landscape Architect prior to backfill.

B. Coverage Test:

(1) When the irrigation system is completed, the Contractor, in the presence of the Landscape Architect, shall perform a test coverage of water afforded the planting areas, complete and adequate. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage disclosed arising from his work.

(2) Contractor shall inform the Owner's representative of any deviation from the plan required due to wind, planting, soil or site conditions that bear on proper coverage; and upon approval, perform changes to provide for proper coverage at no additional cost to the Owner.

3.10 REVIEWS

A. Normal Progress Reviews: Normal progress reviews shall be requested from the Landscape Architect at least 48 hours in advance of any anticipated review. A review will be made by the Landscape Architect on each of the steps listed below. The Contractor will not be permitted to initiate the succeeding steps of work until he has received written approval to proceed by the inspector.

(1) Immediately prior to the commencement of the work of the section.

(2) Irrigation materials and equipment to be used.

(3) After trenching and before backfill.

(4) Completion of line testing, test to be made prior to backfill.

(5) After placement of all heads, valves and controllers for coverage.

(6) Final review and receipt of "Record Drawings"/"Controller Charts".

(7) Final acceptance of project by Owner.

(8) In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval. Any work covered prior to review shall be opened to view by the Contractor, at his expense.

B. Unprepared Review Requests: In the event the Contractor requests review of work and said work is incomplete, the Contractor shall be responsible for review cost.

C. Completion: The work will be accepted, in writing, when the whole shall have been completed satisfactorily to the Owner and the Landscape Architect. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved by Owner, in writing, at the proper times.

(1) Leave the entire installation in complete operating order, free from any and all defects in material, workmanship or finish, regardless of any discrepancies and/or omissions in plans or specifications.

(2) Remove from the site all debris and rubbish resulting from the work, and leave the installation in clean condition.

3.11 GUARANTEE

A. General: The entire sprinkler system, including all work done under this contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following the filing of the Notice of Completion. All materials used shall carry a manufacturer's guarantee of one (1) year.

Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense to the County within ten (10) calendar days of receipt of written notice from the County. When the nature of the repairs as determined by the County constitute an emergency (e.g. broken pressure line) the County may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the County by the Contractor, all at no additional cost to the County.

B. Form of Guarantee: Guarantee shall be submitted on Contractors own letterhead as follows:

FORM OF GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace any defects in materials or workmanship which may develop during the period of one year from date of filing of the Notice of Completion and also the repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the County. We shall make such repairs or replacements within 10 calendar days following written notification by the County. In the event of our failure to make such repairs or replacements within the time specified after receipt of written notice from the County, we authorize the County to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT: _____

LOCATION: _____

SIGNED: _____

ADDRESS: _____

_____

_____

PHONE: _____

C. After the system has been completed, the Contractor shall instruct the Parks Department Representative in the operation and maintenance of the system and shall furnish a complete set of operating instructions.

D. Any setting of trenches which may occur during the one-year period following acceptance shall be repaired to County's satisfaction by the Contractor without any additional expense to the County. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

3.12 MAINTENANCE

A. Maintenance of irrigation system prior to job completion, and during the Landscape Maintenance period, shall be the responsibility of the Contractor including, but not limited to, the following:

- Cleaning of plugged irrigation heads.

-Irrigation heads adjustments.

-Volume of water being applied (coordinate with landscape maintenance.)

-Programming of the controller (coordinate with landscape maintenance.)

-Repairing leaking valves, etc.

-Any other problem areas which occur after installation attributed to the irrigation system.

-Repair or replace equipment due to acts of vandalism, theft or pest damage.

-Lower all seeded area heads to final grades prior to final acceptance by Owner.

END OF SECTION

SECTION 02461
SITE FURNISHINGS

PART 1 - GENERAL

1.01 Related Documents:

The work of this section shall conform to the "Standard Specifications for Public Works Construction", latest edition, except as modified herein.

1.02 Scope of Work:

Work of this Section includes all materials, labor and equipment necessary to provide and install the Site Furnishings as shown on the drawings, as reasonably implied or as specified herein. The equipment shall be assembled on site as per manufacturer's recommendations and this section. All work and equipment provided shall be subject to approval of the Project Inspector.

1.03 Related Work Specified Elsewhere:

Concrete: Section 03300

1.04 Submittals:

A. Contractor shall submit a complete list of materials along with manufacturer's catalog data for all materials proposed for use in the work at the pre-construction conference. Proposals for substitution of those materials specified herein shall be submitted and reviewed.

B. Manufacturer's Product Data: Submit six (6) copies of manufacturer's literature for each item of site furnishings.

C. Shop Drawings: Manufacturer's shop Drawings shall be provided for all prefabricated items. Shop Drawings, which show complete details, shall be furnished in quadruplicate for all items requiring shop fabrication in accordance with Section 2-5.3 of the Standard Specifications.

1.05 Guarantee & Liability Insurances:

A. Manufacturer shall guarantee all materials and workmanship for a period of one (1) year exclusive of vandalism. Manufacturer will be required to provide product liability insurance coverage in the minimum amount of $1,000,000 per incident. Manufacturer or his representative shall inspect all installation work and provide written certification that equipment has been installed in accordance with the manufacturer's specifications.

B. Each Manufacturer will be required to provide complete installation drawings including specifications and a replacement parts list for all products.

C. Contractor shall provide a written guarantee on his firm's letterhead for all materials and workmanship for a period of one (1) year exclusive of vandalism. Written guarantee shall be submitted to the County at the final inspection prior to final acceptance of the work.

1.06 Proposed Substitutions:

Products proposed for substitutions as "equals" to those specified are subject to the approval of the County. If at the time proposed equals are delivered to the site, it is determined by the County that they are not equal to those specified, they shall be removed and products as specified shall be provided by the Contractor at no additional cost to the County.

1.07 Location Inspection:

No equipment or apparatus or foundations for same shall be placed until location stakes have been inspected for recommended approval by the Landscape Architect and/or Project Inspector.

PART 2 - MATERIALS

ALL MATERIALS SHALL BE AS CALLED FOR ON PLANS

2.1 "OR APPROVED EQUIVALENT" PRODUCTS

This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The County's and Landscape Architect's approval is required as to whether or not a product meets the County's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract**

PART 3 - EXECUTION:

3.01 Layout:

Contractor shall stake/mark locations for all slabs equipment or apparatus or foundations for same and shall obtain the acceptance of their location from Landscape Architect and/or Project Inspector prior to commencing any digging. Locations shall be adjusted to provide minimum clear distances required from all edges of slabs, trees, irrigation heads, or other obstructions.

3.02 Concrete Work:

All concrete foundation work shall be performed in accordance with the Standard Specifications, Section 201. Contractor shall obtain the acceptance of all forming from the Project Inspector prior to pouring any concrete. Foundations holes shall be inspected and accepted by the Inspector prior to pouring concrete.

3.03 Steel Fabrication and Welding:

All steel members shall be thoroughly hand cleaned and solvent cleaned to remove all rust, scale, oil, grease, and foreign material prior to welding. All welds shall be continuous fillet welds along all abutting surfaces. Sand all welds smooth. Galvanized steel shall be touched up after welding with Galvicon paint.

3.04 Site Furnishings:

A. All Site Furnishings shall be installed plumb, at a height above the finish surface as

recommended by the manufacturer. Minimum footing size shall conform to the manufacturer's recommendations. **All footings shall be installed prior to placement of concrete slabs, where they occur. No "block outs" will be permitted.**

3.07 Painting:

A. All items to be painted shall be properly primed prior to application of a minimum of two (2) finish coats.

B. After installation, all site furnishings and play equipment shall be touched-up as necessary. Touch-up paint shall be as supplied by the manufacturer.

3.08 Clean-Up

Contractor shall clean up and legally dispose of all unused materials, excess soil, and debris at regular intervals throughout the duration of the work, and as directed by the County.

END OF SECTION

SECTION 02740
FLEXIBLE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Asphalt materials.
2. Aggregate materials.
3. Aggregate subbase.
4. Asphalt paving base course, binder course, and wearing course.
5. Asphalt paving overlay for existing paving.
6. Surface slurry.

B. Related Sections:
1. Section 02081 - Manholes and Structures.
2. Section 02311 - Rough Grading: Preparation of site for paving and base.
3. Section 02721 - Aggregate Base Course: Compacted subbase for paving.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Aggregate Subbase:
1. See Section 02721.

B. Asphalt Paving Base Course:
1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing base course.

C. Asphalt Paving Binder Course:
1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing binder course.

D. Asphalt Paving Wearing Course:
1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing wearing course.

E. Tack Coat:
1. Basis of Measurement: By square yard.
2. Basis of Payment: Includes preparing surfaces and applying.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.

3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.

B. Asphalt Institute:
1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
2. AI MS-19 - Basic Asphalt Emulsion Manual.
3. AI SP-2 - Superpave Mix Design.

C. ASTM International:
1. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
2. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
3. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
4. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
6. ASTM D977 - Standard Specification for Emulsified Asphalt.
7. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
9. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
10. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
11. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
12. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
13. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
14. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
16. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
17. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
18. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
19. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
20. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.

21. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
22. Standard Specifications for Public Works Construction (SSPWC).
23. California Building Code 2007 (CBC-07).

1.4 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking and light duty commercial vehicles and occasional fire apparatus traffic.

1.5 SUBMITTALS

A. Section 01300 - Submittal Procedures: Requirements for submittals.

B. Product Data:
1. Submit product information for asphalt and aggregate materials.
2. Submit mix design with laboratory test results supporting design.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Sustainable Sites Certificates:
a. Certify paving materials solar reflectance index.
2. Materials Resources Certificates:
a. Certify recycled material content for recycled content products.
b. Certify source for local and regional materials and distance from Project site.

B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
1. Provide cost data for the following products:
a. Products with recycled material content.
b. Local and regional products.

1.7 QUALITY ASSURANCE

A. Mixing Plant: Conform to the SSPWC and CBC-07 as a minimum.

B. Obtain materials from same source throughout.

C. Sustainable Design Requirements:
1. Recycled Content Materials: Furnish materials with recycled content as required by local agency having jurisdiction.
2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

D. Perform Work in accordance with SSPWC and CBC-07 as a minimum.

E. Maintain one (1) copy of each document on site.

1.8 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Place asphalt mixture when temperature is not more than 15 degrees F less than initial mixing temperature.

C. Do not place asphalt mixture during rainy days.

PART 2 - PRODUCTS

2.1 ASPHALT MATERIALS

A. Asphalt Binder: Shall conform to Sections 203 and 302 of the SSPWC.

B. Primer: In accordance with Sections 203 and 302 of the SSPWC.

C. Tack Coat: ASTM D977 and AASHTO M140; diluted emulsified asphalt, type SSS-1h unless otherwise specified in construction documents.

D. Reclaimed Asphalt Pavement (RAP): Processed material obtained by milling or full depth removal of existing asphalt paving.

E. Oil: In accordance with Sections 203 and 302 of the SSPWC.

2.2 AGGREGATE MATERIALS

A. Coarse and Fine Aggregate: in accordance with Sections 203 and 302 of the SSPWC.

B. Mineral Filler: ASTM D242 or AASHTO M17; finely ground mineral particles, free of foreign matter.

2.3 ACCESSORIES

A. Geotextile Fabric: AASHTO M288; non-woven, polypropylene.

B. Sealant: ASTM D6690 Type II or Type III; hot applied type, unless otherwise specified on drawings.

2.4 MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Asphalt Paving Mixtures: Designed in accordance with sections 203 and 302 of the SSPWC with maximum 15 percent by weight reclaimed asphalt pavement.

C. Asphalt Base Course Mix: AR 4000-C2.

D. Parking and Drive Area Mix: AR 4000-D2.

E. Surface Slurry: ASTM D3910, Type 1; emulsified asphalt slurry.

2.5 SOURCE QUALITY CONTROL

A. Submit proposed mix design of each class of mix for review and approval by Architect/Engineer prior to beginning of Work.

B. Test samples in accordance with AI MS-2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.

B. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.
   1. Proof roll subbase with compaction roller approved by Architect/Engineer in minimum two (2) perpendicular passes to identify soft spots.
   2. Remove soft subbase and replace with compacted fill as specified in these specifications.

C. Verify gradients and elevations of base are correct. Tolerance ± 0.1 feet.

D. Verify gutter drainage grilles and frames, manhole frames and other features are installed in correct position and elevation.

3.2 SUBBASE

A. Aggregate Subbase: Install as specified in Section 02721.

B. Verify that subbase is in accordance with SSPWC.

3.3 EXISTING WORK

A. Saw cut and notch existing paving as indicted on Drawings.

B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.

C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

3.4 PRIMER

A. Apply primer in accordance with AI MS-2 and SSPWC.

B. Use clean sand to blot excess primer.

3.5 TACK COAT

A. Apply tack coat in accordance with AI MS-19 and SSPWC.

B. Apply tack coat to contact surfaces of curbs, gutters.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt paving. Do not tack coat these surfaces.

3.6 SINGLE COURSE ASPHALT PAVING

A. Install Work in accordance with Sections 203 and 302 of the SSPWC.

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Place asphalt wearing course to thickness indicated on Drawings.

D. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.7 DOUBLE COURSE ASPHALT PAVING

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place binder course to thickness indicated on Drawings.

C. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.

D. Place wearing course to thickness indicated on Drawings.

E. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.8 ASPHALT PAVING OVERLAY

A. Apply tack coat to existing paving surface at rate recommended by geotextile fabric manufacturer.

B. Install geotextile fabric in accordance with manufacturer's instructions to permit asphalt saturation of fabric. Lap fabric edge and end joints 4 inches.

C. Place wearing course to thickness indicated on Drawings.

D. Compact overlay by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.9 SURFACE SLURRY

A. Install uniform thickness surface slurry over existing paving in accordance with ASTM D3910.

B. Allow slurry to cure.

C. Roll paving to achieve uniform surface.

3.10 CURBS

A. Install extruded asphalt curbs of as indicated on Drawings and conforming to the SSPWC.

3.11 ERECTION TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from Indicated Elevation: Within 1/2 inch.

3.12 FIELD QUALITY CONTROL

A. Take samples and perform tests in accordance with AI MS-2 or AI SP-2 as approved by Geotechnical Engineer.

B. Verify that tests are in accordance with SSPWC.

C. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

D. Asphalt Paving Thickness: ASTM D3549; test one core sample from every 1000 square yards compacted paving or as directed by Architect/Engineer.

E. Asphalt Paving Density: ASTM D1188 or ASTM D2726; test one core sample from every 1000 square yards compacted paving or as directed by Architect/Engineer.

3.13 PROTECTION OF FINISHED WORK

A. Immediately after placement, protect paving from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

3.14 SCHEDULES

A. Unless otherwise specified on drawings:
   1. Paving at Parking Areas: Two courses; binder course of 2-inch compacted thickness and wearing course of 1 inch compacted thickness.

2. Paving Front Sidewalks: Thickness and compaction of subbase to support moderate pedestrian traffic.

END OF SECTION

SECTION 02763
PAINTED PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Traffic lines and markings.
2. Legends.
3. Paint.
4. Glass beads.

B. Related Sections:
1. Section 02740 - Flexible Pavement.
2. Section 02750 - Rigid Pavement.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Traffic Lines and Markings:
1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings for the duration of the project construction and maintenance period.

B. Legends:
1. Basis of Measurement: By square foot.
2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings for the duration of the project construction and maintenance period.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.

B. ASTM International:
1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
3. ASTM D562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer.
4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.
6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.

9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.
10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
11. ASTM D2202 - Standard Test Method for Slump of Sealants.
12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.
15. Standard Specifications for Public Works Construction (SSPWC).
16. California Building Code 2007 (CBC-07).
17. California Manual for Uniform Traffic Control Devices (CMUTCD).

1.4 PERFORMANCE REQUIREMENTS

A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

1.5 SUBMITTALS

A. Section 01300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit paint formulation for each type of paint.

C. Samples:
1. Submit eight (8) sample plates of each color of material. Prepare four (4) plates without glass beads and four (4) with glass beads for each different batch of material. After approval, Owner will retain these plates for field comparisons of applied paint.
2. Submit two gallons and four one quart paint samples accompanied by properly executed test reports.
3. Submit samples of glass bead in compliance with AASHTO M247.

D. Test Reports: Submit source and acceptance test results in accordance with AASHTO M247.

E. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:

a. Certify source for local and regional materials and distance from Project site.

B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
1. Provide cost data for the following products:
a. Local and regional products.

1.7 QUALITY ASSURANCE

A. Sustainable Design Requirements:
1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

B. Perform Work in accordance with the SSPWC, CBC-07 and CMUTCD.

C. Maintain one (1) copy each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

B. Applicator: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by Architect/Engineer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

B. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

C. Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.

D. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.11 WARRANTY

A. Furnish three (3) year manufacturer’s warranty for traffic paints.

1.12 MAINTENANCE SERVICE

A. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

A. Manufacturers:
1. Pervo Paint Company.
2. Pathmark Traffic Products.
3. Safety Coatings Inc.
4. Franklin Paint Company.
5. EZ-Liner Industries Model.
6. Substitutions: Permitted with prior approval of Architect/Engineer.

B. Furnish materials in accordance with the SSPWC and CMUTCD.

C. Paint: Ready mixed, conventional and fast dry waterborne traffic paints, lead-free, non-toxic, NASSHTO Test Deck, minimum retroreflectance of 100 mcds, durability rating of 6 or more after in place for 9 months; within following limits:
1. Pigment, percent by weight: 60 plus or minus 2.
2. Vehicle, percent by weight: 40 plus or minus 2.
3. Non-Volatile, percent by weight of paint: 76.0.
4. Weight per gallon, pounds minimum 13.0.
5. Viscosity: 80-95 Kreb Units at 77 degrees F.
6. Grind (Hegeman Gauge), minimum Field Tested no tracking time under ambient conditions: 20-90 seconds.
7. Dry Through Time, 15 mils wet at 90 percent relative humidity, 72 degrees F, ASTM D1640: 125 minutes maximum.
8. VOC (Volatile Organic Content): One lbs/gal maximum.

D. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

2.2 EQUIPMENT

A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
4. Device to heat paint to approved temperature for fast dry applications.

B. Machine Calibration:
1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.

2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.
4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.

C. Other Equipment:
1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.3 SOURCE QUALITY CONTROL

A. Test and analyze traffic paints in accordance with these specifications.

B. Make paints and glass beads available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.

C. Allow witnessing of factory inspections and test at manufacturer's test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not apply paint to concrete surfaces until concrete has cured for 28 days, unless otherwise approved by Architect/Engineer.

3.2 PREPARATION

A. Maintenance and Protection of Traffic:
1. Provide short term traffic control in accordance with Section 01500 - Temporary Facilities and Controls.
2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
3. Maintain travel lanes between 7: 00 AM to 9: 00 AM and between 4: 00 PM and 6: 00 PM, unless otherwise approved by Architect/Engineer.
4. Maintain access to existing businesses and other properties requiring access.

B. Surface Preparation.
1. Clean and dry paved surface prior to painting.
2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.
4. Notify Architect/Engineer after placing pavement spots and minimum three (3) days prior to applying traffic lines.

3.3 EXISTING WORK

A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.

B. Clean and repair existing remaining or reinstalled lines and legends.

3.4 APPLICATION

A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.

B. Dispense paint at approved temperature to wet-film thickness of 15 mils, except dispense edge markings to wet-film thickness of 12 mils.

C. Apply glass beads at rate of six (6) pounds per gallon of paint.

D. Apply markings to indicated dimensions at indicated locations.

E. Prevent splattering and over spray when applying markings.

F. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.

G. Collect and legally dispose of residues from painting operations.

H. Install Work in accordance with SSPWC and CMUTCD.

3.5 APPLICATION TOLERANCES

A. Maximum Variation from Wet Film Thickness: 1 mil.

B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.

C. Maintain cycle length for skip lines at tolerance of plus or minus six (6) inches per 40 feet and line length of plus or minus three (3) inches per 10 feet unless otherwise approved by Architect/Engineer.

D. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F

3.6 FIELD QUALITY CONTROL

A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.

B. Repair lines and markings, which after application and curing do not meet following criteria:
   1. Incorrect Location: Remove and replace incorrectly placed patterns.

2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.

C. Replace defective pavement markings as specified throughout a three (3) year warrantee period. Replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, and snow plowing or other loss of marking material regardless of cause. When markings are damaged by pavement failure or by Owner's painting, crack sealing, or pavement repair operations, Contractor is released from warranty requirements for damaged work. If this requirement is different in the Contract Documents, then the Contract Documents override this specification.

D. A three member team will evaluate warranty provisions. Team will consist of one member from Owner, one member from Contractor, and third person who is mutually acceptable to Owner and Contractor. Any costs for third person will be equally shared between Owner and Contractor. At least once each year, beginning with year after acceptance, team shall:
1. Observe Owner taking readings by retroreflectometer, or review Owner records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
2. Determine color fade, discoloration or pigment loss based on visual color comparison between original sample plates with glass beads and in-place pavement markings.
3. Determine magnitude of material loss.

E. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.

F. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
1. Average retroreflectivity within any 528 foot section is less than 1225 mcd/m2/1x for white pavement markings and 100 mcd/m2/1x for yellow pavement markings.
2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.

G. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of original three (3) year period even when replacement materials have been installed as specified.

H. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to

transverse and longitudinal joint sealers, and repair any damage according to requirements in Section 02740 or Section 02750.

I. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

3.7 PROTECTION OF FINISHED WORK

A. Section 01700 - Execution Requirements: Requirements for protecting finished Work.

B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.8 SCHEDULES

A. Pavement Markings: Use the following schedule unless otherwise specified in construction drawings.

Items	Location
4 inch White Conventional	Edge
4 inch White Fast Dry	Edge
24 inch White Fast Dry	Stop Line
4 inch Yellow Conventional	Center
4 inch Yellow Fast Dry	Center

END OF SECTION

SECTION 02783
PRECAST CONCRETE PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Permeable interlocking concrete pavers.
2. Crushed stone bedding material (No. 8 Stone).
3. Open-graded subbase aggregate (No. 02 Stone).
4. Open-graded base aggregate (No. 57 Stone).
5. Bedding and joint/opening filler materials.
6. Edge restraints.
7. Geotextiles.

B. Related Sections:
1. Section 02055: Soils and Fill Material for Earthwork.
2. Section 02300: Earthwork.
3. Section 02311: Rough Grading.
4. Section 02630: Storm Drainage.
5. Section 02721: Aggregate Base Course.
6. Section 02750: Rigid Pavement.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. C 67, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
2. C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
4. C 140, Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8 – Freezing and Thawing.
5. D 448, Standard Classification for Sized of Aggregate for Road and Bridge Construction.
6. C 936, Standard Specification for Solid Interlocking Concrete Pavers.
7. C 979, Specification for Pigments for Integrally Colored Concrete.
8. D 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
9. D 1557, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and 18 in. (457 mm) drop.
10. D 1883, Test Method for California Bearing Ration of Laboratory-Compacted Soils.
11. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Interlocking Concrete Pavement Institute (ICPI).
1. Permeable Interlocking Concrete Pavement manual.

C. Standard Specifications for Public Works Construction (SSPWC).

1.3 SUBMITTALS

A. Manufacturer's drawing and details: Indicate perimeter conditions, junction with other materials, expansion and control joints, paver layout, patterns, color arrangement, installation and setting details. Indicate layout, pattern, and relationship of paving joints to fixtures and project formed details.

B. Minimum 3 lb (2 kg) samples of Sub-Base, base and bedding aggregate materials.

C. Sieve analysis of aggregates for Sub-Base, base and bedding materials per ASTM C 136.

D. Soils report indicating density test reports, classification, and infiltration rate measured on-site under compacted conditions, and suitability for the intended project.

E. Erosion and sediment control plan.

F. Stormwater management (quality and quantity) calculations.

G. Permeable concrete pavers:
   1. Manufacturer's product catalog sheets with specifications.
   2. A representative full-size sample of each paver type, thickness, color, and finish. Submit samples indicating the range of color expected in the finished installation.
   3. Accepted samples become the standard of acceptance for the work of this Section.
   4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C 936.
   5. Manufacturer's material safety data sheets for the safe handling of the specified materials and products.
   6. Manufacturer's written quality control procedures including representative samples of production record keeping that ensure conformance of paving products to the project specifications.

H. Paver Installation Subcontractor:
   1. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.
   2. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.
   3. Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.

1.4 QUALITY ASSURANCE

A. Paver Installation Subcontractor Qualifications:
   1. Utilize an installer having successfully completed concrete paver installation similar in design, material and extent indicated on this project.
   2. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Regulatory Requirements and Approvals: Specify applicable licensing, bonding or other requirements of regulatory agencies.

C. Review the manufacturers' quality control plan, paver installation subcontractor's Method Statement and Quality Control Plan with pre-construction meeting of representatives from the manufacturer, paver installation subcontractor, general contractor, engineer and/or owner's representative.

D. Mock-Ups:
1. Install a 10 ft x 10 ft (3 x 3 m) paver area.
2. Use this area to determine surcharge of the bedding layer, joint sizes, lines, laying pattern(s), color(s) and texture of the job.
3. This area will be used as the standard by which the work will be judged.
4. Subject to acceptance by owner, mock-up may be retained as part of finished work.
5. If mock-up is not retained, remove and properly dispose of mock-up.

1.5 DELIVER, STORAGE AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle.
1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.
3. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction

D. Storage and Protection: Store materials in protected area such that they are kept free from mud, dirt, and other foreign materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install in rain or snow.

B. Do not install frozen bedding materials.

1.7 MAINTENANCE

A. Extra materials: Proved one (1) percent additional material for use by Owner for maintenance and repair, unless otherwise stated in contract documents.

B. Pavers shall be from the same production run as installation materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Precast Concrete Unit Pavers Manufacturers:
1. Ackerstone Ind., Inc.

B. "OR APPROVED EQUIVALENT" PRODUCTS

This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The County's and Landscape Architect's approval is required as to whether or not a product meets the County's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract**

2.2 MATERIALS

A. Permeable Interlocking Concrete Paver Units:
   1. Paver Type: Precast Concrete.
      a. Material Standard: Comply with ASTM C 936.
      b. Color and Finish: As specified on drawings.
      c. Color Pigment Material Standard: Comply with ASTM C 979.
      d. Size and Shape: Rectangular; Interlocking; 4 3/8 inches x 8 3/4 inches x 3 1/8 inches thick. Unless otherwise specified in construction drawings.

2.3 CRUSHED STONE FILLER, BEDDING, BASE AND SUBBASE

A. Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131, minimum CBR of 80% per ASTM D 1883.

B. Do not use rounded river gravel.

C. All stone materials shall be washed with less than 1% passing the No. 200 sieve.

D. Joint/opening filler, bedding, base and subbase: conforming to ASTM D 448 gradation as shown in Tables 1, 2 and 3 below:

Table 1
ASTM No. 8 Grading Requirements
Bedding and Joint/Opening Filler

Sieve Size	Percent Passing
12.5 mm (1/2 in.)	100
9.5 mm (3/8 in.)	85 to 100
4.75 mm (No. 4)	10 to 30
2.36 mm (No. 8)	0 to 10
1.16 mm (No. 16)	0 to 5

Table 2
ASTM No. 57 Base
Grading Requirements

Sieve Size	Percent Passing
37.5 mm (1 1/2 in.)	100
25 mm (1 in.)	95 to 100
12.5 mm (1/2 in.)	25 to 60
4.75 mm (No. 4)	0 to 10
2.36 mm (No. 8)	0 to 5

Table 3
Grading Requirement for ASTM No. 2 Subbase

Sieve Size	Percent Passing
75 mm (3 in.)	100
63 mm (2 1/2 in.)	90 to 100
50 mm (2 in.)	35 to 70
37.5 mm (1 1/2 in.)	0 to 15
19 mm (3/4 in.)	0 to 5

E. Gradation criteria for the bedding and base:
   1. D15 base stone /D50 bedding stone < 5.
   2. D50 base stone/D50 bedding stone > 2.

2.4 ACCESSORIES

A. Provide accessory materials as follows:
   1. Edge Restraints
      a. Concrete Curb and Concrete ribbon gutter as stated in construction drawings. Specifications per 02750: Rigid Pavement.
   2. Geotextile Fabric: Use Mirafi type 180N, unless otherwise specified in drawings and as approved by Geotechnical Engineer.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

A. Contractor company specializing in performing work in this section with minimum three (3) years of experience with the equipment to perform unit paver machine installation.

3.2 EXAMINATION

A. Acceptance of Site Verification of Conditions:
   1. General Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.
      a. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
      b. Provide written density test results for soil subgrade to the Owner, General Contractor and paver installation subcontractor.
      c. Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage pipes and inlets.
   2. Do not proceed with installation of bedding and interlocking concrete pavers until subgrade soil conditions are corrected by the General Contractor or designated subcontractor.

3.3 PREPARATION

A. Verify that the soil subgrade is free from standing water.

B. Stockpile joint/opening filler, base and subbase materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.

C. Edge Restraint Preparation:
   1. Install edge restraints per the drawings at the indicated elevations.

3.4 INSTALLATION

A. General
   1. Any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities shall be removed before application of the geotextile and subbase materials.
   2. Keep area where pavement is to be constructed free from sediment during entire job. Geotextiles Base and bedding materials contaminated with sediment shall be removed and replaced with clean materials.
   3. Do not damage drainpipes, overflow pipes, observation wells, or any inlets and other drainage appurtenances during installation. Report any damage immediately to the project engineer.

B. Geotextiles
   1. Place on bottom and sides of soil subgrade. Secure in place to prevent wrinkling from vehicle tires and tracks.
   2. Overlap a minimum of 0.3 in (12 in.) in the direction of drainage.

C. Open-graded subbase and base.
   1. Moisten, spread and compact the No. 2 subbase in 4 to 6 in. lifts without wrinkling or folding the geotextile. Place subbase to protect geotextile from wrinkling under equipment tires and tracks.
   2. For each lift, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (10 T) vibratory roller until there is no visible movement of the No. 2 stone. Do not crush aggregate with the roller.
   3. The surface tolerance of the compacted No. 2 subbase shall be ±2 1/2 in. (± 65mm) over a 10 ft (3 mm) straightedge.
   4. Moisten, spread and compact No. 57 base in 100 mm (4 in.) lift over the compacted No. 2 subbase with a minimum 10 t (10 T) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
   5. The surface tolerance the compacted No. 57 base should not deviate more than. ±1 in. (25 mm) over a 10 ft (3 m) straightedge.

D. Bedding layer
   1. Moisten, spread and screed the No. 8 stone bedding material.
   2. Fill voids left by removed screed rails with No. 8 stone.
   3. The surface tolerance of the screeded No. 8 bedding layer shall be ±3/8 in (10 mm) over a 10 ft (3 m) straightedge.
   4. Do not subject screeded bedding material to any pedestrian or vehicular traffic before paving unit installation begins.

E. Permeable interlocking concrete pavers and joint/opening fill material.
   1. Lay the pavers paving slabs in the pattern(s) and joint widths shown on the drawings. Maintain straight pattern lines. Use a unit paver installation machine approved by Architect/Engineer.
   2. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.
   3. Cut pavers and place along the edges with a double-bladed splitter or masonry saw.
   4. Fill the openings and joints with sand material approved by Engineer.
   5. Remove excess aggregate on the surface by sweeping pavers clean.

6. Compact and seat the pavers into the bedding material using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs (18 kN) centrifugal compaction force. This will require at least two passes with the plate compactor.
7. Do not compact within 6 ft (2 m) of the unrestrained edges of the paving units.
8. Apply additional aggregate to the openings and joints, filling them completely. Remove excess aggregate by sweeping then compact the pavers. This will require at least two passes with the plate compactor.
9. All pavers within 6 ft (2 m) of the laying face must be left fully compacted at the completion of each day.
10. The final surface tolerance of compacted pavers shall not deviate more than ±3/8 (10 mm) under a 10 ft (3 m) long straightedge.
11. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.5 FIELD QUALITY CONTROL

A. After sweeping the surface clean, check final elevations for conformance to the drawings.

B. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent pavers.

C. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.6 PROTECTION

A. After work in this section is complete, the General Contractor shall be responsible for protecting work from sediment deposition and damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 02890
SYNTHETIC TURF SYSTEM

02890.01 SUMMARY

A. Section Includes: Synthetic turf system for playing fields, including a vertical draining, porous stone aggregate base, and markings.

02890.02 REFERENCED STANDARDS

A. ASTM International (ASTM):

1. D 1335-05 -Test Method for Tuft Bind of Pile Yarn Floor Coverings.
2. D 5034-95(2001) - Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
3. D 5035-06 -Test Method for Breaking Strength and Elongation of Textile Fabrics (Strip Test).
4. F 355-01 -Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials.
5. F 1292-04 -Specifications for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
6. F1487-07a -Consumer Safety Performance Specification for Playground Equipment for Public Use.
7. F 1951-99 - Specification for Determination of Accessibility of Surface Systems Under and Around Playground.

B. California Building Standards Code (CBSC):

1. California Building Code [CCR Title 24, Part 2] (CBC), 2001 edition:
    a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Publicly Funded Housing: 1) Division II - Site Accessibility.
    b. Section 1127B - Exterior Routes of Travel.
2. Division III - Accessibility of Entrances, Exits and Paths of Travel. a) Section 1133B - General Accessibility for Entrances, Exits and paths of Travel.

02890.03 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive data in accordance with Section 01330.

1. Submit one sample, a minimum of 4" x 4" in size, illustrating details of finished product.
2. A letter and specification sheet certifying that the products of this section meet or exceed all specified requirements.
    a) Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:

1. Pile Height, Face Width & Total Fabric Weight, ASTM D418 or D5848.
2. Primary & Secondary Backing Weights, ASTM D418 or D5848.
3. Tuft Bind, ASTM D1335.
4. Grab Tear Strength, ASTM D1682 or D5034.
5. Pill Burn Test ASTM D2859.

B. Shop Drawings: Provide Shop Drawings in accordance with Section 01330 for entire field including the following:

1. Seaming plan.
2. Installation details, including edge details and penetrating elements, such as goal posts.
3. Composite striping plan and details, to show all game event lines, markings and boundaries as indicated on the Contract Drawings.
4. Delineate colors, painted versus inlaid fabric markings, and markings that are inlaid fabric versus tufted-in fabric for line striping.

C. Test Data: Certified test reports by third-party agency, reporting the following for synthetic turf to be provided:

1. Pile Height, Face Weight and Total Fabric Weight: According to industry standards.
2. Primary and secondary Backing Weights: According to industry standards.
3. Tuft Bind: ASTM D 1335.
4. Grab Tear Strength: ASTM D 5034 and ASTM D 5035.
5. Dynamic Cushion Test: ASTM F 355, Procedure A (system).

D. Manufacturer's Instructions:

1. Installation: Submit complete written instructions for preparation and installation of all components.
2. Maintenance: Submit written instructions for recommended maintenance practices, to be included in binder as specified in Section 017823. Include instructions for proper care and preventative maintenance of synthetic turf system, including painting and striping.

E. Sample of Complete Warranty.

02890.04 BASE BID SYNTHETIC TURF

The synthetic turf material and resilient infill shall be in accordance with the following:

Base Bid Synthetic Turf shall be **FieldTurf Duraspine PRO FTOMPRO-2S** Monofilament Synthetic Grass System, 34-ounce extruded monofilament polyethylene pile with rows spaced 3/4-inch apart, as manufactured by FieldTurf: 760-635-2504

1. A complete synthetic grass system, consisting of not less than **2"** inch long, not less than 34 oz. per square yard of extruded monofilament polyethylene pile blended fiber, with rows spaced no less than ¾" apart, tufted into a double primary porous backing and a micro-porous secondary coating, with no holes punched in the backings.

2. A resilient infill system, consisting of a specially formulated, layered mixture of selected and graded dust-free silica sand silica sand on the bottom; a sand and smooth, rounded cryogenic recycled rubber mixture in the middle; and a layer of smooth, rounded cryogenic recycled rubber on top, designed to provide the look, feel, and safety of optimally maintained natural grass. The infill shall be filled so that there is a void of 1/2" to the top of the fiber.

3. The infill weights are of critical importance and shall be a minimum of six (6) pounds per square foot of layered cryogenically ground rubber and silica sand. Systems with an all rubber, all sand or coated sand filling; and/or systems with an infill of less than 60%-40% sand & rubber infill ratio (the rubber component being at least 3 lbs. per square foot) will not be accepted.

4. The fiber shall be not less than a 10,000 denier, low friction, spined monofilament fiber, measuring not less than 2 inches high and not less than 235 microns in thickness at the spine. Fibers shall have been extruded individually through a spinneret, stretched and twisted. Monofilament systems with less than a 2" inch fiber, fibrillated slit-film, slit-tape**,** "flat", "rectangular" or "elliptical" cross-sections will not be accepted as equal.

5. The fiber shall feature an arched profile with a "vein" or "spine" running through center of each fiber.

6. The tufted fiber weight shall not be less than 34 ounces per square yard. The low friction fiber shall be custom blended polyethylene, treated with UV inhibitors.

7. The tuft bind must be a minimum of 9 lbs. tensile strength or greater without infill.

8. The carpet's primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors. The secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place. Perforated carpet backing shall not be acceptable. Perforation—backed carpet, (that is, a carpet fully coated and drained by means of melted, burned or punched holes), shall not be acceptable.

9. Rubber must be smooth, rounded, cryogenically ground SBR recycled rubber; artificial grass products without cryogenically processed recycled rubber or a finish application of straight rubber cryogenically processed, or from truck tires, will not be acceptable.

10. Sand must be dust free, rounded, silica sand; any other sand will not be accepted.

02890.05 – ALTERNATE BID SYNTHETIC TURF

A. **FieldTurf Prestige XM50**

1. Comply with the manufactures published specifications and performance requirements

B. **Mondo Green Ecofill MF4563** infill material with sand and sewn seams, as manufactured by Mondo America

1. Comply with the manufactures published specifications and performance requirements

C. **Sprinturf Ultrablade DF** with sand / rubber and sewn seams.
1. Comply with the manufactures published specifications and performance requirements

D. Each alternate bid must meet the following qualifications:
   A. Sewn Seams
   B. At least 5lbs of infill per square foot
   C. At least 2" monofilament fiber
   D. 3rd Party Insured Warranty
   E. Must have installed a minimum of 10 fields in California within the past 3 years

02890.06 GENERAL CONTRACTOR EXPERIENCE AND CERTIFICATIONS

1. Prior to award, the Prime Contractor shall provide evidence of experience in preparing drainage base systems for synthetic turf and must have installed a minimum of 10 sub-grade drainage base systems for synthetic turf playing fields the past 3 years in California.

2. The turf contractor and installation company (if different) must provide competent workmen, skilled in this specific type of infilled synthetic grass installation; they must have installed a minimum of 100 fields of 65,000 square feet or more (of at least 10 in California) with the same specific manufacturer/company and infilled system that is being proposed for this project. The designated supervisory personnel on the project must be certified in writing by the turf manufacturer as competent in the installation of this material, including sewing seams and proper installation of the infill mixture. The manufacturer shall have a representative on site to certify the installation and warranty compliance.

3. Prior to award and prior to County approval of the specified synthetic turf system, the contractor shall provide evidence direct from the turf manufacturer stating the installer has complied with the requirements stated herein and is certified by the manufacturer to install the type of approved synthetic grass.

4. Prior to award and prior to County approval of the specified synthetic turf system, the company/manufacturer shall provide a certified letter stating where the rubber will be supplied from including the name of the rubber company. If cryogenic rubber is to be used, the synthetic grass company/manufacturer must list the company from whom the cryogenic rubber will be purchased and certification of the material.

5. Prior to award and prior to the County approval of a specified synthetic turf system, the company/manufacturer shall provide a certified letter stating where the product will be manufactured including the name of the manufacturing company and certifications of the material to be used.

6. Prior to award of the bid and approval of a specified synthetic grass system, the manufacturer shall specify in writing that their turf system does not violate any other company/manufacturer's patents, patents allowed or patents pending.

7. Prior to award and prior to County approval of the specified synthetic turf system, Contractor shall provide written documentation that verifies that both their FIFA approved field and the field they are proposing for this project contains the exact specified infill material and backing. The product must utilize the exact same infill system and backing that was approved by FIFA and that is being proposed for this project.

02890.07- MARKINGS

All designs, markings, layouts, and materials shall conform to all currently applicable NCAA and/or FIFA rules and other standards as specified that may apply to this type of synthetic grass installation. Contractor shall submit a layout for field markings to be approved by the County prior to manufacture and installation.

02890.08- FIELD CONDITIONS

A. Soil Conditions: Contractor shall assume that the soil conditions are less than ideal. The Contractor shall perform any additional subsurface investigations determined as necessary by the manufacturer of synthetic turf system. The cost of any such additional subsurface investigations shall be included in the price of the line item, "Grading and drainage." The cost of any additional grading and sub-grade preparation to meet the manufacturer's specifications shall be included in the cost of the line item for "Grading and drainage."

B. Environmental Requirements for Synthetic Turf Installation: Comply with manufacturer's instructions and recommendations for ambient and surface temperatures and for humidity at time of installation.

02890.09- WARRANTY

The contractor, turf installer and/or the turf manufacturer must provide the following:

1. Turf manufacturer must provide proof of the ability to provide an eight-year, up-front prepaid, third party insured, non-prorated warranty as described herein prior to award of contract.
2. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements.
3. Three (3) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
4. Prior to final acceptance of the field, turf manufacturer must provide the owner a copy of a tuft bind test by an independent lab or testing service as per ASTM D1335 and this test must meet an overall minimum of 9 lbs/force.
5. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
6. The prime and turf contractor shall provide a warranty to the owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's onsite representative for a period of three (3) years.
7. Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer and Insurance Carrier. Submit information confirming that 3rd Party

Insurance Policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by an AM Best "A" (or better) Rated Insurance Carrier. Insurance carrier must confirm that the policy is in force and premiums paid. The manufacturer's warranty shall include general wear and damage caused from UV degradation. Must have a 3rd party insured, non-prorated and NON-CANCELEABLE warranty pre-paid for 8 years from no lower than an 'A' rated insurance company listed in the A.M. Best Key Rating Guide The policy must include a minimum annual aggregate of $13,000,000 per year and be based on claims arising from fields installed and completed only during the policy year. The policy must include an unlimited amount per claim up to the maximum aggregate. The policy cannot have any epidemic failure limitations or restrictions. The policy must not have any deductible and the coverage must be for labor, materials and any other costs to repair or replace each field per the warranty certificate. Upon completion of the field, the turf manufacturer will supply evidence that the policy is in effect, fully funded and that the installation is added to the policy upon completion and acceptance. Policy must cover full 100% replacement value of total square footage installed with a minimum of $7.00 per square foot (in case of complete product failure, which will include the removal and disposal of the existing surface). Any policy that includes self insured participation or deductible amounts shall be deemed non compliant. Policy must be in force at time of bid; insurance carrier must confirm that the policy is in force and premiums paid.

8. All turf warranties shall be NON PRORATED and limited to repair or replacement of the affected areas, at the option of the manufacturer, and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs.
9. Insured Warranty Coverage must be provided in the form of 1 single policy.
10. All warranties must state that, "Turf must maintain an ASTM 355 G-max of below 175 for the life of the warranty."

02890.10 MANUFACTURERS / SUPPLIERS

A. Contractor shall not mix different manufacturer's products and/or systems.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or the products of a manufacturer accepted in advance.

02890.11- REGULATORY REQUIREMENTS

A. Accessibility: Provide artificial turf determined to be accessible when tested according to ASTM F 1951 and designed to comply with requirements for an accessible route as required by CBC Chapter 11B.

B. If surface is indicated in accessible paths of travel for wheelchairs, surfacing shall be fire stable and slip-resistant, and shall comply with requirements of FED-STD-795, 28 CCRF Part 36, ASTM F 1487, ASTM F 1292 and the California Building Code.

02890.12- IMPERMEABLE FABRIC MEMBRANE

A. The prepared soil subsurface is to be isolated from the installed field and drainage system above it with a fabric membrane placed across the entire surface of the field. This ensures no mixing of the soil sub surface with the aggregate drainage system, and keeps water from infiltrating into existing soils with high clay content.

B. Membrane is a 12-mil fabric with a minimum gage weight of 6 oz/yd^2 equal to Hercushield 2400, as manufactured by In-Line Plastics, LC, Houston, TX (800)364-7686, (281)272-1660.

C. The membrane is to be additionally draped and formed into the perimeter drainage trenches to insure non-penetration of surrounding soil.

02890.13 UNDERFIELD DRAINAGE SYSTEM

A. Install one inch by twelve inch (1" x 12") prefabricated drains under drain system in a "V" design as shown on drawing with lines approximately thirty fee (30') on center and connect to a perimeter linear drain as indicated on Construction Documents.

B. Install according to the manufacturer's specifications, a prefabricated interior perimeter drain, as shown on drawing. Connect 1" x 12" lines using appropriate connectors, as recommended by manufacturer. Install an eight inch (8") covered and perforated drain line along the straightaway and connect according to manufacturer's specifications. Connect one inch by twelve inch (1" x 12") under drain lines to perimeter drain lines according to the manufacturer's specifications.

C. Contractor shall supply all necessary connectors and waterproof tape and is responsible for a proper and secure connection to the perimeter drain line. The Contractor shall be responsible to close and cover, in a manner acceptable to the Owner, any existing basins, which the Owner determines to be detrimental to the function of the new artificial turf field.

02890.14 PERIMETER DRAIN SYSTEM

A. Surrounding the playing surface and inside the perimeter curbing is located a perimeter drainage system coupled to your main drain exit or other equivalent drainage handling system.

B. The perimeter drainage trench is nominally placed 3' inboard of the perimeter curbing with a width of 3' and a minimum depth of 18".

C. The drainage trench is isolated from the surrounding soil by use of a woven polymer membrane as described above.

D. The trench shall have a drainage slope of 0.5% minimum.

E. Drainage piping is permeable 18" styrene.

F. Drainage piping is encased in a volume of rounded 3/4-inch minus pea gravel and overlaid with permeable membrane to isolate the drainage gravel from the upper course of crushed aggregate.

02890.15 CRUSHED AGGREGATE STRUCTURAL BASE

A. Coarse Primary Layer:

1. Material to be open graded, fractured friction course that provides adequate mechanical stability and compaction for athletic field applications.

2. Compacted nominal thickness of 4".

3. Installed drainage properties to exceed 40 gallons/hour/s.f. of vertical water passage.

4. Material to be clean washed with minimal fines as described in gradation table below.

5. Material to be minimum 80% fractured with at least one mechanical fracture per particle greater than ¼" sieve size.

6. Installed compaction average to be 95% minimum measured at 8 locations reasonably spaced across the field surface with no individual measurement less than 90%.

7. The synthetic turf system requires a permeable base for outdoor use. The permeable base shall be a geonet and one 4" layer of crushed stone that meets the gradation criteria for the California Department of Transportation 3/4" Permeable Class II (Section 68):

8. Soft limestones and shale materials are not suitable. Questionable materials should be evaluated using a sulfate soundness test (ASTM C-88) and LA Abrasion Test (ASTM C-131).

Sieve Size	Percentage Passing
1”	100
¾”	90-100
3/8”	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

9. The stone shall be installed maintaining a finished grade slope of 0.75%. The Owner must approve variations of this finished slope. The depth of the aggregate will increase at the edges of the field, as determined by the sub-base slope, as the elevations are maintained throughout. The washed stone aggregate material must be free draining, consistent with the vertical draining requirements of the turf manufacturer and Owner.

10. The finished grade of the aggregate base shall not vary more than a quarter of an inch (1/4-inch) in ten feet (10’). It is suggested that a laser grader be used to meet these requirements.

11. The artificial turf shall be installed over an area the full length and width of the existing field from inside edge of the curbing.

12. Excavation of materials shall be as necessary to establish proper grade of sub-base to a tolerance of one inch (1") in ten feet (10’). Sub-base shall be sloped of 0.75% from center of field toward sidelines. After sub-base has been properly graded, contoured and sloped as required, it shall be compacted using ten ton (10) vibrating roller, as close as possible to 95% Proctor density.

13. The contractor shall strictly adhere to the installations procedures outlined under this section. Any variance from these requirements shall be accepted in writing by the manufacturer onsite representative, and submitted to the architect, verifying that the changes do not in any way affect the warranty.

14. The turf contractor will accept the aggregate base in writing prior to the installation of the synthetic turf system. The compaction of the aggregate base shall be 90% (or as close as is possible to attain with the specified aggregate), and the surface tolerance shall not exceed a quarter of an inch (1/4-inch) in ten feet (10’). Over compaction of the stone base will not be tolerated. Contractor must hire an Independent lab to test compaction and permeability of base and supply results to owner to confirm specifications have been met.

15. Verify that all sub-base, drainage and leveling is complete prior to turf installation.

16. The surface to receive the synthetic turf shall be inspected by the Installer, and prior to the beginning of installation, the Installer must accept in writing the sub-base surface planarity and compaction. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

17. The compaction of the aggregate base shall be 90-95%, according to the Modified Proctor procedure (ASTM D1557), and the surface tolerance shall not exceed 1/4 inch over 10 feet and ½" from design grade. The Customer shall be responsible for independent testing to be supplied to Installer, prior to the start of installation, verifying that both the compaction and permeability of the aggregate base satisfy project requirements. Customer shall provide written independent documentation, prior to the commencement of synthetic grass installation, that the aggregate base complies with all permeability and compaction requirements.

02890.16 PERIMETER PAVING AND TURF ATTACHMENT

A. A continuous foundation grade paving shall be installed around the entire perimeter of the synthetic field.

B. Concrete paving is to be installed as indicated on the Construction Documents.

C. Concrete paving shall be 2500 psi PCC with an additional polymer composite lumber molding for direct turf attachment.

D. Polymer composite 2x4 lumber is attached directly (concrete nailed and glued) to the poured concrete paving and will serve as the attachment surface for the turf.

F. Turf is attached directly to the concrete supported polymer composite curbing utilizing galvanized fabric studs placed at 10" intervals.

02890.17 MAINTENANCE

A. The Turf Contractor shall supply a field sweeper and groomer.

B. The field sweeper shall be the FieldTurf Sweep-Right, and the groomer shall be the FieldTurf Groom-Right or equivalent (Phone 1-800-724-2969), at the discretion of the Manufacturer. The sweeper and groomer must be of the highest quality available and specifically made for this type of application.

C. The Turf Contractor will train the Owner's facility maintenance staff in the use of the Turf Manufacturer's recommended Groomer after completion of the installation process and before final payment.

END OF SECTION

SECTION 09860
ANTI-GRAFFITI COATINGS

PART I - GENERAL

1.01 SUMMARY:

A. Section includes: Anti-graffiti coatings.

B. Related Sections:

1. Section 09900 - Painting: Applicable preparation and application requirements.

C. Anti-graffiti coatings shall be applied to **all exposed surfaces of walls (both block & concrete)** as well as on **all exposed surfaces of Restroom Building**.

1.02 SUBMITTALS:

A. Product Data: Submit complete manufacturer's descriptive literature and specifications. Include complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Samples: Submit the manufacturer's standard palette for the selection of color.

1. When selections have been made, submit samples of finish not less than 12 inches by 12 inches in size for review and acceptance.

C. Quality Control Submittals:

1. Certificates: Submit written certification that the applicator has been approved by the anti-graffiti coating manufacturer.

2. Manufacturer Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations safety and environmental cautions, and application rates.

D. Contract Closeout Submittals:

1. Certification: Submit, to the County, a certified copy of invoices from the coating manufacturer clearly showing the quantity of the accepted coating delivered to the job site, together with an affidavit showing the square footage of surfaces to which the coating was applied and the manufacturers written recommendations for coverage.

1.03 QUALITY ASSURANCE:

A. Qualifications:

1. Use products by manufacturers regularly engaged in manufacturer of this product and with a history of at least three successful applications, within the last three years, acceptable to the County.

2. Use skilled workers who are thoroughly trained and experienced and who are

completely familiar with the specified requirements and methods.

a. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction. Where those requirements conflict with this Specification, comply with the more stringent provisions.

b. Certifications: Upon completion, issue to the County, a Certificate of Inspection and Compliance indication that the completed work meets all the requirements of this Specification and the manufacturer's printing instructions. Certificate shall be signed by the applicator.

STORAGE AND HANDLING:

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Acceptance at Site: Material shall be delivered to Project in original containers, completely sealed and bearing name of coating contained therein.

B. Storage and Protection: Use all means necessary to protect the materials of this Section before, during and after installation.

1.05 PROJECT CONDITIONS:

A. Environmental Requirements:

Do not apply coatings when surface temperature is more than 90 degrees F. in the shade, nor when the relative humidity more than 70 percent.

PART II: PRODUCTS

2.01 MANUFACTURERS:

1. Bithell, Inc
1004 East Edna Place
Covina, California 91724
Telephone No: (626) 331-2292, FAX (626) 338-4588

2. "OR APPROVED EQUIVALENT" PRODUCTS

This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The County's and Landscape Architect's approval is required as to whether or not a product meets the County's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract**

2.02 MATERIALS:

2. VITROCEM as manufactured by Bithell, Inc.

a. Color shall CLEAR.

b. Painted surfaces covered by a clear polyurethane coating will not be acceptable.

c. Coating shall have been tested in accordance with the manufacturer's printed literature.

PART III - EXECUTION

3.01 EXAMINATION:

A. Verification of Conditions: Prior to Work on this Section, examine the installed work of all other trades and verify that all such work is complete or properly corrected to the point where this installation may properly commence.

B. Correct defects or other conditions that would adversely affect anti-graffiti coatings to the satisfaction of anti-graffiti material applicator prior to application of coatings.

3.02 PREPARATION:

A. Protection: Protect and cover finished work and materials of all other trades that may be affected by work of this Section during coating application.

B. Surface Preparation:

1. Substrata to receive anti-graffiti coatings shall be thoroughly cleaned of all dirt, encrustation and other foreign materials that would adversely affect the required appearance of the structure.

2. Preparation of Substrates: Concrete, concrete block masonry and metal shall be cleaned by water blasting at 3000 pounds per square inch, or other methods in accordance with coating manufacturer's current written instructions and recommendations.

3.03 APPLICATION:

A. General: Apply coatings in strict accordance with the manufacturer's recommendations as accepted by the County.

B. Apply 2 coats of Vitrocem Clear Polyester and one coat of clear Polyester Polyurethane. Finished dry mil thickness should be 29 mils minimum.

3.04 PROTECTION:

A. Protect finished work during progress of coating application and make good damage done to such work in manner satisfactory to the County Representative. Properly cover and protect finished work of other trades.

END OF SECTION

SECTION 13000

PREFABRICATED RESTROOM/CONCESSION BUILDING AND STORAGE BUILDINGS

A. General, Specifications and Clarification of Prefabricated Building and Site Installation

1. This portion of the bid specifications does not follow the CSI standard format as the prefabricated structure in this bid is an ***offsite constructed "product"*** and not "typical" general construction.
2. The ***installation of the product on site is general construction*** which must be coordinated between the general contractor and the supplier. Specifications for the building foundation/pad shall be provided herein by the specified design/build supplier. Due to the responsibility of the specified building supplier for architecture, engineering and a five-year warranty, the site pad/foundation must meet the suppliers design so the pad and building can be considered from a single source for warranty purposes. The supplier must accept the pad and compactions tests before they take responsibility for the entire system under their warranty.

B. Architectural Design/Engineering and Insurance Responsibility

1. While the County has provided bid specifications and a design for the building, the building design/build supplier remains legally responsible for architecture, engineering, and all applicable building, safety, health, fire, and accessibility code compliance. Since they hold professional design responsibility to the owner, the building supplier must furnish certification that they provide product liability insurance in the amounts required by the general specifications ***to cover property damage and personal injury***. Final drawings shall be stamped by a California engineer and California Department of Housing, suitable for local permitting.

C. Errors and Omissions Insurance

1. The building design/build supplier must also provide an additional Professional Architectural and Engineering Errors and Omissions insurance, in the minimum amount of $1,000,000, ***to cover claims against the owner or the general contractor for State and Federal ADA handicapped accessibility and other design/engineering code issues***. This Errors and Omission Policy must remain in effect for 5 years from the completion and owner acceptance of the project. Products liability insurance (since it does not cover professional design responsibility only) will be insufficient for this bid and will be cause for rejection of the bidder.

D. Insurance for the Building offsite, while in transit, and/or on site until turn over and final owner acceptance

1. The supplier may request invoicing for a percentage of building completion in-plant, monthly. Under UCC law, this means that the supplier is turning over responsibility for the portion invoiced to the owner yet the building will not be on the owner's property and may not be covered by the owners insurance. Therefore, the building supplier must provide a separate insurance policy insuring the owner and general contractor as additionally insured for liability, damage and/or vandalism to the building while in the manufacturing facility, while in transit, and/or while in storage at a certified bonded storage facility or at the final project site for up to $200,000 for each prefabricated building module, until the building is final accepted by owner.

E. General Contractor Coordination with Design/Build Supplier

1. The specified prefabricated public restroom building requires coordination between the General Contractor (who prepares the site pad and delivery access for the prefabricated storage building) and the prefabricated restroom building supplier (who completes the architectural design, engineering, off-site building construction, delivery and installation on site.) The specified prefabricated restroom building specifications include unique components/systems which are custom to the restroom building supplier. Since the restroom supplier is responsible for design, additional insurance requirements for errors and omissions is required.

F. General Contractor, General Scope of Work

1. The general contractor for this project is responsible for the site survey and staking the building location, finished slab survey elevations and marking on site, construction and compaction of the required building pad; access to the site for a large crane and tractor trailers delivering the prefabricated building; providing water, sewer, and power at a point of connection (POC) within 6 feet of the building and at the depth required by the building subcontractor and local code; and the installation of any sidewalks outside the building footprint.

2. The general contractor is responsible for verification to the building subcontractor design/build firm that there are no unanticipated site delivery issues such as overhead wires, trees, tree roots, or existing grade changes and that prevent a clear path of travel between a roadway and the final site exists for a tractor trailer and crane to expedite delivery. The design/build supplier requires that the general contractor certify that the required delivery crane must be able to set the building module/modules within 35' distance from the center of the building to the center of the crane hoist.

G. Supplier/Prefabricated Restroom Building, General Scope of Work:

1. The prefabricated restroom building specialist will provide to the general contractor final building design architectural drawings and engineering calculations under the responsibility of a licensed structural engineer, in compliance with all local, state and federal codes. The design/build supplier shall construct the building offsite as a permanently relocatable building, transport it to the final required destination, and install the building turnkey, (to 6' from the building footprint) on a general contractor prepared pad per the drawings included in this bid.

H. Licensing:

The supplier must comply with all the State of California; Department of Housing prefabricated "Commercial Coach requirements" as follows:

1. The building *manufacturer* must be licensed by the State of California, Department of Housing as a manufacturer for the last five years, to verify experience.
2. Submit a copy of the all the current licenses for verification with bid.
3. The selling dealer must be a California licensed dealer and present their license for verification with the bid.
4. If a salesperson solicits this project, the salesperson for the dealer must present his license for verification with the bid.
5. The licensed dealer must also possess a State of California Contractors License Board Class B License and present their license for verification with the bid.

I. Bid Standard for the Prefabricated Restroom Building

1. The County of Riverside understands that there are several firms who design and build various types of public restroom buildings in varying quality and architectural styles, using similar or different construction methods and materials. For the purpose of this bid, the owner has selected:

   Public Restroom Company, 9390 Gateway Dr. Suite 102, Reno, Nevada, 89521 and specifies herein that this firm is the standard for architectural design (safety, green design, code compliance, and site specific compatibility.) PRC is also the standard of building performance and materials selection quality for the 50 year building design life with low maintenance based upon the longevity of the materials selected. Other firms quoting "or equal" whose criteria and standards do not comply will be rejected. PRC contact information is (888-888-2060 extension 113 telephone, and 888-888-1448 fax.)

J. "Or Equal Restroom Design/Build Suppliers"

1. The County of Riverside may also allow other firms to become qualified to bid but any firms so authorized to bid must comply with the bid specifications and plans, or be subject to post bid rejection.

2. In order to provide full and open competition, other firms may request pre-bid approval as "or equal."

The following items must be provided to the owner for approval pre-bid at least 10 days before bid to allow a written response for approval or rejection.

a) Or Equal applicant shall provide with their submission pre-bid request scaled floor plans and elevations, to show general architectural design criteria is met.
b) Or Equal applicant shall provide with submission pre-bid a written list of each and every deviation from the published bid specifications/plans. Lack of specifiCounty to each deviation from the bid specifications will be cause for rejection.
c) Or Equal applicant shall provide with submission pre-bid manufacturers cut sheets for each and every deviation from the bid specifications.
d) Or Equal applicant must provide a list of every building they designed and built over the last 3 years utilizing the same building materials/systems design criteria as published in this bid. Provide date of building bid, date of completion, and most knowledgeable owner contact.
e) Or equal applicant shall provide pre-bid certification of the special insurance required in this bid.

3. The County of Riverside will be solely responsible for the decision to accept or reject the "or equal submission." Said decision shall be in writing pre-bid so all general contractors can compete with knowledge.

K. Certificate of Off-site Inspection and Construction Compliance, Provision for Maintenance Manuals, and Warranty

1. The off-site restroom construction requires that a licensed third party inspection firm provide the owner and the local building official with certification and compliance for the building with the approved plans and specifications. A certificate of compliance shall be issued by this inspector to the local building official to provide certification that the building meets and or exceeds the approve plans and applicable codes.

2. At the project conclusion, the building supplier shall furnish two sets of complete maintenance manuals including a trouble shooting guide, location of manufacturers of key components for replacement parts together with final as-built plans, and a **five (5) year warranty** to the owner or general contractor.

L. Site Scope of Work by General Contractor

The general contractor shall prepare the restroom building pad to receive the prefabricated building in accordance with the bid "pad preparation drawings."

1. The building pad shall be excavated to 14" deep from the final building concrete slab elevation in accordance with the drawing titled "foundation pad design."
2. The building pad shall meet a 90% compaction in lifts using class 2 base for the first four inches and coarse sand for the last two inches of the pad, leaving the finished sub grade pad elevation at finished floor, minus 8".
3. The General Contractor shall provide water point of service at 30" below finished building slab; sewer at 24" below the finished building slab; and electrical at 36" below the finished building slab or other per bid plans.
4. General Contractor shall coordinate with restroom supplier to provide full site delivery access for a 70' tractor-trailer and hydro crane to the final building site.
5. If the final site access is over existing sidewalks, utilities, or landscaping, the General Contractor shall be responsible for plating and or tree trimming, utility line removal, or other to protect any existing conditions.
6. The hydro crane must be able to locate no greater than 35' from the center point of the building to the center point of the crane.
7. The utilities shall be furnished per bid site plans at specified points of connection (POC) nominally 6' from the building line.
8. General contractor shall furnish and install final grading, landscaping and sidewalks.

M. Connection to Utilities

1. The restroom supplier will furnish and install traffic rated concrete lockable concrete Christy curb boxes for Electrical, Water, and Sewer at the proper POINT OF CONNECTION AND AT THE PROPER ELEVATION BELOW GRADE, for this project. Restroom subcontractor shall provide final hook up of the water from building to POC; sewer hookup to POC; and electrical sleeve from building panel to POC only. Final utility connections shall be by General Contractor or others. General contractor shall flush the water lines thoroughly before making final water connection and contaminating the fresh water supply to the building.

N. Concrete Slab, Required Independent Testing Laboratory Certification:

1. The prefabricated building slab special concrete technology claims to be water and urine resistant for life due to special additive technology. The building subcontractor must furnish a test certification of compliance from a national independent testing laboratory to support the claim for absorption resistance. The written report must state the concrete compressive strength and absorption resistance per ASTM standard #C642 and #C39 respectively. Since this non-absorbency capability is so significant, the design/build supplier must provide both a general certification and an in-plant construction certification of the actual slab or slabs used on the project.

O. Prefabricated Restroom Building:

1. The County of Riverside has evaluated several prefabricated restroom building suppliers. This bid requires such a building be used in lieu of site built traditional construction because of the unique built-in advantages guaranteed by the design/build firm. This technology includes many new innovations such as non-absorbent concrete; anti-microbial components to reduce health risks; built in vandal resistance design; lowered maintenance and long term warranties that reduce owner risk for failure. The specifications below are written around this new technology.

P. Mat Engineered Concrete Building Slab/Foundation:

1. The mat engineered 8” thick slab/foundation shall be engineered and constructed to withstand the transportation weight of the building without cracking and to resist absorption from any liquids deposited on the surface. The concrete slab shall be constructed inside a steel angle curb, reinforced with dual mats (tension and compression,) and poured with a custom concrete formula with special admixtures to create a finished slab that is water proof for life.
2. Perimeter Steel Curb: 5/16” 50,000 kip steel 6” X 6” welded continuous angle.
3. Rebar Steel Mat: Two layers of 40,000 tensile steel rebar in varying sizes per engineers requirements, including a perimeter structural continuous grade beam design inside the exterior steel angle and at any other location deemed by the engineer of record as required for the use intended. In coastal locations or when required for corrosion resistance rebar shall be epoxy coated or fiberglass to resist permanent corrosion. Rebar mats shall be wire tied to code with a minimum of three turns of the wire and overlaps shall be minimum of 15 diameters for any connection.
4. All slab openings shall be surrounded with two layers of steel collars as required by the engineer of record to stop corner cracking and to reinforce the openings for lifting.
5. 1’ thick by 3” minimum length threaded nuts shall be welded to the steel perimeter frame with continuous ¼” fillet welds. Nuts shall be welded to common steel plates per the engineer of records design and attached to the interior steel rebar structural mats.
6. The engineer of record shall provide lifting locations with sufficient reinforcement to allow the safe lifting of the entire designed weight of the structure with dual 1” steel bolts and washers at each lifting location. The number of lifting locations with each location fitted with removable ¾” 8” X 8” 50,000 tensile strength steel angles shall be determined by the engineer of record.
7. The slab shall be poured over a 1” thick steel plate table. The concrete mix design shall not exceed a 3” slump and shall be stinger vibrated for maximum consolidation. All floors shall slope to any floor drains within each room and if no floor drain is present the floor should not slope. The surface shall be a very light broom that should meet a coefficient of friction on the surface of .06. Birdbaths shall be cause for rejection.
8. The steel perimeter angle will remain below the concrete surface by nominal two inches to prevent corrosion. After the site concrete sidewalks are poured, the joint shall be full flow sealed with self-

leveling grey urethane caulk to prevent penetration of water into the joint.

9. The building shall be designed for future relocation and shall provide protection for the lifting openings in the mat slab so that the threaded openings will be available for future use if needed.
10. The building system shall be designed for placement on a general contractor site prepared class 2 building pad/and or footings as required by code, per the bid drawings, suitable for 1500 pounds soil bearing capaCounty minimum. Any soils survey (if necessary) shall be by owner or engineer of record.

Q. Exterior & Interior Masonry Block Walls

1. The exterior walls shall be 4" thickness per State of California codes or engineering for wind and seismic. The interior walls shall be 4" block to nominally 7'-4" above finished floor and framed with applicable required finishes above for pony and gable walls. A structural steel tubular .188 wall cap beam shall be welded to 5/16" 40,000 kip steel plate embeds, at intervals per the engineer of record, within the masonry wall.
2. The 8" mat engineered concrete slab shall be cured a minimum of 7 days. Holes for vertical dowels shall be drilled into the mat engineered slab avoiding any grade beams or other structural reinforcement. Once the holes are drilled, blow out the remaining material and using two part structural epoxy, wet set the #3 or #4 vertical rebar (as specified on the engineering calculations into holes drilled to the depth per the engineer of record requirements. Each rebar shall be held vertical to allow equal epoxy support to each dowel during the drying period. Engineering calculations require that rebar shall be installed in each concrete block center void or every block hole. The engineered uplift on each rebar shall be sufficient to restrain any load imposed on the masonry block wall for vertical rebar pull out from the concrete mat engineered slab.
3. The block walls shall be nominal 8" x 16" CMU. The building corners shall have special standard corner return block that matches the exterior finish and creates a uniform appearance. All 4" CMU shall be custom fabricated with an enlarged interior hole for placement of the grout and vertical rebar.

R. Roof System

1. The roof shall be exposed fiber reinforced cement ceiling panels over a galvanized steel structural frame. The exterior finish shall be 26 gauge standing seam metal roofing over a 30 pound building paper, over a structural exterior shear panel. Building roof rake and fascia shall be wrapped with 14 gauge formed metal to match roof. Roof shall be 4/12 slope to prevent vandals from climbing on roof and to obtain proper ventilation for the gables. Roof color shall be determined by owner and selected from the color chart by restroom supplier. The ventilation screens (described in a following section) shall be welded to the truss frames.

S. Interior Wall Finish:

1. Interior precision CMU block masonry walls shall be smoothed to a pebble grain finish with 2-4 mil layers of 7-day curing block fillers and painted with two additional 4 mil layers of industrial high solids (white) industrial grade enamel. Pony and gable walls shall be galvanized steel framed, sheared, and surfaced with fiber cement board, pattern selected by owner and painted white with industrial high solids gloss enamel.

T. Exterior Wall Finish, Masonry and Gable

1. The building exterior finishes are a combination of split face and precision 8" x 16" CMU to wall height per the exterior elevations in the bid plans, color to be "Tan." The precision block shall be covered with a ledgestone veneer wainscot and water table, color selected by Owner. The exterior block and wainscot shall be coated with a site-installed anti-graffiti coating manufactured by Vitrocem. The gable ends above the cap beam shall be surfaced with ¾" plywood and covered with a vapor barrier, then surfaced with stucco pattern fiber-cement siding, painted in color selected by owner.

U. Gable Ventilation System

1. Shall be woven ¼" X 1.5" X 1.5", 304T,stainless steel woven crimp-stop wire mesh set into stainless steel welded frames. Pre-shipment building protection includes plywood shipping panels fastened to the stainless steel ventilation screens.

V. Doors and Gates

1. All entry doors shall be 7' 0" high, custom fabricated, 14 gauge steel; High density foam filled; reinforced with 14 gauge steel ribs welded at 6" intervals on each face, concealed; reinforced with a welded plate for door closer mounting; hung on a single continuous, 1 million cycle, aluminum gear hinge with stainless steel vandal resistant screws at nominal 4" on center. The doors shall weigh nominally 176 lbs each for a 36" X 84" door. All doors shall lock with a Schlage B-600 series commercial series dead bolt and a "LCN" heavy duty #4210 Series door closer fastened to a structural reinforced welded door plate per manufacturer design. "C-shaped" anti-microbial pull handles shall be mounted on all entry doors. Custom fabricated 14 gauge steel door jambs with 4" steel heads shall be welded to the steel cap beam and be solid filled with 3000 psi masonry grout mix. Stainless steel vandal resistant fasteners shall be used on all hardware. Storage building shall have a 10' 20 gauge sectional roll-up door painted in a color selected by Owner.

W. Specialties

1. All specialty washroom equipment shall be commercial grade stainless steel fastened securely to walls with vandal resistant stainless steel screws to avoid removal by vandals as follows:
2. Toilet paper holder shall be a covered three roll, 18 gauge stainless steel. Toilet paper holders shall be attached to block walls with 4 epoxy bedded vandal resistant stainless steel fasteners.
3. Stainless steel grab bars to code shall be 1 ¼" minimum exposed fastener vandal resistant design and installed at each accessible water closet. Two grab bars shall be vertically mounted, one each side of the accessible urinal per code.
4. Cast Aluminum T-24 compliant door signs shall be recessed into block surface flush with masonry exterior. Signs shall have raised pointed Braille tips and shall be blind secured with epoxy adhesive and stainless steel fasteners.
5. Hand dryers shall be concealed Fastaire HD03, with operating equipment remotely located in mechanical room.
6. Soap dispensers shall be large single stainless steel tank remote reservoir with float for capaCounty reading, concealed in the mechanical room, with a through/wall stainless steel pipe dispenser at each lavatory.
7. The toilet partition walls shall be concrete precision block finished the same as the building interior walls, structurally reinforced to support load of 350 lbs minimum and raised (12" above finished floor). The toilet partition doors shall be custom fabricated, ¾" Solid Color Reinforced Composite (SCRC) panels. The doors are secured by stainless steel fasteners to a continuous stainless steel spring loaded 54" hinge.

X. Plumbing:

1. Building shall be fully compliant with 2007 CBC, Mechanical provisions and the following codes:
   a) California Department of Environmental Health.
   b) All applicable State of California and County of Riverside Building Codes. Latest edition applicable.
   c) Uniform Plumbing Code. Latest edition applicable.
2. GENERAL: All components and fabrications shall be designed to reduce life cycle maintenance, be compatible with current maintenance spare parts, and shall be listed in a spare parts/maintenance manual (two copies) delivered in mechanical room of building.
3. WATER PIPING: shall be type L copper soldered per code above grade and type K with silver solder below grade. All water piping shall be designed and constructed with high and low point drain fittings. All piping shall be mounted on Uni-strut wall brackets with neoprene isolators, to code.
4. WATER PRESSURE GAUGE/VALVE COMBO: install three commercial grade industrial water pressure gauges, isolation ball valves, 150 PSI pressure regulator with wye strainer, check valve, and expansion piping for future expansion tank on the main line.
5. PLUMBING FAUCETS, ISOLATION VALVES AND ACTUATORS: All fixtures except those with flush valves shall be isolated with ball valves for each fixture. Flush valves shall be sensor operated, and concealed body push button lavatory faucets. (deck mounted faucets will not be used.)

6. DWV PIPING: DWV piping shall be concealed behind the wall. DWV piping shall be PVC DWV, solvent welded, for all concealed piping. A cast iron no hub DWV vent pipe with a cast iron roof mounted vandal cap vent shall be required, through the roof.
7. REMOVABLE PIPE TRAPS: all floor drain, sink drain, and waste traps shall be removable for maintenance. Floor drains shall be trapped behind the wall in the mechanical room using a combination waste and vent system. Floor drains shall be increased two pipe sizes over standard to allow code use. Trap primers shall not be used as preferred method of cleaning shall be by hose down maintenance. All surface mounted mechanical room piping shall be mounted on Uni-strut with plastic isolators to code. Sink drain traps shall be concealed behind the mechanical room walls where maintenance staff can access all plumbing.
8. PLUMBING FIXTURES: Plumbing fixtures shall be stainless steel manufactured by Acorn. Toilets shall be wall hung, rear discharge, with concealed sensor-type flush valves. Toilet seats shall be black solid core plastic, non-flammable construction with continuous stainless steel concealed self-checking hinges. Lavatories shall have concealed remote traps behind the mechanical wall. Schedule of fixtures:
   a. Water Closets: Acorn-Penal Ware, 1675-W-1-9-ada-gw-hs
   b. Water Closet Flush Valve: Sloan Royal 143-1.6
   c. Lavatories: Acorn-Dura-ware 1652-LF-3-M
   d. Lavatory in Family Assist Restroom: Shall be a 18” x 18” Stainless Steel drop-in type placed in a 18 gauge Stainless Steel, custom-fabricated countertop, per plan. Faucet shall be Chicago 807-E12-665-PSHCP
   e. Urinal: Acorn Penal Ware 1705-W-1 with custom stainless steel 1-1/2” spacer
   f. Urinal Flush Valve: Royal 195-1.0
9. FLOOR GRATES: Removable 350 lbs per square foot pultruded fiberglass non-skid floor grates shall be installed over every opening in the mechanical room for OSHA protection/compliance.
10. HOSE BIB: There shall be one Woodford 24B hose bib provided in the mechanical room.
11. HI-LO DRINKING FOUNTAIN: Shall be an Acorn Aqua, 14 gauge stainless steel, hi-lo, ADA accessible, drinking fountain shall be installed per plans and manufacturers recommendations.

Y. Electrical:

1. GENERAL:
   Electrical system and components shall be commercial spec grade or better and piping conduits shall be installed on commercial Uni-strut wall hangers. Interior and Exterior Electrical lighting fixtures in public areas shall provide lifetime manufacturer’s warranty.
2. PANEL/WIRING: One 200 amp main (100 amp panel located in the County Storage building), industrial grade Panel Board, Square "D" NOD series, shall be mounted in the electrical room in the restroom building. All breakers shall be snap-in type, minimum 10,000 A.I.C. RMS (Sym) at 120/240 vac. Wiring shall be stranded copper wire #12 min in EMT piping with screw fittings.
3. PIPING: All piping shall be surface mounted to the masonry block walls with minimum of 2” fastener penetration. EMT conduit shall be compression type. Main panel shall maintain a 30” X 36” safety code required clear space, floor to 6’ above finished floor.
4. EXTERIOR LIGHTING: Kenall, Sentinal, S711D 42 watt vandal resistant high impact polycarbonate lens compact fluorescent fixtures shall be installed per plans.
5. INTERIOR LIGHTING: Kenall, Sentinal, S711D 42 watt vandal resistant high impact polycarbonate lens compact fluorescent fixtures shall be installed per plans. Storage buildings shall have ceiling mounted 4’ double tube fluorescent fixtures per plans.
6. LIGHTING CONTROL: All interior restroom and exterior lighting shall be controlled by photo cell with a mechanical room located time clock over ride and by 2 pass switches (one for interior lighting and one for exterior lighting), so maintenance staff can check operation during daylight hours. A single photo cell, roof mounted, and shall control all exterior lighting and a mechanical time clock shall control the interior restroom lighting. The mechanical room lighting shall be an explosion proof incandescent fixture with globe and wire cage with a single spec grade switch at the entry.
7. ELECTRICAL OUTLETS: Commercial spec grade duplex outlets shall be provided per plan.
8. HAND DRYERS: Shall be concealed, low energy, remote located vandal resistant design. Dryers shall be mounted in the mechanical room with only protruding cast metal air nozzles and start switch

accessible to the public. Dryers shall be 840 watts energy consumption.

Z. CONCESSION ROOM:

1. The food service area shall meet all requirements of the California Retail Food Service Act promulgated 1/1/2009. This concession facility is classified as "open food preparation" and shall comply with the County of San Bernardino Health Department.
2. EQUIPMENT: The concession room shall be per plan with the following equipment included within the building upon delivery:
3. COUNTERS: 18 gauge 304T stainless steel counters per plan. Code requires 16 feet of lineal shelving to be installed under countertops.
4. 3-COMPARTMENT SINK: 1 (one) SS-3-LIN-18-2D18 Lambertson Industries, Inc, NSF-rated 3-compartment sink with two drain boards shall drain to floor sink and installed per plan. Faucet shall be Chicago 445-DJ18
5. HAND SINK: Kohler K-2007 with metered faucet.
6. SOAP DISPENSER: Bobrick B-2111
7. PAPER TOWEL DISPENSER: Bobrick B-262.
8. MOP SINK: Mustee-62M; with American Standard 8344.112 faucet and a 3-mop holder mounted to wall.
9. WATER HEATER: 50 gallon, 480 Volt, 10 KW, A.O. Smith DEN-52
10. FLUORESCENT LIGHTING: Lithonia DM232-120 installed per plan with a single switch at the door entry.
11. ELECTRICAL OUTLETS: Duplex spec grade outlets shall be provided in the concession room per plan.
12. AIR CURTAIN: Mars NHV-42 with micro switch, located over entry door.
13. FLOORS: Shall be 4" x 4" red quarry tile set with epoxy thin-set and grey epoxy grout.
14. WALLS: Shall be furred with wood studs and insulated with fiberglass batt insulation, then covered with Kem-Ply smooth FRP to maintain a washable surface.
15. CONCESSION WINDOW: Shall be Ready Access #275 low profile single panel slider, mill finish with 19 x 39 service opening with restrictor plate. A lockable shutter door (same construction as exterior doors described above) shall cover the window and be able to lock open against the building.
16. INTERIOR MOUNTED HVAC SYSTEM: Custom-designed, 3 Ton, Packaged Air-Cooled system with no exterior mounted condenser shall be used.

AA. Shipping Protection

The building, while traveling over roads to the destination may encounter inclement weather or road grime that could require substantial cleaning when it arrives on site. The building shall be shrink-wrapped before transportation and sufficiently strong to arrive at the owner site intact for exterior finish protection. Materials removed on site shall be disposed of and recycled by restroom building install staff.

BB. Certifications

Building shall be certified in compliance with the plan approval by the Department of Housing, State of California and shall be delivered with an applied insignia in compliance with all State regulations. The local building authority shall provide site inspections for the underground mechanical piping and final connections, footings, and access issues outside the restroom footprint. Restroom building subcontractor shall also furnish 5 year warranty, certifications for the concrete slab specification compliance, and maintenance manuals for the building and components.

END OF SECTION

SECTION 13120
PRE-ENGINEERED STRUCTURE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. A single shade contractor shall be responsible for the design, engineering, fabrication, supply and installation of the work specified herein. The intent of this specification is to have a single shade contractor be solely responsible for the above functions as a turnkey project.

1.3 SUBMITTALS

1.3.1 With Bid Submittals:

A. Provide proof of installed reference sites with structures for similar scope of project and installation that are engineered to CBC specifications. Include in reference list install dates and project locations.

B. Provide a minimum of 7 fabric samples to demonstrate fabric color range and powder coat color selections. Also provide letter of authorization from fabric manufacture for use of fabric.

C. Provide proof of all quality assurance items including;

1. A list of at least 3 reference projects that have been installed a minimum of 8 years.
2. Proof of General liability, Professional liability and umbrella insurance as per section 1.4 B
3. Proof of current CA contractor's license.
4. Proof of $6,000,000 bonding capacity.
5. Proof of IAS (International Accreditation Service)certification as per section 1.4 D
6. Proof of a Corporate Safety Program along with an Injury & Illness Prevention Program.
7. Proof of an Annual Maintenance Inspection Program

1.3.2 Award of Contract Submittals:

A. Provide wet sealed structural engineering drawings and calculations.

B. Provide fabric samples and powder coat colors for final order selection.

1.4 QUALITY ASSURANCE

A. All bidders shall have at least 12 years experience in the design, engineering, manufacture, and installation of structures, engineered to California Building Code requirements with similar scope and a successful construction record of in-service performance.

B. All bidders shall be able to provide proof with bid submittal of a minimum of $1,000,000 general/public liability insurance, $3,000,000 professional liability (PL) insurance and additional $5,000,000 umbrella/excess liability insurance.

C. All bidders shall be a licensed contractor in the state of California and shall be bonded and provide proof of a minimum bonding capacity of $6,000,000 with bid.

D. Manufacture shall be accredited by the IAS (International Accreditation Service) for Structural Steel Fabrication under UBC 97 & 2000 Section 1701.7 and IBC 2000 Section 1704.2.2

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for shade structures shown on the Drawings in relation to the property survey and existing structures, and verify locations by field measurements prior to construction.

1.6 WARRANTY

1. The successful bidder shall provide a 12 month warranty on all labor and materials.

2. A supplemental warranty from the manufacturer shall be provided for a period of 5 years on fabric and 10 years on the structural integrity of the steel from date of substantial completion.

3. The warranty shall not deprive the Owner of other rights the Owner may have under the provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 – PRODUCTS

2.1 GENERAL

A. The structure shall be per drawings and specifications as manufactured by USA SHADE & FABRIC STRUCTURES, Inc., or approved equal and include engineering drawings and calculations, patterning and fabrication of architectural membrane, structural steel frame, architectural hdpe membrane roof, steel cables, all fasteners, and installation of structure(s) including foundations.

B. Contact USA SHADE & FABRIC STRUCTURES, Inc., 350 Kalmus Dr, Costa Mesa CA 92626 Tel: (714) 427-6981 Fax: (714) 427-6982 Contact: Patti Abrecht

C. To qualify as an approved equal, please submit product documentation, fabric samples and quality assurance criteria as per section 1.4 at least 10 days prior to bid to be considered.

D. The shade structure shall conform to the current adopted version of the California Building Code 2007 including local agency amendments and additions to the code.

E. All shade structures are engineered and designed to meet a minimum of 90 mph wind load, Exposure C and seismic (earthquake) load based on Zone 4. All shade structures shall be engineered with a zero wind pass through on the fabric.

F. Steel:

1. All steel members of the shade structure shall be designed in strict accordance with the requirements of the “American Institute of Steel Construction” (AISC) Specifications and the “American Iron and Steel Institute” (AISI) Specifications for Cold Formed Members and manufactured in an (IAS) accredited facility.

2. All connections shall have a maximum internal sleeving tolerance of .0625 inches using high tensile strength steel sections with a minimum sleeve length of 6 inches.

3. All non-hollow structural steel members shall comply to ASTM A-36. All hollow structural steel members shall be cold formed, high strength steel and comply with ASTM A-500, Grade C. All steel plates shall comply to ASTM A-572, Grade 50. All galvanized steel tubing shall be triple coated for rust protection using an in-line electro-plating coat process. All galvanized steel tubing shall be internally coated with zinc and organic coatings to prevent corrosion.

G. Bolts:

1. All structural field connections of the shade structure shall be designed and made with high strength bolted connections using ASTM A-354, Grade B or SAE J249, Grade 8.

2. All stainless steel bolts shall comply with ASTM F-593, Alloy Group 1 or 2. All bolt fittings shall include rubber washer for water tight seal at joints. All nuts shall comply with ASTM F-594, Alloy Group 1 or 2.

H. Welding:

1. All shop welded connections of the shade structure shall be designed and performed in strict accordance with the requirements of the “American Welding Society” (AWS) Specifications. Structural welds shall be made in compliance with the requirements of the “Prequalified” welded joints where applicable and by certified welders. No onsite or field welding shall be permitted.

2. All full penetration welds shall be continuously inspected by an independent inspection agency and shall be tested to the requirement of 2007 CBC.

I. Powder coating:

1. Galvanized steel tubing preparation prior to powder coating shall be executed in accordance to solvent cleaning SSPC-SP1. Solvent such as water, mineral spirits, xylol, toluol, which are to be used to remove foreign matter from the surface. A mechanical method prior to solvent cleaning prior to surface preparation shall be executed according to Power Tool Cleaning SSPC-SP3 and utilizing wire brushes abrasive wheels and needle gun, etc.

2. Carbon structural steel tubing preparation prior to powder coating shall be executed in accordance to commercial blast cleaning SSPC-SP6 or NACE #3. A commercial blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, mill scale, rust, coating, oxides, corrosion, products and other foreign material.

3. Powder coating shall be sufficiently applied, with a minimum 3 mils thickness and cured at the recommended temperature to provide proper adhesion and stability to meet salt spray and adhesion tests as defined by the American Society of Testing Materials.

4. Powder used in the powder coat process shall have the following characteristics:
   a. Specific Gravity: 1.68 +/- 0.05.
   b. Theoretical coverage: 114 +/- 4ft^2/lb/mil
   c. Mass loss during cure: <1%
   d. Maximum storage temperature: 75^oF

.

J. Tension Cable: Steel cable is determined based on calculated engineering load.

K. Fabric Roof Systems:

1. UV Shade Fabric:
   a. UV Shade fabric is made of a UV stabilized high-density polyethylene. Mesh shall be rachel knitted with monofilament and tape yarn filler to ensure that material will not unravel if cut. Panels to be 10ft wide.
   b. Fabric shall meet the following fire resistance tests:
      1) ASTM E84
      2) NFPA 701-97 (Weathered or unweathered)
      3) CA Fire Marshall Rating (Reg. # FA-52001)

2. Stitching & Thread:
   a. All sewing threads are to be double stitched.
   b. Thread shall be GORE Tenara Sewing Thread manufactured from 100% expanded PTFE; mildew resistant exterior approved thread. Thread shall meet or exceed the following:
      1) Flexible temperature range
      2) Very low shrinkage factor

3) Extremely high strength, durable in outdoor climates
4) Resists flex and abrasion of fabric
5) Unaffected by cleaning agents; acid rain, mildew, salt water and rot resistant, unaffected by most industrial pollutants.
6) Treated for prolonged exposure to the sun.

3. Shade and UV Factors:
   a. Shade protection and UV screen protection factors shall be as follows:

Color	**UV Block %**	**Shade %**
Pacific Blue	84%	82%
Rain Forest Green	83%	81%
Red	84%	85.5%
Silver	85%	81%
Desert Sand	86%	84.5%
Terracotta	85%	81%
Yellow	86%	84%

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installations of shade structures and demolition of the existing structure shall be performed by a State of CA licensed and bonded contractor with certified Rope Access Technicians on staff with experience in tension fabric structures.

B. The contractor installing the structure shall comply with manufactures instructions for assembly, installation, and erection per approved drawings.

C. Concrete:

1. Concrete work shall be executed in accordance with the latest edition of American Concrete Building Code ACI 318.

2. Concrete specifications shall comply in accordance with the section 03300, and detailed as per plans, shall be as follows:
   a. 28 Days Strength F'c = 3000 psi
   b. Aggregate: HR
   c. Slump: 3 – 5
   d. Portland Cement shall conform to C-150
   e. Aggregate shall conform to ASTM C-33

3. All reinforcement shall conform to ASTM A-615 grade 60.

4. Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual and Manual of Standard Practice.

5. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant (See Table 1).

6. The contractor shall not pour any concrete when daily ambient temperature is below 55 degrees Fahrenheit.

TABLE 1

Temperature Range	**% Accelerator**	**Type Accelerator**
75-80 degrees	1%	High Early (non calcium)
70-75 degrees	2%	High Early (non calcium)
Below 70 degrees	3%	High Early (non calcium)

C. Foundations:

1. All Anchor Bolts set in new concrete shall be ASTM A-325.

2. All Anchor Bolts shall be Hot Dipped Galvanized.

1. Footings shall be placed in accordance with and conform to manufactures engineered specifications and drawings.

END OF SECTION

TABLE CONTENTS

SECTION 016000
ELECTRICAL

PART I: GENERAL

1.01 DESCRIPTION

Division 16 includes everything necessary for and incidental to executing and completing electrical work, except as hereinafter excluded.

1.02 WORK IN DIVISION 16

Furnish and install all materials, labor and equipment necessary for complete and working electrical systems except as noted otherwise. The following list shall not be considered as a complete and detailed list of work and materials to be supplied, but shall be used as a guide.

A. Switchboards, panel boards, distribution and branch circuit wiring for lighting and power systems.

B. Lighting fixtures, lamps, poles, outlets, wiring devices, and connection of all equipment.

C. Conduit and wiring, including final connections and all control systems.

D. Misc. Items:

- Tests required by the Inspector/Engineer.
- Materials List and Shop Drawing submittals.
- Lighting pole foundations and excavation for pole foundations
- Spare parts.
- Submittal of work schedule.
- Record drawings and guarantee.
- Field measure and stake out locations of all proposed ballfield light standards and walkway light standards within reasonable time after award of contract and prior to ordering light standards.
- Cut, repairs and cleaning as necessary.
- Excavation, backfill and compaction for pull boxes, trenches, and equipment.
- Disposal of excess earth and debris shall be off-site or as directed by Owner.
- Provide approved shoring, lights and barricades during construction.
- Repair all damage to all existing improvements caused by this work including landscaping and irrigation systems.
- Empty conduits for future.
- Provide temporary power for all trades. Related fees and costs to be included in bid.
- Hook-up to pre-fabricated building panels.
- Repair all damage to existing improvements caused by this work including landscaping and irrigation system.
- Obtain all necessary permits and Building Department inspections and include fees in this bid.

1.03 PERMITS AND FEES

Secure and pay for all necessary permits (and testing per Paragraph 1.17).

1.04 REGULATIONS AND CODES

All work and materials shall conform to the latest edition of amendments thereto of the following Codes where specified.

- National Electrical Code, 2005 Edition (2007 N.E.C.) or latest adopted addition.
- National Electrical Manufacturer's Association (NEMA).
- Underwriter's Laboratories, Inc. (UL).
- Requirements of the serving utility companies.
- Requirements of Federal, State, or County agencies having jurisdiction.
- Specifications for Public Works, latest edition (Herein referred to as "Standard Specifications").

1.05 KNOWLEDGE

It is anticipated and required that the Electrical Subcontractor be thoroughly familiar with national and local electrical codes and regulations. Every attempt has been made to eliminate unnecessary redundancy and duplication of requirements for materials and installation methods already contained in existing codes and regulations.

1.06 CONFLICTS

When Drawings or Specifications call for materials or work different than, but not in conflict with, requirements of governing codes provide and install these materials or work. If there are any apparent conflicts between Drawings and Specifications and prevailing Codes and regulations, verify with Owner and Engineer. Do not proceed with any related work until such clarification has been made. Nothing in these Drawings or Specifications is to be construed to permit work in violation of governing codes.

1.07 LISTING AND APPROVAL

All materials installed on this project shall be listed or approved by Underwriter's Laboratories, Inc. (UL) and shall bear the label thereof where applicable. Under certain conditions, such as when UL has not established testing procedures, no listing or approval is available. In these cases, obtain prior approval from local authorities and review with Owner and Engineer.

1.08 DRAWINGS AND SPECIFICATIONS

Electrical Drawings are diagrammatic in many respects. Sizes and locations of equipment and wiring are shown to scale where possible but may be distorted for clarity on the Drawings to show all necessary bends, offsets, pull boxes and obstructions. Contractor shall install the Work to conform to the structure, preserve headroom and keep openings and passageways clear.

1.09 SHOP DRAWINGS

Provide equipment and materials conforming to the Drawings and Specifications. Manufacturer’s Shop Drawings will be reviewed by the Owner and Engineer as a service to the Contractor to assist him in obtaining equipment that is in compliance with Drawings and Specifications. However, Shop Drawings will not be accepted for review by the Owner and Engineer until the Contractor has reviewed them, signed as complete, and is satisfied that the equipment he is proposing to furnish will be in compliance with these Specifications and Drawings.

1.10 SUBMITTALS - AFTER AWARD OF THE CONTRACT

A. Submittals. Within 7 days after award of Contract, submit six (6) sets of Shop drawings for the following items.

1. Switchgear, including service equipment, sub-distribution switchboards and panelboards, lighting and power panelboards, and other related items of equipment.

2. Wiring devices and plates.

3. Lighting fixtures, including installation details.

4. Lamp/Ballast information per Par. 3.02.

5. Special systems as specified in this Contract.

6. Pole suppliers, Pole drawings (include order and delivery schedule).

7. Items listed in Par. 3.02 (lamps) and Part V.

B. Sports lighting substitution submittals if other than specified equipment (to be submitted with bid) See Par. 1.20 for all other substitutions.

1. Substitute – To specified sports light system. All contractors bidding on project shall provide the following with his sealed bids if proposing substitution to specified project:

- Manufacturer and Catalog brochure of proposed sports lighting fixture.
- Manufacturer of proposed sports lighting pole with description of pole (i.e.: Tapered, round, hex, sectional, etc.) including Structural Engineering by a licensed California engineer.
- Computerized photometric read out of submitted sports lighting fixture-indicating footcandle read out as described in Part 5 of specifications.
- Show compliance of photometrics and materials meeting specified product.

2. Failure to submit above item 1.10,B (if substitution to specified product) with bid shall result in rejection of bid.

1.11 SPARE PARTS

Provide spare parts per:

1. See Part V for Musco spare parts.

2. Three (3) spare lamps of each wattage and type on project.

1.12 INFORMATION TO MANUFACTURERS

Furnish to the various equipment manufacturer copies of Drawings and Specifications relating to their products.

1.13 AS BUILT DRAWINGS

Keep an accurate dimensioned record reproducible transparencies of as-built locations, and of work which is installed.

1.14 LOCATIONS AND ACCESSIBILITY

Contractor shall fully inform himself regarding peculiarities and limitations of spaces available for installation of work and materials furnished and installed under this Division. Drawings indicate location and arrangement of conduit, equipment, and other items, and are to be followed as closely as possible. Work specified and not clearly defined by Drawings shall be installed and arranged in a manner satisfactory to the Engineer. In the event changes in indicated locations and arrangements are deemed necessary by the Owner, they shall be made by the Contractor without any additional charge provided that change is ordered before the work is installed and no

extra materials or labor is required. The Owner and Engineer shall reserve the right to move any outlet or device, or pole six feet without additional charges by the Contractor prior to the rough in.

1.15 CLEANING OF EQUIPMENT, MATERIALS AND PREMISES

Clean equipment and materials thoroughly. Leave surfaces to be painted smooth and clean, ready for painter. Clean entire premises of unused materials, rubbish, debris, and dirt created by work under this Division.

1.16 OPERATION AND MAINTENANCE INSTRUCTIONS

Fully instruct and demonstrate to the Owner's operating personnel the performance, operation and maintenance of equipment.

1.17 OBSERVATION, TESTING AND ADJUSTMENT

A. Covering Of Uninspected Work - Notification For Inspection.

1. Contractor shall notify the Owner and Engineer 48 hours (two working days) prior to observation for Owner and Engineer and Building Dept.

B. Tests

1. The Contractor shall make all tests required by the Engineer, the Electrical Inspection Division of the Building Department, or other authorities having jurisdiction.

2. See 2.07 Power System Study – Coordination Study (Not in Contract).

3. The cost of all tests, the replacing and/or repairing of any damage resulting from these tests and any other work necessary to replace materials, etc. not in accordance with the Electrical Ordinance, Safety Orders, Specifications and accompanying Drawings, shall be borne by the Contractor.

4. Should the Contractor refuse or neglect to make any tests necessary to satisfy the Engineer or his representative that he has carried out the true intent and meaning of the specifications and the accompanying drawings, the Owner may make such tests and charge the expense thereof to the Contractor, to be retained out of final payment.

5. Ground Tests

a. Provide insulation resistance test for all 120V through 480V wiring. In each conduit, insulation resistance shall be measured between each combination of two conductors including neutrals, metallic conduit or ground wire in case of non-metallic conduit.

1) Test shall be made before wiring connections to utilization equipment (lights, transformers, motors, etc.).

2) Testing shall be performed at either 500V D.C. for ten (10) seconds or at 1,000V D.C. for (1) second (3 seconds maximum). Test equipment shall be Associated Research, Biddle, Hitachi or Stichet.

3) Minimum acceptable insulation resistance is 10 meg-ohms. Measurements below this value are usually due to faulty or damaged insulation and must be replaced. For runs over 500 feet, consult with the Engineer for lower acceptable values or insulation resistance.

b. Electrical ground test: The main electrical service ground bus shall be tested with grounding connections completed.

1) Testing shall be performed with either a three or four point ground tester such as manufactured by Associated Research or Biddle

2) The total resistance measured between the main service ground bus and the earth shall not exceed 25 ohms under dry ground conditions.

c. Ground fault protection receptacle test: Each ground fault circuit protection receptacle shall be tested by the Contractor to insure proper operation, verify that the receptacles are installed in accordance with the manufacturer's instructions, including terminal connections secure.

1.18 FINAL OBSERVATION AND ACCEPTANCE

After all requirements of Drawings and Specifications have been completed, representative of the Owner and Engineer will observe the Work. If requested by the Owner, the Contractor shall provide competent personnel to demonstrate the operation of any item or system involved.

1.19 GUARANTEE

A. The Contractor shall furnish to the Owner a written warranty to guarantee all work under this contract to be free from defects of workmanship and materials for a period of one (1) year from date of acceptance of work and contract, and he shall guarantee to repair or otherwise make good at his own expense any defects developing within that period of time. Work shall be performed within 48 hours after receiving notice from the Owner. Notice may be by phone or letter.

B. Warranty shall include all lighting ballast's and H.I.D./fluorescent lamps.

C. Warranties for equipment furnished that have warranties greater than one year shall be extended to the Owner (in writing).

1.20 PROPOSED SUBSTITUTIONS AND APPROVED EQUALS:

A. Equipment and wiring shown on Plans is for materials as specified. Should equipment of other manufacturers be approved and used, the Contractor shall make all changes in other equipment, conduit, wiring, or location of equipment, as approved by the Owner without charge to the Owner.

B. All requests for substitutions shall be submitted in writing to Engineer ten (10) days prior to bid date. Engineer shall respond within two (2) working days as to acceptance. If accepted, floodlight and pole substitutions shall conform to Par. 1.10, B. It shall be the Contractor's responsibility to show that all products proposed for substitution are equal to the item specified, by submitting sufficient information to permit a comparative check, including three (3) copies of a complete materials list with brochures showing all substituted equipment. Materials list shall be indexed with job title. Material must be submitted with bid. Proposed substitutions submitted after bid will not be accepted. Submitting a catalog number and manufacturer's name and stating that the item will be furnished to meet specifications will not be acceptable.

C. The term "or approved equal" shall mean the product or this specified item used shall have equivalent or more performance, longevity, ease of maintenance and replacement based on the value of the item set forth in the specifications or plans, and then only after a submittal in writing, by the Contractor and written approval received. If, after installation substituted equipment is found not to be equal to material specified, it shall be replaced with approved material at no cost to the Owner.

D. The Engineer reserves the right to charge the Contractor $200.00/hour (minimum of $400.00) for review of substitution.

E. If requested by the Engineer provide a sample of any lighting fixture proposed as a substitution for a specified fixture. Sample fixture shall be delivered to the Engineer's office for review and shall be picked up within (10) working days after review comments have been received; any samples left over this time will be discarded by the Engineer. Decision of the Engineer regarding acceptability of any fixture is final.

1.21 PROTECTION OF EXISTING SITE IMPROVEMENTS

Restore disturbed turf, landscaped areas, irrigation, concrete, AC paving, etc. Repair damaged park equipment and turf caused by Contractor to like-new condition including backfill and re-sodding of trench surface per instruction of the Owner. Repairs to the irrigation system and other existing underground utilities shall be made in accordance with the Standard Specifications for Public Works Construction, latest edition and included in contract. Materials shall be as designated by the Owner or Engineer.

PART II: GENERAL MATERIALS

2.01 FINISHES

A. Metal Surfaces shall be cleaned by means of a process equivalent to "Parkerizing" and given a rust-inhibiting coat, such as zinc chromate, prior to application of finish paint.

B. Surface-Mounted Equipment, such as panel boards, switch- boards, motor control centers, gutters, pull and junction boxes and cabinets for control, and signal systems, including telephone, and like items shall have a nameplate showing pertinent information. Nameplates shall be engraved, laminated bake-lite or aluminum, with white letters on black background. Attach with 6 x 32 self-tapping machine screws. Card holders, plastic tape or other means of attachment are not acceptable. Do not use abbreviations.

C. Exterior surface mounted cabinets mounted to side of switchboard shall be painted same color as switchboard.

2.02 WIRE AND CABLE CONDUCTORS

Wire and cable conductors shall be copper No. 12 AWG minimum unless specifically noted otherwise on Drawings. Type of wire shall be as follows:

A. Type THW or THWN (or dual rated THHN/TWHN) 600-volt insulation may be used for all wiring and shall be used for all underground wiring (wet location).

B. Type THHN, 600 Volt insulation shall be used for all branch circuit conductors installed in conduit above grade, outside of air conditioned spaces and other hot locations. (THHN not approved for underground). THHN shall also be used in light fixtures for feed-through wiring and in wire gutters.

C. All conductors to be copper only.

D. Cable Markers.

1. Lettering is to be black on a white background.

2. Lettering is to be typed.

3. Lettering shall be either: a white tape that is applied directly to the cable and then covered with a clear heat-shrinkable material or typed directly on heat-shrinkable material.

E. Conductors for General Wiring: Thermoplastic insulated rated for 600V manufactured in accordance with UL 83 and listed by an acceptable independent testing laboratory.

1. Provide 3/4 hard drawn copper conductors. Provide solid conductor for #12 AWG and smaller. Provide stranded conductors for #10 AWG and larger.

F. Flexible Cords and Cables: Jacketed Type SO, suitable for use outdoors with thermoplastic insulated conductors rated for 600V and manufactured in accordance with UL62 and listed by and acceptable independent testing laboratory.

G. Conductor Connectors for General Wiring:

1. Sizes No. 14 to No. 8: Splice with insulated spring wire connectors.

a. Ideal No. 451, 455, and 453.

b. Minnesota Mining: Types Y, R, G and B.

c. Buchanan No. B1, B2, and B4.

2. Sizes No. 6 or Larger, Copper: Splice and terminate with compression or pressure type connectors and terminal lugs.

H. Provide connector-sealing packs for splices that require complete protection from dampness and water where indicated.

1. Scotchlok No.'s 3576, 3577, and 3578, by 3M Company.

I. Conductors for General Wiring

1. Minimum 75 degree C temperature rated insulation on conductors, except where required due to high ambient temperature or otherwise indicated.

2. Conductors #4 and larger shall be THW, unless otherwise indicated.

3. Where installed in raceway exposed to direct sunlight outside buildings or conduit just under or within roofing material or boiler rooms, provide minimum 90 degree C temperature rated insulation.

4. Where located in fixtures installed in continuous rows, provide conductors with RHH or AVA insulation unless the fixture is rated for carrying branch circuit conductors.

5. Stranded conductors at motors and other applications where subject to vibration.

6. Minimum size conductors for power and lighting #12 AWG, except where noted.

7. Minimum size conductors for control circuits #14 AWG stranded with THHN/THWN insulation.

J. Use flexible cords and cables for connection of special equipment as indicated. Length not to exceed 72 inches.

K. Ground Conductors

1. Provide an insulated green ground conductor for all branch circuit wiring where indicated.

2. Bare copper conductor may be used.

a. Install ground conductors in all non-metallic conduits as required by code. Install ground conductors in all motor branch circuits and all feeders. Where ground conductor size is not indicated, provide size as required for an equipment ground conductor by the National Electrical Code.

b. Install ground conductors in all flexible metal conduits exceeding 72 inches in length unless conduit 'approved' for ground with UL label.

L. Inspection

1. Check conduit system for damage and loose connections. Replace damaged sections.

2. Check for caps at conduit openings. Make sure that inside of conduit is free of dirt and moisture.

3. Pull mandrel, one size smaller than the conduit, through entire length of all underground conduits prior to conductor installation.

M. Installation

1. Conductors for General Wiring:

a. Color code conductors insulation as follows:

	SYSTEM VOLTAGE	
CONDUCTOR	208Y/120	480Y277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow

Different switch leg and traveler color-coding may be utilized, but coding shall be consistent and unique for the various voltage systems. Project Record Drawings shall be provided noting the color coding system utilized.

b. For conductors #6 AWG or larger, permanent plastic colored tape may be used to mark conductor in lieu of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.

- Provide color tape on each end and at all terminal points and splices on wire enclosed in conduit.

- Provide color tape every 3 feet on wire enclosed in a listed wireway.

c. When pulling conductors do not exceed manufacturer's recommended values.

d. Use polypropylene or nylon ropes for pulling conductors.

N. Insulate splices with plastic electrical tape: Scotch No. 33+, Tomic No.1T, or equal.

O. Terminate all control wires with terminal lugs on terminal boards not designed with pressure plates. If splices are needed, use same procedure, installing a terminal board in a junction box for protection.

P. Vertical cable supports shall be O.Z. Gedney, type M or equal.

Q. Identification

1. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices and in pull boxes.

2. Branch Circuits: Identify with the corresponding circuit designation at the overcurrent device and at all splices and devices.

3. Control Wires: Identify with the indicated number and/or letter designation at all terminal points and connections.

4. Alarm and Detection Wires: Identify with the indicated wire and zone numbers at all connections, terminal points and coiled conductors within cabinets.

5. Conductors Terminated By Others: Indicate location of opposite end of conductor, i.e., “Pull Box-Room 101”.

6. For identification of conductors use plastic coated self-sticking markers such as Thomas & Betts E-Z Code.

7. Circuit designation is construed to mean panel designation and circuit number, i.e., LA-13.

R. Splices, Joints and Taps.

1. For wire in sizes No. 8 AWG and smaller, use Ideal "Wire-Nuts" or 3M "Scotchlocks".

2. For Copper Wire in sizes No. 6 AWG and larger, use Bundry split-bolt type connectors.

3. Make Splices, joints and taps, and connections to motors and related equipment with approved solderless lugs sized for the wire or conductor size involved.

S. Tagging of Conductors

1. Tag branch circuits in panel boards, in gutters, and in junction boxes where unused circuits terminate for purpose of identifying various circuits.

2. Tag feeders and mains in switchboards.

3. Tag with adhesive type of marker manufactured by Brady as distributed by Graybar Electric Co.

T. Branch Circuit and Feeder Wiring for all systems shall be continuous from switch to terminal or farthest outlet. No joint shall be made except in pull junction or outlet boxes, or in panel or switchboard gutters.

U. Installation. Thoroughly clean conduit and wire-ways and ensure all parts are perfectly dry before pulling wires. Do not install permanent wiring, without special permission from the Owner, until plastering is done and dirt removed. Wire shall be neatly arranged and laced together.

2.03 TIME SWITCHES/PHOTO CELL AND LIGHTING CONTROL (See Plans)

2.04 CONTACTORS AND RELAYS

A. Electrically operated, magnetically held as required with coil contacts, no overload, 250 volt or 600 volts AC as required. Amperage and number of poles as indicated. Mount contactors on sound absorbing rubber mounts, Siemons, SQ-D or approved equal.

B. Relays for control of individual night-lighting circuits as specified on plans.

2.05 FUSES

A. Fuses shall be class "R" Type as indicated on Drawing, as manufactured by Bussman. No substitutions allowed. Furnish to the Owner two extra fuses of each size and type used in main switchboard in metal hinges type box, size as required. All box mount in electrical room. All fuses shall be type required by plans (i.e., LPN-RK, KTN-RK, etc.). NOTE: Pull out "T" type fuses will be allowed where indicated on plans.

2.06 MAIN SERVICE AND DISTRIBUTION SWITCHBOARD

A. Series Rated System:

1. The entire main switchboard and electrical panel system shall be UL listed for series rated system based on available A.I.C. fault current shown on Plans. The switchboard shall be braced for a minimum 65,000 A.I.C.

2. The short circuit current rating of each panel shall be equal to the lowest interrupting rating of any device installed but not more than the main rating at the

system voltage. Additional or replacement devices shall be of same manufacturer, type designation and an equal or greater interrupting capacity.

3. See Power System Studies, 2.07. (Not in Contract)

4. Provide red engraved plate with white letters: "Switchboard is fully rated (type). Replacement devices shall be of same manufacturer, type designation and an equal or greater interrupting capacity."

B. Copper bussing shall be 1000A/Sq. inch for 100% rating. Aluminum bussing shall be 750A/Sq. inch for 100% rating.

C. Busbars: Rectangular cross-sections, full height (fully bussed for future add-ons) in each distribution section with horizontal cross busbars between sections. Fully insulated, UL rated tin plated aluminum, braced for 65,000 KASYM.

D. Switchboard is free standing outdoor unit. Bolt to concrete slab with 1/2" ∅ Phillips red head wedge anchors 4" embedment. Cat. No. WS-1252 (4) bolts per.

E. Contractor shall send switchboard/meter section shop drawing to Power Company Representative for approval by Power Company and confirmation that switchboard complies with Power Company regulations.

F. All dimensions of switchgear are based on RSE-Sierra (714/529-3471). Contractor is responsible for any substitution of equipment with greater dimensions than manufactured by RSE-Sierra and for allowed space and code clearances.

G. Contactors and/or relays and or time clocks to mount in separate sections with hinged (lockable) doors. Time clocks and/or any toggle or push button on-off devices to be mounted in separate barriered section with hinged lockable door and to have no live contacts or bussing exposed to operator. (Comply with Cal-OSHA Title 8, Electrical Code 2320.1 and 2320.2).

H. Outdoor switchgear to have hinged pad lockable doors and pad lock cover with door handle hardware at meter section capable of two pad locks.

I. Light fixture in switchgear shall be Lithonia #VWC-2-17-120V-wet location (25”L x 4-1/2”W x 5-1/4”D), two 17W/T8 lamps (verify voltage for 120V or 277V) with two U4220 screwdrivers. Provide 20A/1P circuit breaker and toggle type light switch in switchboard to control same.

J. Provide single or three phases, 3 or 4 wire, switchboards, as shown on plans, containing circuit breakers and switches with ratings, components and arrangements as indicated on the single line drawings and herein specified.

K. Enclosure: Total enclosed sections bolted together to form a single floor-standing section, NEMA Type 1 for indoor and NEMA 3R for outdoor general purpose with front access only. Sections 90" high and all of the same depth, width as required. Legal gauge sheet steel finished hammertone gray or manufacturer's standard gray baked enamel.

L. Lugs: Shop drawings must indicate lug size based on the actual conductors to be provided.

M. Main Circuit Protector: (As shown on plans - Circuit Breaker or Switch and Fuse): Molded case thermal magnetic circuit breaker pad lockable in the "off" position with minimum interrupting capacity of 42,000 symmetrical RMS amperes at voltage shown on plans. All multi pole units with common trip and single handle. Feeder rejection switch and fuses per single line diagram, provide one spare set of fuses of each size and type. Provide fuse holders in cabinet in electrical room or in switchboard. Label with nameplate "Spare Fuses."

N. Nameplates: Black-on-White engraved laminated plastic. Provide a main nameplate for each section with first line in 1/2" high letters stating (Example: "MAIN SWITCHBOARD") the second line in 1/4" high letters indicating the second line in 1/4" high letters indicating voltage, phases, amperes (of main busbars) and year, (Example: "480/277V, 3-phase, 4-wire-800A 2000"). Provide nameplate for each circuit protector.

O. Installation: Use leveling screws to set the switchboard plumb and true, and with the bottom approximately 1" above finished floor slab. Completely fill space between the floor and the bottom of the switchboard with cement grout.

P. Provide switchgear and all components made by one of the following manufacturers: RSE, General Electric, Sylvania Square-D, or Siemens.

Q. Service entrance equipment shall include underground pull section combination service and distribution section, and shall conform to the requirements of the serving utility company.

2.07 POWER SYSTEM STUDIES (NOT IN CONTRACT)

A. Provide independent testing laboratory (Power Engineering Services, Brea, California 714/524-9100 or approved equal) Short Circuit and Coordination Study and to include:

1. Provide to testing lab:

   a. Manufacturer set of all feeder overcurrent protective devices (circuit breakers or switch/fuses as shown on plans) coordination curves showing and confirming selective tripping of all main circuit breakers (or switch/fuses) and ground fault relays with downstream branch circuit breakers (fusible switches) and upstream power company fuse and breaker protective devices for all services.

   b. One complete set of electrical plans.

   c. One line diagram showing lengths of all feeders.

   d. Power Company information as requested by laboratory.

2. All feeder and main circuit breakers and ground fault systems shall be field tested after contractor installation by testing laboratory to confirm proper settings on all trip devices.

3. The testing work to include all main and feeder protective devices. Exact fuse types to be determined by coordination study.

4. Provide fuse types as recommended by testing lab. Make all calibrations to circuit breaker settings as recommended by testing lab.

5. Provide 3 sets of final report to engineer at job completion.

2.08 PANEL BOARDS

A. General Construction. Panels shall have hinged doors with pad lock hasps. NEMA 3R construction for outdoor panels.

B. Panels shall contain thermal-magnetic trip (bolt-on type), QB circuit breakers rated for voltage as shown on drawings. Circuit breakers shall be per "fully rated" system and minimum 10,000A.I.C. (Ampere rating and number of poles are shown on panel schedules.)

C. Bus Size shall be as indicated. Where not shown, size the bus to equal ampacity of feeder switch or circuit breaker. In no case shall bus ampacity be less than 100 amperes.

D. Finish. Where panels are mounted flush with wall, the trim and door shall be given a primer coat, to be finished painted by others. Where panels are surface mounted, all exposed surfaces shall be finished as specified previously.

E. Nameplates. Panel nameplates shall be engraved and show panel name, voltage, phase and number of wire. Example:

PANEL 2A
120/208V
3Ø, 4W

F. Circuit Directory. Each circuit shall be identified by a card mounted on inside of panel door with following information neatly typed. Number and type of outlets on circuit, location of outlets and load in volt-amps per phase.

G. Panel boards shall be same manufacture as switchboard (when new switchboard specified) including devices in panel board.

2.09 CONDUIT

A. Rigid conduit shall be used when installed in concrete slabs, in concrete or masonry walls, exposed on exterior or exposed in interior wall below 4 feet above floor.

B. Concrete Encasement. If concrete encasement of underground conduit is called for on plans, conduit shall be encased 3 inches on all sides with red mixed concrete envelope. Concrete mix shall be 5.5 sack, using pea gravel as aggregate. Use PVC SCH. 80 conduit only.

C. (Not Used.)

D. EMT (Interior Use Only)

E. Flexible conduit: Use where indicated on drawings and in other locations due to structural conditions as permitted by code and with review of the Owner. Other locations permitted by N.E.C. and/or local Codes.

F. Use of conduit and fittings not specified shall not be used without prior review of Engineer.

G. Seal-tite flexible conduit shall be used for all final connections to motors and in wet, damp or outdoor areas where drawings indicate use of flexible conduit.

H. Terminate conduit runs to rotating, adjustable, or moveable equipment with flexible connections.

I. Install flexible isolating connections in conduit runs between building structure and air-conditioning equipment, transformers or other equipment transmitting vibration or noise.

J. (Not Used)

K. Do not use threadless conduit couplings for rigid conduit except for connections requiring union.

L. Rigid conduit shall be terminated with metallic bushings.

M. Terminate underground conduit stub-outs from building (or switchgear as indicated) into a 12” x 18” pull box flush in grade.

N. Conduit shall not be embedded in concrete slab less than 4 inches thick and conduit +1-1/4 inches and larger shall not be installed in slab. Install conduit embedded in concrete slabs not on grade between reinforcing bars and bottom of slab. For slabs on grade, install conduit below slab as specified.

O. Non-metallic conduit (PVC SCH. 40) shall be installed underground and in duct banks. Bends and risers shall be PVC SCH. 80 with out of grade risers to be rigid-steel conduit. Risers shall terminate at panels and pull boxes with double locknuts and insulated grounding bushing. Bare copper ground wire shall be installed in conduit runs between panels and pull boxes and connected to ground busing at each end. Ground wire shall be code sized or as indicated on drawings. Where installed below floor slabs or below grade, conduits shall be separated by a minimum of 3" between identical systems.

P. Non-metallic conduit in duct banks shall be installed as described in Concrete Encasement (if indicated on plan).

Q. Provide secure mounting facilities for conduits. Wire or plumber's tape shall not be used for hanging suspended conduit. Conduits shall not be secured to suspended ceiling hanger wires or to suspended ceiling structure.

R. Provide junction or pull boxes where required for pulling conductors due to excessive numbers of bends or lengths of conduit runs.

S. Provide expansion couplings wherever conduits cross expansion or seismic joints or for continuous straight runs in excess of 100 feet except when embedded in concrete. Expansion fittings shall have bonding jumper or be of grounding type.

T. Re-route conduit where necessary to clear structural and mechanical obstructions.

U. Bury underground conduit except under buildings to depth of not less than 24 inches below finish grade. Bury runs smaller than 1-1/4 inches to minimum depth of 6 inches under floor slabs and provide 3 inch concrete encasement. For conduit 1-1/2 inch and larger, trench sufficiently under floor slabs to provide a minimum buried depth of 36 inches below finish grade. Minimum depths are to top of conduits.

V. Install long-radius bends in underground service conduits and in other long underground runs in excess of 100 feet. Do not flatten or kink bends.

W. Conduits installed in concrete, wet locations, exposed to weather, or underground shall have threads filled with red lead and oil before screwing into couplings and threaded fittings.

X. Run conduits in spaces above suspended ceilings parallel to walls and floors.

Y. Where more than two conduits are installed in one common concrete envelope, separate conduits with conduit spacers.

2.10 BOXES

A. Outlet Boxes:

1. Pressed Steel Boxes: Knockout type, hot-dipped or electro-plate galvanized.
2. Cast Iron Boxes: Hot-dipped or electro-plate galvanized with threaded hubs.
3. Cast Iron Conduit Bodies: Hot-dipped or electro-plate galvanized with threaded hubs.
4. Cast copper free aluminum conduit bodies with threaded hubs.
5. Covers for Pressed Steel Boxes: Hot-dipped or electro-plate galvanized.
6. Outlet boxes manufactured in accordance with UL 514.
7. Floor Boxes:
   a. Single, gang, similar to Hubbel #B-2536.
   b. Covers:
      1) Combination, similar to Hubbel #S-2525.

2) Duplex receptacle, similar to Hubbell #S-3925.

c. Carpet flange, similar to Hubbell #S-3075 through S-3079.

d. Hubs: Provide hubs as required to suit the conduit arrangement.

8. Pre-Cast Concrete Pull Boxes: As manufactured by Christy, Brooks, BES or Associated Concrete Products and shown on drawings.

9. High impact resistant PVC boxes: As manufactured by Carlon, Sedco, or R&G Sloan.

B. Cabinets: Sheet metal, prime coat and final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.

1. Control Cabinet: NEMA 1 enclosure, door with butt hinges and flush handle latches.

a. Provide with removable steel back panel.

2. Terminal Cabinets: NEMA 1 enclosure, door with concealed hinges and spring catch type flush cylinder locks. Key locks alike, provide two keys with each lock, with lock number etched in key.

3. Provide engraved plastic nameplates with 1/4" minimum height letters indicating designation of control and terminal cabinets as shown on the drawings.

C. Outlet Boxes:

1. Ceiling Outlet Boxes: Not less than 4" octagonal by 2" deep.

2. Cast iron or cast aluminum device boxes and conduit bodies with metal covers for exposed conduit installation. Provide gasket for covers in wet areas.

3. Intercom Microphone and TV Outlet Boxes: Not less than 4-11/16" square x 2-1/8" deep.

4. Provide floor boxes with quantity of gangs as required for power, communication or control as indicated. Use boxes with barriers where required. Provide carpet flanges in carpeted areas.

D. Pull and Junction Boxes:

1. Use sheet boxes NEMA Type 1 for indoor and NEMA Type 3R for outdoor installation, except as follows.

a. Use pre-cast concrete boxes for boxes flush in finish grade where requiring a nominal capacity greater than 144 cubic inches, where located in vehicular traffic areas, or where indicated.

b. Use polyvinyl chloride (PVC) boxes flush in finish grade where the nominal internal volume is less than or equal to 144 cubic inches or where indicated.

c. Use cast iron boxes for boxes flush in slab on grade.

2. Where exposed to weather, provide rain-tight hubs for conduits entering the boxes, top and sides only.

3. Pull boxes in Grade

a. Christy N9 (or as indicated on plans) concrete type for all lighting circuits in landscape areas. Provide bolt-down concrete lid in landscape areas

and steel traffic lids in driving areas. All lids shall be engraved "electrical."

b. Set pullbox on compacted pea gravel base (minimum 12 inches of base material).

c. All connections or spices located in a pull box or other space below grade or where moisture can collect shall be waterproofed. The recommended method is to use Scotchlok, or approved equal, connectors and to embed the connectors within a "Unipak" of 3M "Scotchcast" epoxy type resin. Make all connections and splices necessary to properly install and complete the work, and all underground spices shall be taped. All tape shall be 3M "Scotch" #33 plastic electrical tape. All connections and splices shall be electrically and mechanically perfect, and in strict accordance with all code requirements.

E. Installation

1. Provide 3/8" fixture studs in wall bracket and ceiling boxes.

2. Provide covers suitable for the fixtures or devices used.

3. Make outlet box covers flush with finished surfaces.

4. Close unused open knockouts with knockout seals.

5. Provide 1" deep plaster rings on recessed outlet boxes installed in areas where concrete will be exposed after construction is complete.

6. Where boxes are concealed in exposed concrete unit masonry, use square cornered types or boxes fitted with rings of sufficient depth for the box to be recessed completely within cavity of block or tile. Install box to insure that ring fits an opening sawed out of the masonry, so that no mortar is required to fill between ring and construction.

7. Provide a 6" base on compacted crushed rock under pre-cast concrete pull boxes.

8. Adjust floor boxes so they are level with top of finished floors.

9. Provide pull boxes junction boxes in all branch circuit and feeder runs as indicated. Do not provide pull boxes unless they are indicated or required by the Electrical Code.

10. Do not locate boxes in public view unless specifically indicated.

11. Multiple gang boxes containing 277 volt switches shall have a barrier between each switch.

12. Boxes shall not be mounted back to back in any wall. Provide a minimum offset of 6 inches between boxes in non-fire rated walls and 24" between boxes in fire rated walls.

2.11 WIRING DEVICES

A. Wall Switches

1. Quiet toggle type 20A-120/277V, AC rated, with terminal screws to take up to #10 AWG conductors, color ivory except where noted otherwise:

	SPST	DPST	3-WAY	SPST KEY SWITCH
Arrow-Hart	1991-	1992-	1993	1991-L
Bryant	4901-	4902-	4903-	4901-L
Gen. Electric	GE5951-G	GE5952-G	GE5953-G	GE5951-OLG
Hubbell	1221-	1222-	1223-	1221-L
Leviton	1221-	1222-	1223-	1221-L
Pass & Seymour	20AC1-	20AC2	20AC3-	20AC1-L

2. Momentary contact type, 20A-120/277V, 2 circuit, 3 position, center off, color ivory except where noted otherwise.

Arrow-Hart	1995-
Bryant	4921-
Gen. Electric	GE5935-_G
Hubbell	1557-
Leviton	1257-
Pass & Seymour	1250--

B. Dimmers: Similar to Nova Series as manufactured by Lutron. Provide size, voltage, and load type as required.

C. Receptacles:

1. NEMA 5-20, 20A-125V, straight blade ground type, color ivory except where noted otherwise.

	SINGLE	DUPLEX	GFCI	SURGE SUPPRESSION
Arrow-Hart	5361-	5362-	GF5342-	-
Bryant	5361-	5362-	GFR53FT-	-
Gen. Electric	GE4102-	GE4108-	----------	GE5951-OLG
Hubbell	5361-	5362-	GF5362-	6352-IS
Leviton	5361-	5362-	6899-	5380-I
Pass & Seymour	5361-	5362-	2081.F	

2. Clock Outlet – NEMA 5-15R or 5-20R, straight blade grounding type, with stainless steel cover.

	RECEPTACLE
Bryant	2828-GS
Gen. Electric	GE4224-5
Hubbell	5261-CH
Leviton	5361-CH
Pass & Seymour	S3733-SS

3. NEMA L5-20, 20A-125V, 2 pole, 3 wire, locking type, with ground:

	RECEPTACLE
Arrow-Hart	6200
Bryant	70520-FR
Gen. Electric	GL0520
Hubbell	2310
Leviton	70520-FR
Pass & Seymour	L520-R

4. NEMA 6-20, 20A-250V, 2 pole, 3 wire, straight blade grounding type.

	RECEPTACLE
Arrow-Hart	5861
Bryant	5461
Gen. Electric	GE4182
Hubbell	5461
Leviton	5461
Pass & Seymour	5871

5. NEMA L6-20, 20A-250V, 2 pole, 3 wire, locking and grounding type.

	RECEPTACLE
Arrow-Hart	6200
Bryant	70620-FR
Gen. Electric	GL0620
Hubbell	2320
Leviton	70620-FR
Pass & Seymour	L620-R

D. Plates

1. Interior Plates: Specification grade plastic, .06" minimum thickness, color to match receptacles or switches, except as follows:

   a. In food service areas or areas where mounted on or adjacent to stainless steel panels, use polished stainless steel, .040" thick for wall switches and 304 stainless steel plates for receptacles.

   b. In dish rooms and other wash down areas, use double-lift lid weatherproof plates for convenience receptacles and weatherproof wall switch cover plates.

2. Exterior Plates: Weatherproof, gasketed, or die cast aluminum with self-closing, hinged cover. It shall be listed as weatherproof in the open position. Hubbell Cat. No. 5206W0 or equal for duplex receptacles, Hubbell Cat. No. 7420 or equal for switches. NEMA 3R polycarbonate plates as manufactured by "Jaymac Corporation" for GFCI receptacles (see 3.04).

E. Installation

1. Mount switches and receptacles in vertical position in building interiors, unless otherwise noted.

2. Mount receptacles with weatherproof plates in horizontal position.

3. Install receptacles mounted vertically so that the ground contact falls on the top position, and horizontally mounted receptacles with neutral pole in top position.

4. Individually Mounted Dimmers: Install in accordance with manufacturer's ventilation clearance requirements.

PART III: LIGHTING FIXTURES/LAMPS/BALLASTS (See Part V for Sports Lighting)

3.01 GENERAL

A. Provide light fixtures complete including lamps, ballasts, sockets, housings, ceiling trim rings for special ceilings, brackets, diffusers/lenses and outlet boxes.

B. The catalog numbers included in the description of the various types of lighting fixtures shall be basically considered to establish the type or class of the fixture with a particular manufacturer only. The fixture length, number of lamps, component materials, accessories, mounting type and all other features required to fulfill the total description of the fixture based on all drawing and specification information shall be complied with

regardless of whether or not the catalog number specifically includes these features. If any conflict exists between the catalog number and the description, the Contractor shall either resolve the conflict with the Owner prior to submittal of his bid or furnish the fixture to meet the intent as later interpreted by the Owner without change in contract price.

C. Lighting fixtures shall be of types as indicated in fixture schedule on drawings.

D. All fixtures of one type shall be of one manufacturer and of identical finish and appearance, unless indicated otherwise on drawings.

3.02 LAMPS:

A. Submit certification letter from manufacturers of lamps and ballasts stating the specific lamp and ballast combination comply with manufacturer's approval for the combined use, shown on the drawings. Lamps manufactured 360 days prior to start of construction shall not be used.

B. Submit manufacturers certified lamp and ballast test report data showing compliance with contract document.

C. Provide complete manufacturers catalog data information for each light fixture, ballast and lamp.

D. Lamps shall be new, of wattage indicated and shall be as manufactured by General Electric, Westinghouse (W&K trademark), Phillips or Sylvania. Each fixture or lighting outlet shall be supplied with the proper lamp.

E. High pressure sodium and metal halide lamps shall be clear unless noted otherwise on drawings.

3.03 BALLASTS

A. Metal halide and high pressure sodium, fixtures equipped with constant wattage, H.P.F. ballasts.

B. Fluorescent ballasts shall be as indicated on Plans.

C. Each ballast shall be independently fused within ballast compartment. Provide a label next to ballast cover reading: "Ballast is fused, check fuse prior to relamping". Provide an additional quantity of 10% spare fuses and deliver to the Owner. (Not in contract.)

3.04 TAMPER PROOF SCREWS

Provide tamper proof screws on all exterior electrical junction box cover plates and light fixtures below 8 feet. Provide two sets of matching screwdrivers for each type screw.

3.05 LIGHT FIXTURES - GENERAL

A. Lighting fixtures shall have all parts and fittings necessary to complete and properly install the fixture. All fixtures shall be equipped with lamps of size and type specified.

B. Fixtures shall be wired from outlet boxes supplied with fixture to socket with #14 AWG Underwriters' Type BS1"AF" or "CF" fixture wire. Electrical 16000

C. The fixture to bear Underwriter's label of approval for the wattage indicated.

D. Light fixtures installed outdoors in damp or wet locations shall be UL labeled for said location.

E. Ballfield lighting fixtures. See Part V.

3.06 SPORTS LIGHTING (See Part V of this Specification.)

3.07 LENS AND DIFFUSERS

A. Lens and diffusers shall be completely cleaned of all dust, dirt and fingerprints after the installation of the light fixtures.

PART IV: GENERAL INSTALLATION

4.01 DESCRIPTION

Installation requirements specified herein are general in nature and are not necessarily complete. All installation requirements listed may not be used.

4.02 EXCAVATION AND BACKFILLING

Excavation and backfilling required for electrical work shall be performed under this section, unless otherwise specified, and shall conform to requirements of applicable sections of these specifications and public authorities having jurisdiction.

A. The contractor shall make all necessary excavations for footings and slabs and do any additional excavations necessary to provide ample room for installation of concrete forms where required. Sides of footings may be poured against undisturbed soil if Soils Engineer approves. Bottom of footing excavations shall be level, free from loose materials, and brought to the indicated or required grades in undisturbed earth. All excavations shall be kept free from standing water. The Contractor shall do all pumping or drainage that may be necessary in carrying on the work. Should excavations for footings through error be excavated to a greater depth or size than indicated or required, such additional depth or size shall be filled with concrete as specified for footings at the Contractor's expense.

B. Backfilling:

- Select site material shall be used for backfill of trenches and shall be free from large stones and clods. Material shall be as approved by the Soils Engineer or owner.
- Backfill shall be deposited in layers of maximum six (6") inch thickness.
- Layers of backfill shall be moistened with water, the amount to be rigidly controlled to insure optimum moisture conditions for the type of fill material used. Excess water causing saturated earth beneath footings, walks, and curbs will no be permitted.
- Backfill shall be compacted by suitable means to a minimum of ninety percent (90%).
- All trenches shall be backfilled in accordance with this section and may be tested at the discretion of the Owner.

C. Placement of Aggregate Base: (If indicated on Plans)

All subgrade work shall be completed, inspected, and approved prior to placements of aggregate base material. Aggregate base material shall be placed to the thickness matching existing and compacted to required density. Compaction tests shall be as required and approved by the Soils Engineer prior to placement of A.C. paving.

D. Dust and Noise Abatement:

During the entire period of construction, site areas shall be kept sprinkled as necessary to reduce dust in the air and annoyance to surrounding properties. Adhere to the requirements of the Local Ordinances for dust and noise control.

4.03 HANGERS AND SUPPORTS

Provide inserts, hangers and supports required for supporting switches, conduits, junction and pull boxes, fixtures and similar materials and equipment. Conduit 1" size or smaller, located

above suspended ceilings, may be fastened to ceiling furring or support wires in an approved manner.

4.04 LIGHTING FIXTURES (See Part III and Part V)

4.05 PULL WIRES

Provide a 1/8" size polypropylene pull wire in all empty conduits, including those for signal and telephone systems. Identify conduits at exposed ends with tags. Tags shall identify location of other end of conduit.

4.06 JOINTS AND CONNECTIONS

Cut conduit squarely and ream ends to remove burrs. Close open ends of conduit, unless in a closed box or cabinet, with approved conduit caps or closures as soon as installed and keep closed until ready to pull in conductors.

4.07 TERMINATION OF CONDUITS

Terminate conduits of 1-1/4" size and larger with insulated bushings, with grounding lugs where required, O.Z. Type BLG, or equal.

4.08 RUNNING OF EXPOSED CONDUIT

Run exposed conduit parallel or perpendicular to building structure. Bends for conduits used for telephone systems shall be long radius.

4.09 FLASHINGS

Where conduits extend through roof, provide flashings as required in other sections of specifications.

PART V: BALLFIELD LIGHTING

5.01 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of these specifications is to define the performance and design standards for Rancho Jurupa Sports Park, Riverside, California. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth by the criteria set forth in these specifications.

C. The sports lighting will be for the following fields:

1. Soccer Field 1
2. Soccer Field 2
3. Soccer Field 3
4. Soccer Field 4
5. Soccer Field 5
6. Soccer Field 6

D. The primary goals of this sports lighting project are:

1. Life Cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated, and the field(s) should be proactively monitored to detect fixture outages over a 25 year life cycle. To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system.

2. Environmental Light Control: It is the primary goal of this project to minimize spill light and glare.

3. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore the lighting system shall be designed such that the light levels are guaranteed for a period of 25 years.

5.02 LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average constant light level and uniformity as specified in the chart below. Light levels shall be held constant for 25 years. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Measured average illumination level shall be +/- 10% of predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

Area of Lighting	Average Constant Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Soccer Field 1	30 footcandles	2.5:1.0	77	30' x 30'
Soccer Field 2	30 footcandles	2.5:1.0	77	30' x 30'
Soccer Field 3	30 footcandles	2.5:1.0	77	30' x 30'
Soccer Field 4	30 footcandles	2.5:1.0	77	30' x 30'
Soccer Field 5	30 footcandles	2.5:1.0	50	30' x 30'
Soccer Field 6	30 footcandles	2.5:1.0	50	30' x 30'

B. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, the pole mounting heights from the playing field surface shall be 70'.

5.03 ENVIRONMENTAL LIGHT CONTROL

A. Spill Light Control: Maximum horizontal footcandles at the property line shall not exceed 0.5. Footcandle readings shall be taken at 30' intervals along the specified line. Measured average illumination level shall allow a 10% variance of predicted mean in accordance with IESNA RP-6-01, and be measured at the first 100 hours of operation.

5.04 LIFE CYCLE COSTS

B. Energy Consumption: The average kWh consumption for the field lighting system shall be 40.66 or less for each soccer fields numbered 1-4, and 31.28 or less for each soccer field numbered 5-6.

C. Complete Lamp Replacement: Manufacturer shall include all group lamp replacements required to provide 25 years of operation based upon 750 usage hours per year.

D. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual lamp outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

E. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The manufacturer shall notify the owner of outages within 24 hours, or the next business day. The controller shall determine switch position (Manual or Auto) and contactor status (open or closed).

F. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link.

Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields, to only having permission to execute “early off” commands by phone.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

G. Management Tools: Manufacturer shall provide a web-based database of actual field usage and provide reports by facility and user group.

H. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

I. 25-Year Life Cycle Cost: Manufacturer shall submit 25-year life cycle cost calculations as follows. Equipment price and total life cycle cost shall be entered separately on bid form.

a.	**Luminaire energy consumption** # luminaires x __kW demand per luminaire x .10 kW rate x 450 annual usage hours x 25 years		
b.	**Cost for spot relamping and maintenance over 25 years** Assume 7.5 repairs at $500 each if not included	+	
c.	**Cost to relamp all luminaires during 25 years** 450 annual usage hours x 25 years / lamp replacement hours x $125 lamp & labor x # fixtures	+	
d.	**Extra energy used without base bid automated control system** $ Energy consumption in item a. x 10%.	+	
	TOTAL 25-Year Life Cycle Operating Cost	=	

5.05 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years. Warranty shall guarantee light levels; lamp replacements; system energy consumption; monitoring, maintenance and control services, spill light control, and structural integrity. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.

5.06 DELIVERY TIMING

A. Equipment On-Site: The equipment must be on-site four to six weeks from receipt of approved submittals and receipt of complete order information.

5.07 PRE-BID SUBMITTAL REQUIREMENTS

A. Approved Product: Musco’s Light-Structure Green™ System is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

B. Design Approval: The owner / engineer will review pre-bid shop drawings from the manufacturer's to ensure compliance to the specification. If the design meets the design requirements of the specifications, a letter will be issued to the manufacturer indicating approval for the specific design submitted.

5.08 ALTERNATE SYSTEM REQUIREMENTS

A. Compliance to Specifications: Acceptance of a bid alternate does not negate the contractor and lighting manufacturer's responsibility to comply fully with the requirements of these specifications. Any exceptions to the specifications must be clearly stated in the prior approval submittal documents.

B. Light Level Requirements: Manufacturer shall provide computer models guaranteeing light levels on the field over 25 years. If a constant light level cannot be provided, a maximum Recoverable Light Loss Factor of 0.70 shall be applied to the initial light level design to achieve the maintained light levels of 30 footcandles for Soccer Fields 1-4 and 10 footcandles for Soccer Fields 5-6. For alternate systems, scans for both initial and maintained light levels shall be submitted

C. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel, and wire sizing.

5.09 LIGHTING SYSTEM CONSTRUCTION

A. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and crossarm assembly
2. Pre-stressed concrete base embedded in concrete backfill. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel portion of the foundation be located a minimum of 18 inches above final grade. The concrete shall be allowed to harden for a minimum of 28 days before the pole stress is applied.
3. All luminaires shall be constructed with a die-cast aluminum housing to protect the luminaire reflector system.
4. Manufacturer to provide 1P auxiliary mounting bracket to be mounted on poles S5 – S12 to accommodate security fixtures (security fixture to be provided by others).
5. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall include ballast, capacitor and fusing for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.
6. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
7. Controls and Monitoring Cabinet to provide on-off control and monitoring of the lighting system, constructed of NEMA Type 4 aluminum. Communication method shall be provided by manufacturer. Cabinet shall contain custom configured contactor modules for 30, 60, and 100 amps, labeled to match field diagrams and electrical design. Manual Off-On-Auto selector switches shall be provided.

B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast and other enclosures shall be factory assembled, aimed, wired and tested.

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed steel shall be hot dip galvanized per ASTM A123. All exposed hardware and fasteners shall be stainless steel of at least 18-8 grade, passivated and polymer coated to prevent possible galvanic corrosion to adjoining metals. All exposed aluminum shall be powder coated with high performance polyester. All

exterior reflective inserts shall be anodized, coated with a clear, high gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.

D. Lightning Protection: All structures shall be equipped with lightning protection meeting NFPA 780 standards. Contractor shall supply and install a ground rod of not less than 5/8" in diameter and 8' in length, with a minimum of 10' embedment. Ground rod should be connected to the structure by a copper main down conductor with a minimum size of #2 for poles with less than 75' mounting height and 2/0 for poles with more than 75' mounting height.

E. Safety: All system components shall be UL Listed for the appropriate application.

F. Electric Power Requirements for the Sports Lighting Equipment:

1. Electric power: 480 Volt, 3 Phase

2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

5.10 STRUCTURAL PARAMETERS

A. Support Structure Wind Load Strength: Poles and other support structures, brackets, arms, bases, anchorages and foundations shall be determined based on the 2007 edition of the CBC Building Code, wind speed of 85 MPH, exposure category C. Luminaire, visor, and crossarm shall withstand 150 mph winds and maintain luminaire aiming alignment. Foundation design will be based on 2007 CBC.

B. Structural Design: The stress analysis and safety factor of the poles shall conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

C. Soil Conditions: The design criteria for these specifications are based on soil design parameters as outlined in the geotechnical report provided by Converse Consultants dated Dec. 3, 2008; Project # 07-81-365-01.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole.

5.11 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-01, Appendix B.

B. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be liable to any or all of the following:

1. Manufacturer shall at his expense provide and install any necessary additional fixtures to meet the minimum lighting standards. The Manufacturer shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional wind load.

2. Manufacturer shall minimize the Owner's additional long term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of $1,000.00 (one thousand dollars) for each additional fixture required.

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SUBMITTAL INFORMATION

Design Submittal Data Checklist and Certification

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements

Included	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by, and other pertinent data b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, as well as luminaire information including wattage, lumens and optics d. Height of meter above field surface e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance and uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor. f. Alternate manufacturers shall provide both initial and maintained light scans using a maximum 0.70 Light Loss Factor to calculate maintained values.
	C	Off Field Lighting Design	Lighting design drawings showing spill light levels in footcandles as specified in section 1.3 A.
	D	Life Cycle Cost calculation	Document life cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires, maintenance cost for the system including spot lamp replacement, and group relamping costs. All costs should be based on 25 Years.
	E	Luminaire Aiming Summary	Document showing each luminaire's aiming angle and the poles on which the luminaries are mounted. Each aiming point shall identify the type of luminaire.
	F	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of California.
	G	Control and Monitoring	Manufacturer shall provide written definition and schematics for automated control system to include monitoring. They will also provide examples of system reporting and access for numbers for personal contact to operate the system.
	H	Electrical distribution plans	If bidding an alternate system, manufacturer must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of California.
	I	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed per specification for 25 years.
	J	Warranty	**Provide written warranty information including all terms and conditions.**
	K	Project References	Manufacturer to provide a list of project references of similar products completed within the past three years.
	L	Product Information	Complete set of product brochures for all components, including a complete parts list and UL Listings.
	M	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications.
	N	Compliance	Manufacturer shall sign off that all requirements of the specifications have been met at that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in item N – Non-Compliance

Manufacturer: _____ **Signature:** _____

Contact Name: _____ **Date:** _____/_____/_____

PART VI: DRY TYPE TRANSFORMER

6.01 GENERAL

A. Furnish and install, as indicated on the electrical plans; Sorgel dry-type transformers as manufactured by the Square D Company, or approved equal. See plans for exact voltages and KVA ratings.

B. Single-phase transformers shall be 480 volt primary and 120/240-volt secondary. Three phase transformers shall be 480-volt delta primary and 208Y/120-volt delta secondary. Transformers 25 KVA and larger shall have a minimum of 4-2 1/2% full capacity primary taps. Exact voltages and taps to be as designated on the plans or the transformer schedule.

C. Transformers 15 KVA and above shall be 150 degree C. temperature rise above 40 degree C. ambient. All insulating materials to be in accordance with NEMA ST-20-1972 standards for a 220-degree C. UL component recognized insulation system.

D. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish.

E. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be clamped together with structural steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure. On transformers 500 kVA and smaller, the vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable.

F. Transformers 15 KVA and larger shall be in a heavy gauge sheet steel, ventilated enclosure. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standards for ventilated enclosures. Single phase transformers 15 KVA through 167 KVA and three phase transformers through 112.5 KsVA shall be designed so they can be either floor or wall mounted. Larger transformers shall be designed only for floor mounting.

G. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed, and finished with a gray, baked enamel.

H. The maximum temperature of the top of the enclosure shall not exceed 50 degrees C. above a 40 degree C. ambient.

I. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible-grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

J. Sound levels shall be guaranteed by the manufacturer not to exceed the following:

1. 15 to 50 KVA-45 DB; 51 to 150 KVA-50 DB;
2. 151 to 300 KVA-55 DB; 301 to 500 KVA-60 DB

K. The transformers shall be listed by Underwriters' Laboratory for the specified temperature rise.