



Design and Construction Standards for Park Facilities

City of El Paso
Parks and Recreation Department

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INTRODUCTION

Mission Statement

The mission of the City of El Paso Parks and Recreation Department is to develop, preserve and operate quality parks, open space, and indoor facilities and provide opportunities for structured and unstructured recreational and leisure-time activities for all citizens of El Paso.

Purpose of Design and Construction Standards

The purpose of the Design and Construction Standards for Park Facilities is to establish the minimum standards for the design and construction of parks, trails, and open space developed for, and owned by, the City of El Paso.

These standards are intended to apply to projects developed through City of El Paso Engineering and Capital Construction, as well as developer-generated Parkland Dedication projects.

To maintain acceptable levels of consistency, these standards shall be applied by all City Departments, Consultants, Developers and Contractors working on Parks and Recreation projects.

These standards are not intended to replace federal, state or local codes. References to existing related City and State ordinances and regulations appear throughout the document, and therefore are not re-created in their entirety herein.

Design Inspiration

Taking these standards into consideration, the design intent should be focused on creative landscape and outdoor park facility design that incorporate site conditions, geography, community character and history, as well as functionality and maintenance efficiency.

As the designer considers the site, the following guidelines should be evaluated and incorporated:

- Emphasis on sustainability
 - Use of natural landscape, xeriscape and low water use plantings, use of existing native plants and materials
 - Use of storm water retention, passive water harvesting
 - Use of green-design principles and recycled materials in structures
 - Features should be low maintenance
- Emphasis on creativity
 - Design features that encourage movement and opportunities for exercise
 - Connections to neighborhoods and trails
 - Interpretive displays, habitat gardens, community gardens
- Emphasis on inspiration
 - Original site-built features, and/or incorporating public art
 - Community congregation areas, including naturally produced shade

Appendices

The purpose of the Appendices is to provide standard construction details and amenity selections. The detail cut sheets, while made a part of this document by reference, are stand-alone reference documents that are updated to the most current standard annually by the Parks and Recreation Department.

Relationship to Other Plans

This document is referent to a number of other regulatory and planning documents, including:

- Municipal Code, Chapter 19.20 Parkland Dedication
- Parks and Recreation Master Plan
- Open Space Master Plan
- Policy and Standards Manual for the Care of Trees and Shrubs in the City of El Paso

General

General Design Requirements

- 1) Minimum improvements for land to be dedicated as parkland must meet all minimum requirements listed in the City of El Paso Municipal Code, Chapter 19.20 Parks and Open Space, and in these City of El Paso Design and Construction Standards for Park Facilities (Design Standards).
- 2) Park projects designed and constructed for Parkland Dedication must be registered, reviewed, and inspected by the Texas Department of Licensing and Regulation (TDLR) for compliance with Texas Accessibility Standards (TAS).
- 3) Firms contracted or subcontracted to do park design for City parks:
 - a) All primary design consultants shall be on the approved City of El Paso pre-qualified list for: Civil Engineers, Electrical Engineers, Mechanical Engineers, Architects and Landscape Architects. All sub-consultants are encouraged to get pre-qualified through the Engineering Department criteria.
 - i) Designs that require only pump and controller will not require a design by an Electrical Engineer.
 - ii) Designs that require only turf and irrigation, and no other on-site amenities, will not require design by a Landscape Architect
 - b) All consultants shall stamp their discipline related design drawings.
 - c) The park landscape plan shall be designed by a Landscape Architect registered in the State of Texas in good standing with a minimum five years experience and minimum of five park designs of comparable size.
 - d) The Park Irrigation System shall be designed by a Licensed Irrigator registered in the State of Texas in good standing with a minimum five years experience and minimum of five irrigation designs of comparable size.
- 4) Landscape and irrigation design provided by consultants, shall be required to have a Landscape Architect as the primary consultant for City park projects.
- 5) Submit all designs for review and approval by Parks and Recreation Director or designee as set forth in Design Criteria.
- 6) All irrigation, site amenities, and related park equipment must be approved by the Parks and Recreation Director, or designee.

- 7) Irrigation Systems, Park Amenities, Turfgrass, Playgrounds, Lighting, and other components of the park design and construction process, must follow the standards as set forth in the respective sections of these Design Standards.
- 8) Upon completion of all park improvements, the Developer will submit a request for acceptance of the park site and all improvements to the City of El Paso Parks and Recreation Department.
- 9) Developer shall provide a one-year warranty on park improvements and system operations.
- 10) Irrigation system must be designed to accommodate site static water pressure or a pump must be incorporated in design and installed to accommodate design pressure as established by irrigation system design.
- 11) A minimum seven foot wide concrete accessible route shall be installed adjacent to the curb or adjacent to seven foot wide parkway, sloping into the park, on all street frontage abutting the outside perimeter of the parkland in compliance with ADA and TAS requirements.
- 12) Street trees shall be installed at maximum of 30 foot centers in parkways and provided with drip irrigation.
- 13) All irrigation designs shall comply with City of El Paso Municipal Code Chapter 18.45 (Irrigation Systems) as well as all the applicable requirements set forth within these Design Standards.
- 14) Park design and construction shall incorporate existing stands of native vegetation whenever possible.
- 15) The park shall be graded to retain up to six inches below top of lowest curb elevation for on-site storm water runoff. The park shall be designed to retain on-site storm water runoff where possible.
- 16) Park amenities and athletic fields, as defined within the Design Standards, shall be designed to be above the high water surface elevation when storm water retention is provided within the park. Design shall include natural swales around park amenities and athletic facilities to divert storm water runoff into lower, drainage-pooling areas within the park.
- 17) No overhead utilities shall be installed within Park Property.
- 18) All underground utilities adjacent to a Park shall be installed within street Right of Way and not within Park Property and buried at least 4 feet deep.
- 19) Chain link fencing shall be limited to athletic fields, sport courts, and dog parks and approved on a case by case basis. Decorative fencing (wrought iron, rock) are the preferred standards, and shall be used wherever possible to separate park activities, establish boundaries and provide security.

Soil Testing and Site Design

1) Soil Testing

- a) The Landscape Architect/Designer is responsible for obtaining a soil test, providing test results and recommendations to the City for evaluation, and incorporating recommendations into the Final Design.
 - i) Testing agency/lab shall be acceptable to Parks and Recreation Director, or designee.
 - ii) Soil samples shall be extracted for analysis jointly by the Parks and Recreation Director, or designee, and the consultant and/or contractor.
 - iii) A minimum of two soil samples shall be obtained per acre, or as deemed necessary by site conditions and City of El Paso staff.
 - iv) Enough material will be extracted to send one sample to lab and hold another as a back-up.
 - v) Testing shall be performed in the top 36 inches of the rootzone, for both existing and any proposed imported materials, to determine the following information:
 - (1) pH - potential hydrogen in the soil, which is a measurement of soil acidity.
 - (2) Soil physical characteristics - soil type, infiltration, percolation, organic matter, salinity, etc.
 - (3) Any recommended soil amendments (nitrogen, phosphorus, potassium, organic matter, gypsum).
 - vi) Determine soil salinity potential for sites to be irrigated with reclaimed water.
- b) Percolation Testing.
 - i) Percolation testing shall be required. All storm water shall be required to percolate within 72 hours.

Irrigation

Irrigation System Design Criteria

- 1) Parks and Recreation Director, or designee, shall approve all irrigation system design and related components.
- 2) Firms contracted or subcontracted to do park designs for City parks shall be required to have their registered Landscape Architect and Licensed Irrigator design and seal all park drawings.
 - a) The park landscape plan shall be designed by a Landscape Architect registered in the State of Texas in good standing with a minimum five (5) years experience and minimum of five (5) park designs of comparable size.
 - b) Park projects shall be designed by a Landscape Architect from the City of El Paso Pre-Qualified List of approved Landscape Architects.
 - c) The park irrigation system shall be designed by a Licensed Irrigator registered in the State of Texas in good standing with a minimum five (5) years experience and minimum of five (5) irrigation designs of comparable size.
 - d) All electrical designs shall be completed by an Electrical Engineer registered in the State of Texas.
- 3) Designer shall follow these requirements:
 - a) Designer shall meet with El Paso Water Utility (EPWU) to verify water supply line sizes, availability of reclaimed water, proposed meter locations, actual field tested pressures to the nearest hydrant, and to size new meter installations to ensure service connection will meet water demands of the irrigation system.
 - b) Designer shall provide written verification and confirmation to Parks and Recreation Director, or designee, of information obtained from EPWU as it relates to: water supply line sizes, availability of reclaimed water, reclaimed water quality, and that meter sizes are acceptable as designed by the Designer. The Designer shall use reclaimed water when available and the design shall incorporate all materials required for an irrigation system using reclaimed water. Designer shall comply with PSB Rules and Regulations #12 and 30 TAC 210 for sites irrigated with reclaimed water. Designer must provide irrigation and landscape designs using reclaimed water to EPWU Reclaimed Water Division for review.
 - c) Designer shall apply for all water meters at the Final Design Stage of the project.
 - d) Reclaimed water use considerations:
 - i) Signage: Include flooding hazard signage and reclaimed water use standard signage as applicable for parks and athletic fields built within storm water basins and/or

- irrigated with reclaimed water. Provide submittal for review and approval to EPWU Reclaimed Water Division and Parks and Recreation Director, or designee.
- ii) Sites fronting reclaimed water lines will be connected to the reclaimed water system and designed in accordance with PSB Rules and Regulations #12 and 30 TAC 210.
 - iii) Designer must consider the water quality in selection of plant and turf material and to determine watering schedules to allow for salt leaching.
 - iv) Reclaimed water use shall avoid spraying over fountains, drinking water fountains, furnishings (tables, grills), and playgrounds. Low-angle sprinkler head nozzles shall be selected to prevent over spraying of foliage that may be sensitive to salinity.
- e) Designer shall implement green industry principles such as water harvesting, xeriscape, and use of undisturbed native vegetation areas. The reclaimed water irrigation system shall be designed in such a manner that over spray of sidewalks and runoff onto streets are prevented.
- f) Turf should not be planted adjacent to curbs or sidewalks, especially on parks that are not sport fields. Next to sidewalks, streets or parking areas, a buffer zone (or parkway) should be located to catch water from adjacent irrigation heads. This will eliminate water running into the public right of way.
- g) Designer shall comply with all City ordinances, plumbing codes, electrical codes, minimum Texas Commission on Environmental Quality (TCEQ) requirements as set forth in Texas Water Code Chapter 344, Title 15 Public Services Chapter 15.13 Water Conservation and these Design Standards.
- h) Irrigation system design for turf areas must be based on:
- i) Maximum Head Spacing shall be 50 feet.
 - ii) Equilateral triangular spacing for turfgrass areas.
 - iii) Drip irrigation for trees and other appropriate landscape plants.
 - iv) Design must provide for matched precipitation rates.
 - v) Sprinkler head spacing for roto-type sprinklers shall be designed using 45% of the design diameter of the head based on the manufacturer's specifications, to account for wind conditions, arid hot dry climates and coarse soils, to promote operating efficiency.
 - vi) Spray-head type sprinkler shall be designed using 45% of the design diameter of the head based on the manufacturer's specifications, to account for wind conditions, arid hot dry climates and coarse soils, to promote operating efficiency.
 - vii) First row of Roto-type sprinklers, set in from the perimeter sprinklers, shall be designed using 45% of the design diameter of the head based on the manufacturer's specifications and diffused down as required to minimize overspray onto perimeter sidewalks and hardscapes.
- i) Irrigation system design for trees, shrubs and ground cover plants:
- i) Emitter outlet manifolds shall be used and set on Poly Vinyl Chloride (PVC) pipe.
 - ii) PVC pipe shall not be used as laterals between valves and emitter outlets.

- iii) Pressure regulator shall be specified at valve or at manifold.
- iv) Filter shall be supplied just downstream of the valve.

j) Irrigation Audit Requirements

- i) Designer shall be required to obtain a water audit of the system, completed by a Texas Certified Landscape Irrigation Auditor, after installation of the system is complete to verify actual application rates of the irrigation system design. The auditor shall be independent of the property owner's designer and of all contractors associated with the property. The audits will be conducted in accordance with the current edition of the Irrigation Association Landscape Auditor's Handbook, or Texas Landscape Irrigation Auditor Program.
 - ii) The minimum efficiency requirements to meet in the audit are 65% distribution uniformity (DU) for all fixed spray heads and 80% DU for all rotor systems. The irrigation schedule shall include runtimes per station per cycle, cycles per day, total runtime per cycle, and days per week for each station. The results of the audit must be provided to the City of El Paso Parks and Recreation Department and shall be signed by the auditor.
 - iii) The Audit Report shall include:
 - (1) Controller number and location.
 - (2) Station numbers and locations.
 - (3) Sprinkler head locations and distance between sprinkler heads.
 - (4) Pressure reading per station at backflow device and each sprinkler.
 - (5) Catch device readings and locations.
 - (6) Distribution uniformity for individual stations.
 - (7) Precipitation rates per station and a twelve month irrigation schedule (run times per cycle, cycles per day, and days per week for each station).
 - (8) Estimated soil infiltration rates, root zone soil type per station.
 - (9) The following areas are to be zoned separately:
 - (a) Shrub and ground cover beds separate from turf.
 - (b) Sloped areas or drought tolerant species to have separate zones.
 - (c) Ballfield outfield from infield.
 - (d) Palms to be on separate system.
 - (e) Separate valve for trees within turf areas.
 - (f) Perimeter heads (adjustable).
 - (g) Open area heads (full circles).
 - iv) The results of the audit will be provided to the Parks and Recreation Director, or designee, and any concerns will be resolved by the Designer.
- k) Designer shall provide precipitation schedule for the system with information to include number of controllers, number of stations, total gallons per station, precipitation rates, recommended run times, number of heads per station, nozzle sizes, description of area watered and total run time per station to obtain required precipitation rates.

Designer shall provide a watering schedule for the entire park demonstrating that the design will apply 1.2 inches of water within a 10 hour watering window. The irrigation

systems for parks shall be designed in a manner that the entire park can be watered within the allowed three days and time restrictions set by EPWU water ordinance.

- 4) Designer shall develop design in two phases: Initial Design Phase and Final Design Phase.
 - a) Initial Design Phase at a minimum shall include:
 - i) Site Plan with all proposed development items such as: sidewalks, curbs, parking lot, playgrounds, paths, trees, shrubs, landscaping, and site amenities, etc.
 - ii) Irrigation Design Plan to show site layout, sprinkler head placement, spray coverage arcs of sprinklers, legend of all proposed equipment (sprinklers, remote control valves, etc).
 - iii) Detail Sheet of irrigation system details for all applicable information of each irrigation system component (see Appendices for details as applicable).
 - iv) Detail Sheet with applicable details and construction notes for planting methods of trees, shrubs and other landscaping items.
 - v) Detail Sheet with sections of all construction elements such as sidewalks, curb, pavement, etc.
 - b) Final Design Phase:
 - i) Must include items from Initial Design Phase with any required revisions addressed.
 - ii) Irrigation Design Plan will reflect pipe sizing and pipe routing for entire irrigation system.
 - iii) Designer will provide design criteria and design based calculations for irrigation system and critical head(s) as applicable.
 - iv) Designer will provide Precipitation Rate Schedule and calculations for said schedule.
 - v) Designer will provide a proposed watering schedule for designed irrigation system.
- 5) Other Design Standards and Requirements
 - a) Main water line must be routed outside of athletic fields/multi-purpose turf areas as it applies.
 - b) Remote control valves will be located outside of all athletic fields/multi-purpose turf areas as it applies.
 - c) All irrigation zones for athletic fields/multi-purpose turf areas shall be separate from the remainder of the park space. Ballfield outfield zones shall be separate from infield zones.
 - d) Control System shall be MAXICOM compatible as determined by Parks and Recreation Director, or designee.
 - e) Main line shall be looped as required to provide maximum watering in 10 hours. Time window may be reduced as required based on adjoining land use facilities.
 - f) Main line shall incorporate 45 degree fittings in lieu of 90 degree turn fittings.

- g) Directional Fittings shall be used on main line and lateral lines for any changes in piping direction.
- h) Thrust blocks:
 - i) Shall be required at all 8 inch main line fittings when gasket pipe is used.
 - ii) Thrust block calculations shall be required to determine size of thrust block.
 - iii) No thrust block shall be required on solvent welded main lines smaller than 6 inch in diameter.
- i) PVC Schedule 40 IPS plastic piping shall be used on all main lines four inches or smaller. All other main lines larger than four inches shall be PVC Class 200 IPS plastic pipe.
- j) PVC Class 200 IPS plastic pipe shall be used on all lateral lines.
- k) PVC pipe joint solvent welding procedures on all joints shall be indicated as follows:
 - i) Use IPS Weld-On cleaner.
 - ii) Use IPS Weld-On purple primer P68 or P70.
 - iii) Use IPS Weld-On gray glue # 711 Heavy Duty.
 - iv) Wipe off all excess cement and let set as per manufacturers recommendations.
 - v) Initial set times shall be a minimum of five minutes for 0.5 inch to 1.0 inch pipe, eight minutes for 1.5 inch to 2.0 inch pipe, and 2.0 hours for 2.5 inch to 6.0 inch pipe. Set times - Once weld is set, pipe shall not be moved for any reason until set times have been achieved.
 - vi) Cure times - 20 minutes for 0.5 inch to 1.25 inch pipe, 30 minutes for 1.5 inch to 2.0 inch pipe, four hours for 2.5 inch to 6.0 inch pipe. When humidity exceeds 60%, increases cure time by 50%.
 - vii) Water shall not be turned on until all cure times have been achieved.
- l) Pressure mains and laterals to be hydro-statically tested (as called for on Irrigation Specifications) in the presence of City of El Paso staff and/or the Designer. Pumps shall be isolated from the hydrostatic test using isolation valves and not tested.
- m) Swing Joints - Use Lasco, or equal, factory assembled swing joints on rotors, spray heads and quick couplers.
- n) Backflow prevention devices shall be Reduced Pressure Backflow Prevention Device type with pressure gauges before and after the device.
 - i) Brass ball valve shall be installed upstream of backflow device. All backflow devices shall be supported with pipe saddles prior to making connection to meter or main line. Gate valves shall be equipped with non-rising stem and capable of withstanding cold water pressure of 200 pounds per square inch.

- ii) Backflow prevention device shall be fed with Type K copper piping from meter side up to device, past device and transition to PVC pipe past enclosure slab or past pump shelter where required. Transition is to be done with threaded coupling for pipe sizes smaller than 3.0 inches and flanges for pipe sizes 3.0 inches or larger set in a Carson Model 1419 valve box, or equal, for ease of visual inspection.
 - iii) Reduced Pressure Backflow Prevention Devices (BPD) shall be housed in stainless steel or aluminum insulated and heated enclosure compliant with ASSE 1060 Class I, and anchored and mounted on a concrete pad. All BFD enclosures shall be provided with a sturdy, securable element (Lock Hasp) as approved by Parks and Recreation Director, or designee.
 - iv) Reduced Pressure Backflow Prevention Devices used shall be from the approved list of the USC Foundation for Cross-Connection Control and Hydraulic Research and shall be installed in accordance with the El Paso Water Utilities Cross-Connection Control Program Manual of Procedures.
 - v) Reduced Pressure Backflow Prevention Devices shall be tested and certified as required by El Paso Water Utilities and test report must be furnished to Parks and Recreation Director, or designee.
- o) Stations or Zones shall be fed or served by lateral lines that feed comparable heads.
- p) Electrical Requirements:
- i) All electrical connections and supplies shall be installed per City code.
 - (1) Electric power panel of at least 100-amps must be provided.
 - (2) Ground Fault Circuit Interrupter (GFCI) outlet controlled by on/off toggle switch will be required.
 - (3) All grounds to all electrical equipment components and irrigation controllers, pumps and pump relays shall be grounded as per manufacturers recommendation.
 - (4) All equipment to be grounded to a common buss bar.
 - (5) All components are to be labeled with permanent weather proof tags permanently secured to equipment.
 - ii) Electrical Power design diagram shall be submitted for entire system to include field wiring, controllers, pumps, pump relays, etc., and shall be stamped by a registered electrical engineer.
- q) Controllers:
- i) Shall be on separate circuit from any other equipment and have two surge arrestors. Surge arrestors shall be enclosed in separate junction boxes: one will be connected to the 120 volt GFCI outlet and the other shall be connected to the low voltage side of controller as recommended by manufacturer.
 - ii) Shall be provided with power cord plug to plug into a GFCI protected 120V supply outlet.
 - iii) Each controller shall have a dedicated common wire.
 - iv) Provide three spare remote control valve wires, in different colors, for each controller and extend to furthest valve.

- v) Provide quick disconnect strip to terminate all irrigation low voltage wires and set within a NEMA 3 rated gutter box when installed in a pump house application.
 - vi) Provide RainBird Rain Sensor with connection to controller. Identify rain sensor to be set to 1/8 inch. Identify rain sensor on construction drawings.
- r) Valve wiring:
- i) Wiring Types
 - (1) Typical wiring system
 - (a) Indicate no splicing is allowed on low voltage field wiring between remote control valves and controller.
 - (b) Indicate valve wiring shall be labeled and placed in a weatherproof tag in the field valve box, at controller location and quick disconnect.
 - (c) Indicate valve wiring shall be standard colors: red (hot) and white (common) unless otherwise approved by Parks and Recreation Director, or designee.
 - (d) Require wire connections at valves must be made with “Dri-Splice” type ready filled connectors; additional silicone shall be added as required to ensure connector is properly filled.
 - (e) Indicate installation shall be in separate trench a minimum 5 feet from pressure main line on north and west side of main.
 - (f) Indicate expansion loops for all wiring every 200 feet. Wires shall not be stretched tight.
 - (2) 2-Wire path system
 - (a) As approved by Parks and Recreation Director, or designee, in compliance with manufacturers design and installation criteria.
- s) Sleeves:
- i) Use sleeves wherever piping is routed under any hard surface.
 - ii) Shall be two times the diameter size of pipe encased.
 - iii) Extend sleeve 24 inches beyond edge of hard surfaces; wrap ends with 4 mils plastic and tape.
- t) Pumps:
- i) Start relay shall be installed as required to meet pressure demands of system.
 - (1) Relays shall be located a minimum of eight feet from irrigation controller.
 - ii) Control wiring shall be on separate circuits.
 - iii) Shall be installed with high-pressure and low-pressure limit switches, relief valves, and pressure gauges on inlet and outlet sides of pump.
 - iv) Shall be installed with cutoff valves on inlet and outlet sides.
 - v) Shall be installed with bypass piping and isolation valve.
 - vi) Relief valve shall be vented to exterior of pump houses.
 - vii) Shall be installed 4 inches above the top of pump house footing.
 - viii) Pumps over 5 HP shall be Variable Frequency Drive (VFD) and shall be able to provide consistent pressure through the expected flow range of the irrigation system.

- u) Pump House shall be TufShed™ or approved equal and:
 - i) Shall comply to local Building Code wind load ratings
 - ii) Shall be properly vented with a static metal vent mounted on roof.
 - iii) Shall have insulated walls and ceilings with R-13 and R-19 value respectively.
 - iv) Shall be mounted on a 12 inches wide by 24 inches deep reinforced concrete footing.
 - v) Shall have a LED light mounted on ceiling with an on/off toggle switch.
 - vi) Shall have relief valve vented to exterior of building.

- v) Sprinkler heads:
 - i) Rotary-type sprinkler heads, Hunter or approved equal, shall be of commercial quality:
 - (1) 6.0 inch stainless steel riser.
 - (2) Non-strippable drive mechanism.
 - (3) Easy arc adjustment, at least 50-360°.
 - (4) Operating pressure range of 30-90 psi.
 - (5) Effective radius of 40-70 feet.
 - (6) Check valve in head as required.
 - (7) Automatic arc return.
 - (8) 1.0 inch inlet.
 - ii) Pop-Up spray heads shall be Hunter commercial grade with 6 inch risers and meet requirements of design or approved equal

- w) Quick coupler (QC) shall be a 1.0 inch Buckner, double lug QC with factory assembled Lasco swing joint that has Snap-Lok male brass stabilizer fitting installed in a Carson Model 1419 valve box (or similar) with flat lid and vandal proof bolt or approved equal and isolation brass ball valve installed in a separate similar valve box.
 - i) For non-potable water installations, use:
 - (1) Quick coupler valve and isolation valve shall have a weather proof tag that reads, “non-potable water, not safe for drinking.”
 - (2) Carson Model 1419 valve box (or similar) with purple flat lid.

- x) Type K copper tubing for feed from water meter shall be used on all installations from meter past BFD or past pump as applicable.

Irrigation System Specification

1) General

a) Quality Assurance

i) Installer's qualifications:

- (1) Licensed Irrigator in good standing through TCEQ with a minimum of five (5) years experience installing irrigation systems of comparable size.
- (2) Provide résumé of projects comparable in size for the past five (5) years and current Irrigators License.

b) Submittals

i) Submit manufacturers product data and installation instructions for each of the system components, materials and equipment for approval.

ii) Submit the following material samples:

- (1) Piping and fittings. (With all markings)
- (2) Glue, primer and cleaner.
- (3) Wire.
- (4) Wire connectors and sealer.

iii) Submit the following equipment samples:

- (1) Sprinkler heads, one (1) of each type, complete with housing.
- (2) Valves.
- (3) Valve boxes, valve box extensions and flat lid covers with vandal proof bolts.
- (4) Controller.
- (5) Remote control valve wire.

Approved equipment samples will be returned to Contractor and may be used on the project.

c) Construction Site, Delivery, Storage, and Handling

i) Construction Site shall be properly secured with fencing and appropriate signage.

ii) Deliver irrigation system components in manufacturers original undamaged and unopened containers with labels intact and legible to the site.

iii) Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends, both: threaded or plain type piping as applicable.

iv) Store and handle materials to prevent damage and deterioration.

v) Store materials out of sun to prevent weatherizing and discoloration.

vi) Store materials above grade to prevent contamination with soils and corrosion.

vii) Provide secure, locked storage for piping, valves, sprinkler heads, and similar components that cannot be immediately replaced, to prevent installation delays.

d) Project Conditions

i) Contractor is responsible to coordinate with all utility agencies to verify underground and above ground utility lines, and existing park infrastructure to include irrigation

- lines, irrigation control valve wiring, area lights wiring, athletic field lights wiring, etc. Any damaged utilities will be restored at Contractor's expense.
- ii) Protect existing trees, plants, lawns, and other features designated to remain as part of the final landscape work. Refer to most current version Policy and Standards Manual for the Care of Trees and Shrubs in the City of El Paso.
 - iii) Promptly repair damage to adjacent facilities caused by irrigation system work operations. Cost of repairs is at Contractor's expense.
 - iv) Promptly notify Parks and Recreation Director, or designee, and Designer of unexpected sub-surface conditions.
 - v) Irrigation system layout is diagrammatic. Exact locations of piping, sprinkler heads, valves, and other components shall be established by Contractor in the field at time of installation and coordinated with Parks and Recreation Director, or designees, and Designer prior to start of any work.
 - (1) Space sprinkler components as indicated on plans, or as required to be modified in field after obtaining acceptance of locations by Parks and Recreation Director, or designees, and Designer.
 - (2) Minor adjustments in system layout will be permitted to clear existing fixed obstructions. Final system layout shall be acceptable to Parks and Recreation Director, or designee, and Designer.
 - vi) Cutting and Patching:
 - (1) Cut through concrete and masonry with core drills. Jackhammers not permitted.
 - (2) Materials and finishes for patching shall match existing cut surface materials and finish. Exercise special care to provide patching at openings in exterior walls to ensure water tightness.
 - (3) Method and materials used for cutting and patching shall be acceptable to Parks and Recreation Director, or designee, and Designer.

2) Materials

a) General:

- i) Provide only new material, without flaws or defects, of the highest quality of their specified class and kind. No pipe or fittings with sunburn, visible crack, holes, foreign materials, blisters, or wrinkles shall be used on the project.
- ii) Comply with pipe sizes indicated. No substitution of smaller pipes will be permitted without approval of the Parks and Recreation Director, or designee.
 - (1) Remove damaged and defective pipe from the site immediately.
- iii) Provide pipe continuously and permanently marked with manufacturers name or trademark, size, schedule, type of pipe, working pressure at 73 degrees F., and National Sanitation Foundation (NSF) approval.

b) Plastic pipe, fittings, and connections:

- i) PVC pipe: ASTM D2241, rigid, un-plasticized PVC
 - (1) Pressure mains:
 - (a) PVC Schedule 40 IPS plastic pipe for 4.0 inch or smaller main lines.
 - (b) PVC Class 200 IPS plastic pipe for main lines larger than 4.0 inch.

- (2) Distribution laterals: SDR 21, Class 200.
- (3) PVC pipe fittings: ASTM D2241 schedule 40 PVC molded fittings suitable for solvent weld, or screwed connections.
 - (a) Saddle fittings and cross fittings are not permitted on new installations.
 - (b) Schedule 80 PVC pipe may be threaded.
 - (c) Use male adapters for plastic to metal connections.
 - (d) Use ASTM D-2466 insert type fittings.
- c) Backflow prevention device shall be a reduce pressure backflow preventer.
- d) Valve boxes shall be Carson 1419 heavy duty, with lockable flat lid and secured by tamper proof bolt, or approved equal. Valve box extensions shall be provided as needed.
- e) Sprinkler heads:
 - i) Rotary-type sprinkler heads, Hunter or approved equal, shall be of commercial quality:
 - (1) 6 inch stainless steel riser.
 - (2) Non-strippable drive mechanism.
 - (3) Easy arc adjustment, at least 50-360°.
 - (4) Operating pressure range of 30-90 psi.
 - (5) Effective radius of 40.0-70.0 feet.
 - (6) Check valve in head as required.
 - (7) Automatic arc return.
 - (8) 1 inch inlet.
 - ii) Pop-Up spray heads shall be Hunter commercial grade with 6 inch risers and meet requirements of design or approved equal.
- f) Irrigation system controllers must be Maxicom compatible (Rainbird ESP)
 - i) Controller must be installed in a weather-proof securable metal box that has a hasp, rain hood, door hinge stop and plan pocket holder.
 - ii) Cluster Control Unit (CCU) must be Maxicom compatible (Rainbird).
 - iii) Provide RainBird Rain Sensor and connect to controller. Set rain sensor to 1/8 inch. Install rain sensor as shown on construction drawings.
- g) Quick coupler (QC) shall be a 1.0 inch Buckner, double lug QC with factory assembled Lasco swing joint that has Snap-Lok male brass stabilizer fitting installed in a Carson Model 1419 valve box with flat lid and vandal proof bolt or approved equal and isolation brass ball valve installed in a separate similar valve box.
 - i) For non-potable water installations, use:
 - (1) Quick coupler valve and isolation valve shall have a weather proof tag that reads, “non-potable water, not safe for drinking.”
 - (2) Carson Model 1419 valve box with purple flat lid.
- h) Pipe fittings – all pipe assembly fittings must be Schedule 40 PVC Pipe fittings.

- i) Type K copper tubing for feed from water meter shall be used on all installations from meter past BFD or past pump as applicable.
- j) Electrical control valve low voltage wire:
 - i) Electrical control and ground wire: Direct burial Type UF 600 volt AWG control cable #14 gauge or larger as required by manufacturer based on total distance.
 - ii) Wire color code:
 - (1) Provide control or "hot" wires either black or red in color.
 - (2) Provide common or "ground" wires white in color.
 - (3) Provide a minimum of three (3) spare hot wires in three (3) different colors other than black, red or white.
- k) Other
 - i) Valve box fill material to be used shall be 3/8 inch washed pea gravel in sufficient quantity to provide a minimum depth of 4 inch inside the box and clear equipment and piping underside.
 - ii) Back fill material around all valve boxes will be clean soil free of: stones larger than 1 inch diameter, foreign matter, organic material, and debris and properly compacted to prevent settling.
- l) Low voltage wire connectors: Dry-Splice prefilled Socket seal type wire connectors with properly filled waterproof silicone sealer or approved equal.
- m) BPD enclosure shall be stainless steel or aluminum, insulated, with lockable hasp, hinges for ease of access to test ports mounted on 6 inch concrete pad. Enclosure to be ASSE 1060 Class I certified.

3) Execution

- a) Commencement of work shall be contingent on review and release of all project submittals. Any work performed without the review and release of project submittals may be subject to rejection.
- b) For soil preparation and conditions refer to Turf and Landscape Construction/Renovation section.
- c) Inspection Process
 - i) Inspect final grades and obtain approval from Parks and Recreation Director, or designee and Designer prior to installation of irrigation system, site amenities, site flat work, utilities, etc. Do not start any work until all identified unsatisfactory conditions are corrected.
- d) Preparation

- i) Layout and stake the location of each pipe run and all sprinkler heads and sprinkler valves for approval.
 - ii) Remove existing paving for sleeve installation. Saw cut existing paving to provide uniform straight transition at new to existing paving as applicable.
 - iii) Place sleeves as indicated for installation of control wires where hard surfaces will be traversed. Extend sleeve 24 inches beyond edge of hard surface; keep clean of debris, wrap with 4-mil plastic; and tape with good quality non-cloth heavy duty plastic duct tape.
 - iv) Place sleeves as indicated for installation of main and lateral lines piping – extend 24 inches beyond edge of hard surface; keep clean of debris; wrap with 4-mil plastic, and tape with good quality non-cloth heavy duty plastic duct tape.
- e) Installation
- i) Excavating and backfilling:
 - (1) All excavation shall be considered unclassified excavation and include all materials encountered.
 - (2) Excavate trenches of sufficient depth and width to permit proper handling and installation of pipe and fittings.
 - (3) Fill to match adjacent grade elevations with clean construction sand.
 - (4) Place markers at all joints or assembly points of main and lateral lines for ease of access during pressure test of system.
 - ii) Plastic pipe:
 - (1) Make plastic to metal joints with plastic threaded male adapters or flanges as applicable.
 - (2) Maintain pipe interiors free of dirt and debris. Close open ends of pipe by acceptable methods when pipe installation is in progress.
 - (3) In preparation for pipe solvent welds, any cut piping must be done with miter box and cut ends must be beveled and burrs removed thoroughly.
 - (4) Make solvent weld joints in accordance with manufacturers recommendations or as specified herewith. Solvent welds are to be consistent with the three step gluing process to include: cleaner, primer and solvent.
- f) Sprinklers, fittings, valves, and accessories:
- i) Install fittings, valves, sprinkler heads, risers, and accessories in accordance with manufacturers instructions. Adjust sprinkler heads to provide head to head coverage.
 - ii) Install backflow prevention valve, fittings, and accessories as shown on construction drawings and as required to complete the system.
- g) Control wiring:
- i) Install electric control cable in separate trenches with minimum 18 inches of cover. Trench for wires will be minimum 5 feet from main line on north and west side of main as applicable. Install wire with slack to allow for thermal expansion and contraction. Tape and bundle at 20 foot intervals.

- (1) Expansion joints in wire shall be provided at 200-foot intervals by making 5-6 turns of the wire around a piece for 0.5 inch pipe for slack.
 - ii) Provide sufficient slack at site connections at remote control valve boxes to allow raising the valve bonnet or valve splice to the surface without disconnecting the wires when repair is required.
 - iii) Connect each remote control valve to one station of a controller except as otherwise indicated.
 - iv) Connect one dedicated common ground wire for each Controller and related remote control valves operated by Controller.
- h) Controllers:
- i) Shall be on separate circuits from any other equipment and have two surge arrestors. Surge arrestors shall be enclosed in separate junction boxes: one will be connected to the 120V GFCI outlet and the other shall be connected to the low voltage side of Controller as recommended by manufacturer.
 - ii) Shall be provided with power cord plugs to plug into a GFCI protected 120V supply outlet.
 - iii) Each controller shall have a dedicated common wire.
 - iv) Irrigation controllers shall be installed in a stainless steel pedestal strong box as shown on construction drawings.
 - v) Irrigation controllers shall be installed in water tight NEMA rated, securable enclosures when set in a pump house.
- i) Sleeves:
- i) Irrigation remote control valve wires: Provide new sleeves for all locations where hardscape exists. Install new sleeves prior to paving or sidewalk installation at all applicable locations.
 - ii) Irrigation main and lateral lines: Provide sleeves minimum two (2) times the size of piping it will hold. Place sleeves as indicated for installation of main and lateral line piping – extend 24 inches beyond edge of hard surface - wrap ends with 4-mil plastic and tape with good quality plastic tape. Gray, cloth duct tape is not acceptable.
 - iii) Install pipe sleeves under existing concrete or asphalt surface by jacking, boring, or hydraulic driving of the sleeve.
- j) Backflow prevention device:
- i) Support backflow prevention device during dry fitting process.
 - ii) Backflow prevention device needs to be supported at all times by temporary or permanent methods.
 - iii) Copper risers shall not be used at any time to support the backflow prevention device.
 - iv) Backflow prevention device must have adjustable support brackets provided under both cut-off valves and set in place and anchored properly.
 - v) Backflow support brackets are to have 0.5 inch thick rubber pads under the backflow prevention device.
 - vi) Provide concrete pad of 3,000 psi compressive strength at 28 days, a minimum thickness of six (6) inches.

- vii) Provide PVC pipe sleeves where copper pipe risers pass through concrete slab.
- viii) Concrete slab to extend minimum of 4 inches beyond outer face of backflow prevention device enclosure cabinet.

k) Pumps

- i) Provide size of pump as specified on drawings.
- ii) Provide pump enclosure as specified on drawings.
- iii) Pumps start relay shall be installed as required to meet pressure demands of system.
- iv) Pump relays shall be a minimum of 8 feet from irrigation controller.
- v) Pump control wiring shall be on separate circuits.
- vi) Pumps shall be installed with high-pressure and low-pressure limit switches, relief valves, and pressure gauges on inlet and outlet sides of pump.
- vii) Pumps shall be installed with cutoff valves on inlet and outlet sides.
- viii) Pumps shall be installed with bypass piping and isolation valves.
- ix) Pump houses shall be properly vented and allow for drainage to exterior of building as shown on construction drawings.
- x) Pump relief valves shall be vented to exterior of pump houses.

l) Flushing, testing, and adjustment:

i) Flushing:

- (1) Flush main lines prior to installation of remote control valves.
- (2) Flush main lines after irrigation valves are installed and in preparation for main line pressure test.
- (3) Flush lateral lines with swing joints installed; flushing is performed prior to installation of sprinkler heads and in preparation for pressure test. After pressure test is performed and passed, sprinkler head bodies are installed.
- (4) Flush lateral lines – after successful pressure test install sprinkler head body and flush lateral lines; ensure that sprinkler head body is higher than adjacent ground to prevent back siphon of water into lateral lines. Once system is flushed satisfactorily re-assemble sprinkler heads.

ii) Testing:

- (1) Pressure test main line – after all main line piping, isolation valves, pump piping, stub-outs, quick coupler isolation valves, all irrigation remote control valves and all related components are installed conduct the pressure test for a period of 24 hours. Test main water line at 50 psi above static pressure or design pressure, based on highest value; with a maximum pressure loss of 1% allowed to pass. Water main must be pressurized hydraulically and not pneumatically. The pump shall not be part of the main line pressure test.
- (2) Pressure test lateral lines – for a period of two (2) hours, test lateral lines at static or design pressure, based on highest value, with a maximum loss of 2% allowed to pass. Lateral lines must be pressurized hydraulically.
- (3) The main line pressure test must be conducted from Monday through Wednesday so that completion of test is conducted on a regularly scheduled working day.
- (4) Failed Pressure Tests - any failed pressure tests will be re-tested as applicable after all necessary repairs are completed.

- (5) Test and demonstrate the controller by operating appropriate day, hour, and station selection features as required to automatically start and shut down irrigation cycles to accommodate turf and plant requirements.
 - iii) Adjustments:
 - (1) Set sprinklers perpendicular to grade and level to ground with properly stabilized soils around them.
 - (2) Adjust sprinklers for the proper arc and radius coverage.(Head to head coverage)
 - (3) Adjust nozzles on sprinklers for proper and uniform distribution.
 - m) Service and Guarantee:
 - i) Contractor shall guarantee the irrigation system for one year (365 days) from the date of project acceptance against defects in materials and workmanship, the guarantee does not include vandalism.
 - ii) Contractor shall respond to callbacks within 24 hours of notification within the one year warranty period. Contractor will be required to provide a report of repairs performed to correct callback deficiencies.
 - iii) Emergency repairs performed by City of El Paso staff shall not void the warranty.
 - (1) Emergency or other repairs performed by City of El Paso staff due to contractors' lack of timely response will be invoiced and charged to Contractor. Checks will be made payable to City of El Paso, care of Parks and Recreation Department.
 - n) Disposal of Waste Material
 - i) Stockpile and keep site free of loose and air born debris, perform daily clean up of site and dispose of waste material in an appropriate container.
 - ii) Stockpile, haul from site, and legally dispose of waste materials, including unsuitable excavated materials, rock trash, and debris on a weekly basis.
 - iii) Maintain disposal route clear, clean and free of debris.
- 4) Acceptance
- a) Test and demonstrate to the Parks and Recreation Director, or designee, and Designer the satisfactory operation of the system free of leaks and mechanical or electrical flaws. Provide Water Audit with passing results.
 - i) Prior to the audit, the contractor shall ensure that all heads are adjusted for head to head coverage and to ensure that sidewalks are not sprayed. The irrigation schedule must be properly programmed in the controller to reflect actual operating conditions.
 - b) Instruct City of El Paso staff in the operation of the system, including adjustment of sprinklers, controller(s), valves, pump controls, and moisture sensing control(s) and related irrigation equipment.
 - c) Perform cleaning upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation.
 - d) Upon irrigation system acceptance, submit written operating and maintenance instructions.

- e) Provide as-built irrigation system record drawings: reproducible drawings, and electronic copy in pdf and autocad form.
 - i) Legibly mark drawings to record actual construction to include dimensions.
 - ii) Indicate horizontal and vertical locations, referenced to permanent surface improvements.
 - iii) Identify field changes of dimension and detail and changes made by change order.
 - iv) For irrigation systems with reclaimed water, Designer shall submit as-built drawings in pdf and autocad format to Reclaim Water Division of El Paso Water Utilities for record keeping. Provide Parks and Recreation Director or Designee verification of receipt from El Paso Water Utilities.

Surge Protection/Grounding Specification

- 1) Satellite Units
 - a) At each field satellite unit or cluster of units, furnish and install, as shown on the drawings and as required by the manufacturer, an MSP-1 surge arrester mounted in the cabinet/pedestal of the first satellite unit. Wire in the surge arrester to the terminal strip on the low voltage side as shown in the detail with the satellite unit.
 - b) Each satellite unit shall also be grounded, by means of a #10 or larger bare copper grounding wire, to a 3-rod grid copper grounding network (3) - 5/8 inch diameter copper clad rods 8 foot long arranged in an equilateral triangle at least 8 feet apart and tied together underground with #10 or larger bare copper wire).
 - c) Each leg of the 120V power wiring shall have an LPP-K surge arrester installed on it and wired to the grounding terminal of the terminal strip.
 - d) Grounding network shall measure 10 OHMS or less when measured with Vibra-Ground instruments.
- 2) CCU/Encoder Unit to be installed as recommended by RainBird Manufacturer.
 - a) Install in the electrical panel as shown and directed and ground to the electrical panel grounding bus.

Weather Station Specification

1) General

- a) Must be compatible with Rainbird Maxicom control system and existing weather stations.
- b) Furnish and install, where shown on the drawings or where directed, a weather station for the purpose of monitoring the critical daily weather conditions.
 - i) The unit shall be complete with the necessary instruments for recording wind speed, wind direction, relative humidity, rainfall, solar radiation, and air temperature.
- c) Unit shall be complete with a plug-in 120V/26.5V transformer.
 - i) Furnish wireless remote telephone communications.

2) Weather Station

- a) Batteries charged by 120V/26.5V transformer or optional solar power.

3) Installation

- a) The weather station shall be mounted on a poured concrete base as recommended by manufacturer and securely bolted to it.
- b) An 8 foot high (minimum) security fence on all sides at least 8 feet from the weather station base with access gate. Security fence shall be such as not to interfere with the correct readings of the instruments.
- c) Furnish and install MSP-1 surge arrestors for both the communication cable and the 26.5V power wires, as shown on the drawings and as directed. Weather station as well as the MSP-1 surge arrestors shall be grounded to an earth grounding grid, consisting of (3) - 5/8 inch diameter copper clad grounding rods spaced in a triangle 8 feet apart and tied together underground with #10 or larger bare copper wire.
- d) Ground network shall be 10 OHMS or less when tested with a Vibra-Ground instrument.
- e) Water-resistant sensor connectors and cables as recommended by manufacturer.
- f) Low voltage power wires, (*14UF) used to supply 24V to the weather station, are a requirement for all installations. A remote transformer must be located at a source of primary power that is not easily turned off. The 24V power is used to provide constant charging of the battery within the weather station.

Irrigation Central Control System

1) General

- a) All irrigation systems must be compatible with Rain Bird Maxicom Central Control System.
- b) Must furnish telephone communications with Central Controller.
- c) When required, furnish complete Maxicom Central Control System with dedicated PC and all software necessary to facilitate 2-way communication between Maxicom and the Weather Station, and Maxicom and the CCU/ESP site satellites.
 - i) Must be installed indoors in a secure, climate-controlled area, with all power and communication devices/wire installed.

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Turf and Landscape Construction/Renovation

General Site Preparation

1) Related Work

- a) Irrigation System – must be installed and tested prior to planting any turf, landscaping plants and trees, and meet all specifications outlined in the Irrigation sections of the Design Standards.
- b) Standards for Athletic Fields are listed in a separate section.

2) General Site Preparation for Installation of Turf and Landscape Materials.

- a) Comply with General Quality Control.
- b) Soil preparation, grading, and inspections
 - i) Initial site work:
 - (1) Before soil moving/earthwork occurs, a meeting between Contractor and the Parks and Recreation Director, or designee, will take place to discuss soil sampling/testing, elevations, slopes etc. to ensure quality of soil texture, percolation rate and infiltration rate. Adjustments shall be made during grading to improve the quality of the soil.
 - ii) Rough Grading
 - (1) Suitable Soil Conditions:
 - 1. The City has the option to use existing topsoil, when available in sufficient quantity, in lieu of imported topsoil. The Contractor shall comply with and meet amended topsoil material criteria requirements.
 - 2. If the City decides to use existing topsoil on a City contracted project, the Contractor shall provide a credit for the value of the import material that would have been provided.
 - (2) Unsuitable Soil Condition mitigation to include:
 - 1. Removal of caliche, deleterious materials (concrete, asphalt, trash, building materials, etc.), rock and clay from the first 12 inches below finish grade.
 - 2. Shattering, in two directions, of hard pan caliche, clay soils, rocks to a depth of 36 inches below finished grade.
 - 3. Remove deleterious materials 24 inches below finish grade.
 - 4. Import and install 12 inches of suitable top soil to obtain finish grade for turf grass establishment as determined by the Parks and Director, or designee, and Landscape Architect.
 - (3) After completion of rough grade/initial earth moving, Contractor must contact Parks and Recreation Director, or designee to inspect elevations, slope, etc. prior to this phase of work being considered complete.
 - 1. Contractor must contact Parks and Recreation Director, or designee, at least 24 hours prior to scheduling the inspection.
 - iii) Final Grading - Soil surface preparation

- (1) Soil Surface, for this design standard, will be the upper 12 inches of the soil profile.
- (2) Soil is to be worked with minimum soil moisture content to avoid excessive compaction.
 1. Location for loading and unloading of all soils, amendments etc. will be approved by Parks and Recreation Director, or designee, prior to deliveries.
 2. Depth control of tillage equipment must remain consistent throughout the site.
 3. If water leaks or excessive rainfall occur that severely impact the worksite, work will cease until site is back to good workable state.
- (3) Contractor to pay for all soil testing and provide test results to the landscape architect/designer for evaluation and recommendations.
 1. Testing agency/lab shall be acceptable to Parks and Recreation Director, or designee.
 2. Soil samples shall be extracted for analysis jointly by the Parks and Recreation Director, or designee, and the contractor/developer's representative.
 3. A minimum of two soil samples shall be obtained per acre, or as deemed necessary by City of El Paso staff.
 4. Enough material will be extracted to send one sample to lab and hold another as a back-up.
 5. Testing shall be performed in top 36 inches of the rootzone, for both existing and any proposed imported materials, to determine the following:
 - (i) pH - potential hydrogen in the soil, which is a measurement of soil acidity.
 - (ii) Soil physical characteristics - soil type, infiltration, percolation, organic matter, salinity, etc.
 - (iii) Any recommended soil amendments (nitrogen, phosphorus, potassium, organic matter, gypsum).
 6. If there is excessive soil to be moved during grading which can change the soil profile additional testing may be required after grade work is complete.
 7. Determine soil salinity potential for sites to be irrigated with reclaimed water.

3) Submittals

a) Submit the following material samples:

- i) Seed.
- ii) Sod (City of El Paso staff may elect to visit sod farm to inspect material prior to delivery).
- iii) Fertilizer.
- iv) Mulch, topsoil, and any other proposed amendment.
- v) Any planting accessories

b) Submit the following materials for certification:

- i) Fertilizer(s) analysis.
- ii) Seed

(1) Submit seed vendor's certification for required grass seed mixture indicating percentage by weight, and percentages of purity, germination and noxious weeds.

iii) Sod

(1) Sod Growers Certification of turfgrass species, and identifying source location.

c) Submit materials test report.

d) Upon completion, submit written maintenance instruction recommending procedures for maintenance of areas.

4) Materials

a) Fertilizer - A granular turf product that is non-burning and composed of slow release nitrogen with phosphorus and potassium.

i) Initial fertilizer application to amend the soils, prior to sodding or planting, will be determined by the Landscape Architect/Designer based on the soil reports for the site. The fertilizer blend and application rates shall be determined by the Landscape Architect/Designer.

ii) Turf maintenance fertilizer: will be applied after sodding and have a fertilizer ratio approved by the Landscape Architect/Designer, with an application rate of 1.0 pound of Nitrogen per 1,000 sq. ft. applied every four weeks.

iii) Ammonium phosphate for turf areas: if required, application rate of 300 lbs per acre (7.0 lbs per 1000 sq. ft.).

iv) Landscape fertilizer: will have a ratio and application rate as approved by the Landscape Architect/Designer.

b) Wood cellulose fiber mulch - Degradable wet wood cellulose fiber or 100.0% recycled long fiber pulp, free of weeds or other foreign matter toxic to seed germination and suitable for hydro-seeding/hydro-mulching.

c) Organic material - Composted material that is shredded to a fine workable state.

d) Water – Free of substances harmful to plant growth. All hoses or other methods of transportation furnished by Contractor.

5) Deliveries, Storage, and Handling

a) General

i) Deliver all materials in original unopened containers with labels clearly showing weight, analysis, and manufacturer.

ii) Store in a manner to prevent packaging and materials from becoming wet, damaged, or deterioration.

iii) Handling of materials should be done in a manner that promotes worker safety and efficient use of materials.

b) Sod

i) Refer to Turfgrass section of the Design Standards.

c) Trees and Ornamentals

i) Refer to Trees and Ornamentals section of the Design Standards.

6) Cleaning

a) Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soils, debris, and equipment. Repair damage resulting from planting operations.

Turfgrass

1) Related Work

- a) Irrigation System – must be in place prior to planting, and meet all specifications outlined in the Irrigation sections of the Design Standards.
- b) General Site Preparation – must be completed prior to planting, and meet all specifications outlined in the Turf and Landscape Construction/Renovation division and/or section of the Design Standards.
- c) Standards for Athletic Fields are listed in a separate section.

2) Turfgrass Selection

- a) Multi-purpose turf areas and lawns.
 - i) Acceptable cultivars of Bermuda grass are:
 - (1) Propagated by seed – Common Bermuda, Sydney, Panama, or Bermuda Triangle; at a rate of 5 pounds of seed per 1000 square feet (95% pure live seed), and following all other guidelines for seeding listed in Planting Methods.
 - (2) Propagated by sod – Santa Ana, Tifway (Tif 419), Tifton or as approved by the Landscape Architect/Designer and by the Parks and Recreation Director or designee; and follow all other guidelines for sodding listed in Planting Methods.
 - (a) The use of overseeded sod must be approved by the Parks and Recreation Director, or designee, prior to ordering for planting.

3) Planting Methods

- a) Seed
 - i) The only acceptable methods of planting seed to establish turfgrass are:
 - (1) Hydroseeding
 - (2) Drill Seeder
 - ii) Seed must be applied at the rate of 5 pounds per 1,000 square feet, and of the varieties, listed under Turfgrass Selection.
 - iii) Must notify Parks and Recreation Director, or designee, at least one week prior to the start of planting.
 - iv) Plant immediately after final preparation of soils.
 - v) Seeding must occur between May 15th and August 15th or at times approved in writing by the Parks and Recreation Director, or designee.
 - vi) Perform seeding operations when soil is at a moderate to dry moisture level in the top 6 inches, and wind speed is 5 miles per hour or less.
 - vii) Water seeded areas to maintain proper moisture conditions in the soil for seed germination.
 - viii) Contractor shall obtain a watering permit from Water Conservation of El Paso Water Utilities to establish the turf.

b) Sod

- i) Contractor must notify Parks and Recreation Director, or designee at least 48 hours prior to the start of planting operations.
- ii) Sod must be healthy, and free of weeds, insects, disease, etc.
- iii) Sod must have a uniform thickness of 1.0 inch of root zone, with clean cut edges.
- iv) Mow sod prior to harvesting at the farm.
- v) Sod must be cut and planted the same day it is delivered to site.
- vi) Plant sod immediately after final preparation of soils.
- vii) Remove all netting from the bottom of the sod as sod is being rolled out and placed. Netting will not be permitted to remain between the sod and rootzone.
- viii) Sod is to be planted so that it forms a solid mass with tightly fitted joints and edges.
- ix) Do not overlay edges.
- x) Stagger all joints a minimum of 5 feet.
- xi) Patching of sod shall be done using pieces no smaller than 10 square feet.
- xii) Slopes greater than 3:1 shall be sodded parallel to grade and anchored using sod stakes placed two (2) per yard.
- xiii) After sodded area is complete, properly water sod in preparation for rolling.
- xiv) Sodded area shall be rolled at minimum in two directions perpendicular to each other.

4) Maintenance Following Planting

- a) Water planted areas enough to ensure that sod or seed does not dry out. Maintain this moisture level until germination is at least 95%, or sod has rooted in. Transition irrigation to the designed watering schedule. Watering of sod or seed must comply with requirements set forth by Water Conservation watering permit. The watering permit must be kept on-site at all times located at the irrigation controller. Watering is the responsibility of the Contractor until final acceptance.
- b) Maintenance of turf areas will include, but is not limited to, watering, fertilizing, mowing, removing weeds, applying appropriate pest controls, replanting any areas, etc. until final acceptance.
- c) Mow turf areas to maintain a height of 2.0 inches and repeat mowing weekly.
- d) Apply recommended slow release fertilizer after sod installation is complete at a rate of 1.0 pound of N per 1000 sq ft. Re-apply every four (4) weeks at the same rate.

5) Acceptance

- a) Inspection to determine acceptance of planted turf areas will be conducted by Parks and Recreation Director, or designee upon Contractor's request.

- i) Provide at least two week notice from completion of sod installation prior to requesting an inspection.
- b) Turf areas must have uniform turf coverage and be a healthy, weed and pest free site.
 - i) Shall have been mowed at a height of 2.0 inches at least twice prior to inspection.

Trees and Ornamentals

1) Related Work

- a) General and Site Preparation – must be completed prior to planting sod, trees and shrubs, and meet all specifications outlined in the Turf and Landscape Construction/Renovation section of the Design Standards.
- b) Irrigation System – must be fully operational and meet all specifications outlined in the Irrigation sections of the Design Standards prior to planting sod, trees and shrubs.
- c) Standards for Athletic Fields are listed in a separate section.

2) Quality Assurance and Project Conditions

- a) Comply with standard landscape practices and all general requirements in these specifications.
- b) All plants used must be on the current Approved Plant and Tree List, current version as posted on the City of El Paso website.
 - i) Trees and ornamentals with thorns will not be allowed without the approval of Parks and Recreation Director, or designee.
- c) All tree and shrub selection, installation, and maintenance should comply with the Policy and Standards Manual for the Care of Trees and Shrubs in the City of El Paso, current version as posted on the City of El Paso website.
- d) Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, providing that the larger plants will not be cut back to the size indicated on the construction documents.
- e) Shrubs and small plants shall meet the requirements for spread and height indicated in the plant list.
 - i) Measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
 - ii) Single stemmed or thin plants will not be accepted.
 - iii) Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
 - iv) Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.
- f) Plants planted in rows shall be matched or similar in form.
- g) Provide “specimen” plants with a special height, shape or character of growth. Tag specimen trees or shrubs at the source of supply. The Parks and Recreation Director, or

designee, may inspect specimen selections at the source of supply for suitability and adaptability to selected location. When specimen plants cannot be purchased locally, provide sufficient photographs of the proposed specimen plants for approval.

- i) Plants may be inspected and approved for compliance with specification requirements for quality, size and variety.
 - ii) Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.
- h) A complete list of plants, including a schedule of sizes, quantity, and other requirements is shown on the construction drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.
- i) Amended Planting Medium for Planting Beds - Shrubs
- i) Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sand, stones, plants, roots, sticks and other foreign materials, with acidity range between pH 6.0 and 8.0.
 - ii) Identify source location of topsoil proposed for use on the project.
 - iii) Provide topsoil free of substances harmful to the plants which will be grown in the soil.
- j) Mulch
- i) Brown to black in color, weed and seed free, granulated bark, and well decomposed, containing not more than 9% mineral on dry basis.
- k) Water
- i) Free of substances harmful to plant growth.
 - ii) Hoses or other methods of transportation furnished by Contractor.
- l) Weed Control Barrier: Shall be a woven polypropylene weed barrier fabric, water and air permeable.
- m) Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.
- n) The irrigation system will be installed prior to planting. It is Contractor's responsibility to locate, protect, and maintain the irrigation system during planting operations.
- i) Repair of irrigation system components damaged during planting operation will be at the Contractor's expense.
- 3) Warranty

- a) Warrant all plant material to remain alive in healthy, vigorous condition for a period of one year after completion and acceptance of entire project.
 - i) Inspection of plants will be made by the Parks and Recreation Director, or designee, at completion of planting and again prior to acceptance of the project.
- b) Remove and immediately replace all plants, as determined by the Parks and Recreation Director, or designee as unsatisfactory during the initial planting installation.
- c) Replace, in accordance with the drawings and specifications, all plants that are dead or as determined by the Parks and Recreation Director, or designee, as in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the Contractor's negligence.
 - i) The cost of such replacement(s) is at Contractor's expense.
 - ii) Warrant all replacement plants for 1 year after installation.
- d) Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, floods, freezing, rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area; acts of vandalism or negligence on the part of the City of El Paso.

4) Inspection

- a) Parks and Recreation Director, or designee, will examine proposed planting areas and conditions prior to installation.
 - i) Do not start planting until unsatisfactory conditions are corrected.

5) Preparation

- a) Must notify Parks and Recreation Director, or designee, at least one week prior to the start of planting operations.
- b) Planting Times
 - i) Balled and burlapped plant material shall be planted between November 1 and June 1.
 - ii) Container grown stock can be planted at any time that is approved by Parks and Recreation Director, or designee.
- c) Planting shall be performed only by experienced workers familiar with planting procedures under the supervision of the Contractor's project manager.
 - i) Locate plants as indicated or as approved in the field after staking by the Contractor.
 - ii) If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected and approved by Parks and Recreation Director, or designee.

6) Installation

- a) Refer to the Policy and Standards Manual for the Care of Trees and Shrubs in the City of El Paso.
- b) Planting beds - Shrubs
 - i) Space plants in accordance with indicated dimensions.
 - ii) Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants.
 - iii) Shrubs shall be planted to within 1.0 to 6.0 inches of edges at all hardscape surfaces.

7) Acceptance

- a) Inspection to determine acceptance of planted turf areas will be conducted by Parks and Recreation Director, or designee, upon Contractor's request.
 - i) Provide at least two week notice prior to requested inspection date.

Infrastructure

Park Area Lighting Standard

1) General

- a) Park Area lighting must be provided as noted below, coordinate with Parks and Recreation Director, or designee, for site specific requirements.

2) Related Work

- a) All necessary components to include:
 - i) Electrical service/meter and electrical panel must be in place.
 - ii) Photo cell, timer and other items required to make system fully operational.

3) Lights for general open area of the park will be provided in the following manner:

- a) Poles shall be 30 feet tall, Pre-Stressed Concrete Direct Bury Pole type.
- b) Luminaire must comply with City of El Paso Municipal Code for Outdoor Lighting, Section 18.18.
 - i) Maximum five foot-candles with a uniformity ratio of 3:1.
 - ii) Use LED type fixtures and lamps.
- c) Power Supply must be provided through underground installation of conduit with necessary wiring and control equipment. Conduits must be installed minimum 36 inches to top of pipe.
- d) Install light poles a maximum distance of 150 feet from each other.

Park Perimeter Lighting Standard

- 1) General
 - a) Park Perimeter Lighting must be provided as noted below, coordinate with Parks and Recreation Director, or designee, for site specific requirements.
- 2) Related Work
 - a) All necessary components to include:
 - i) Electrical service/meter and electrical panel must be in place.
 - ii) Photo cell, timer and other items required to make system fully operational.
- 3) Lights for park perimeter adjacent to street frontage will be provided in the following manner:
 - a) Poles shall be 30 feet tall, Pre-Stressed Concrete Direct Bury Pole type.
 - i) If provided by EPEC - Poles must be steel, Direct Bury, Street Light Pole type.
 - b) Luminaire must comply with City of El Paso Municipal Code, Outdoor Lighting, Section 18.18.
 - i) Maximum two and one-half (2.5) foot-candles with a uniformity ratio of 4:1.
 - ii) Use LED type Fixture and lamps.
 - iii) If provided by EPEC, luminaire must be minimum 65 watt LED.
 - c) Power supply must be provided through underground installation of conduit with necessary wiring and control equipment. Conduits must be installed minimum 36 inches to top of pipe.
 - d) Install light poles a maximum distance of 150 feet from each other.

Park Trail Lighting Standard

1) Lighting Guidelines

- a) The Developer shall furnish and install trail lights whether within the City limits or within the annexation path of the extraterritorial jurisdiction. Such trail lights shall comply with City of El Paso Municipal Code Chapter 19.16.30 Custom Lighting and Chapter 18.18 Outdoor Lighting.
- b) Trail lighting placed within the trail right of way, or within a public easement, shall provide an average foot-candle level of at least two and one-half (2.5) foot-candles, with a uniformity ratio of 4:1. The interval spacing between poles shall not exceed 300 feet.
- c) Bollard lighting shall be spaced to meet two and one-half (2.5) foot-candles light level with a uniformity ratio of 4:1.
- d) The Developer shall have the option of providing metal poles, concrete poles, or aluminum bollards to achieve the necessary lighting to meet the required foot-candle levels.
- e) Trail corridor lighting shall not be required where earthen trails are provided, nor where corridors are located in public right-of-way where street lighting is provided.

2) Related Work

- a) All necessary components to include:
 - i) Electrical service/meter and electrical panel must be in place.
 - ii) Photo cell, timer and other items required to make system fully operational.
 - iii) Coordinate with Parks and Recreation Director, or designee for site specific requirements.

3) Trail Lighting shall be provided with either standard pre-stressed concrete poles, illuminated bollards or through El Paso Electrical Company (EPEC) street lighting contract as noted below.

a) EPEC Lighting Standard

- i) EPEC lights along trail:
 - (1) Poles must be steel Direct Bury Street Light Pole type.
 - (2) Luminaire must be a minimum 65 watt LED as provided by EPEC.
 - (3) Power Supply must be provided through underground installation of conduit buried at a minimum of 36 inches, with necessary wiring.
 - (4) Install light poles a maximum distance of 300 feet from each other.
- ii) EPEC Lights provided within street right-of-way intersecting with trail:
 - (1) Poles must be steel Break Away Street Light Pole type.

- (2) Luminaire must be the standard 100 Watt HPS lamps as required by EPEC.
- (3) Power Supply must be provided through underground installation of conduit buried at a minimum of 36 inches, with necessary wiring.
- (4) Install light poles 300 feet maximum distance from other lights within street right-of-way abutting park perimeter.

b) Standard Pre-Stressed Concrete Poles with Lights:

- i) Poles must be 30 feet tall, Pre-Stressed Concrete Direct Bury Pole type.
- ii) Luminaire must be LED type
- iii) Power supply must be provided through underground installation of conduit buried at a minimum of 36 inches, with necessary wiring and control equipment.
- iv) Placement: install light poles 300 feet maximum distance from other lights within hike/bike trail boundaries.

c) Standard Illuminated Bollards along Trail:

- i) 36 inch tall illuminated bollards must be one-piece aluminum casting type bollard.
- ii) Luminaire must be LED type.
- iii) Power Supply must be provided through underground installation of conduit buried at a minimum of 36 inches, with necessary wiring and control equipment.
- iv) Bollards must be installed at each street intersection and then along hike/bike trail to maintain lumen level noted.

	Required Spacing	Pole Type	Lamp Type	Height
Trails	At intervals of not more than 300 feet	Metal-direct burial Metal-Breakaway poles at street intersections	65 watt minimum LED	30.0 feet
Trails	At intervals of not more than 50 feet	Aluminum Bollards	65 watt minimum LED	3.0 to 4.0 feet
Trails	At intervals of not more than 300 feet	Concrete direct burial	65 watt minimum LED	30.0 feet

Concrete Sidewalk Standard

1) General

- a) Provide a minimum 7 foot wide landscaped parkway from back of curb to the face of a minimum 7 foot wide concrete sidewalk along park perimeter on street right-of-way.
- b) Sidewalk construction must comply with all applicable Municipal, State and Federal Regulations to include TAS and ADA.

2) Sidewalk Construction Standard

- a) Must be a minimum of 4 inches thick, with #6-6X6 wire mesh. 8.0 inch of Sub-grade to be scarified and compact to minimum 95.0% density per ASTM D – 1557. This is a requirement for all City park contracted projects only.
- b) Concrete strength per subdivision code.
- c) Rough broom finish.
- d) Cross-slope shall be at 1.0%, sloped into the park.
- e) Expansion joint must be provided along back of concrete curb and be provided with 0.5 inch thick expansion joint material.
- f) Scored joint marks 0.25 inch wide and 0.5 inch deep, every 3.5 feet on center, both directions.
- g) Expansion Cold joint every 21 feet with 0.5 inch thick expansion joint material.
- h) Running slope of sidewalk may not exceed 5.0% in any direction.

3) Accessibility Ramp

- a) Ramp(s) will not exceed 6 feet in length or exceed an 8.3% slope.
- b) Ramp(s) at street intersections must be provided by installation of two ramps running along direction of sidewalk with a landing at the bottom level to standard concrete curb and gutter, gutter line and a landing at top level to the concrete sidewalk.
- c) Ramp(s) and landing(s) must have a cross slope of 1.0%. Surfaces must be sloped to ensure that water does not collect or stand after a rain. Drain onto street or park site as required.

- d) Ramp(s) and landing(s) are to have a 6 inch high by 6 inch wide and 6 inch deep curb installed on park side to ensure that erosion does not occur onto ramps and landings.
- e) Ramp must comply with other requirements as set forth in City of El Paso Design Standards for compliance with TAS and ADA.

4) Construction

- a) Must provide clean and damage free forms.
- b) Installation must follow good industry practices and methods with proper vertical and horizontal control to ensure compliance with slope and cross-slope requirements.
- c) Forms must be maintained in good repair prior to and during installation and while pouring of concrete sidewalk.
- d) Sub-grade preparation
 - i) Scarify and compact 8 inches of sub-grade.
 - ii) Must be compacted to 95% density per ASTM D-1557.
- e) Densities – provide density tests of sub-grade as deemed necessary based on length of concrete sidewalk.
 - i) Provide a minimum of one every 300 feet.
- f) Site cleaning
 - i) Complete and thorough cleaning is required of site after concrete sidewalk is installed.
 - (1) This is to include concrete waste (debris) found in soils and concrete splatter residue found on existing concrete curb and gutter or adjacent sidewalks.
- g) Site restoration
 - i) Adjacent ground and/or landscaping surfaces must be restored to previous condition as directed by Parks and Recreation Director, or designee, to ensure that site is clear and free of any foreign materials not suitable for a park setting or turf maintenance.

Trail Standard

1) General

- a) Park trails are a specific park feature that must accommodate multiple non-motorized use (pedestrian and bicycle).
- b) Park trail construction must comply with all applicable Municipal, State and Federal regulations to include TAS and ADA.
- c) Trails not meeting the Design Standards will not count towards Parkland Dedication requirements.
- d) Trails in utility corridors require the written consent of the corresponding utility company, and the approval of the Parks and Recreation Director, or designee, at the time of subdivision application.
- e) Removable barrier(s) will be provided to prevent unauthorized vehicular access on to trail.
 - i) Bollards or operable guard rails are acceptable as removable barriers. Bollards are to be set at 4 foot on center, on the width of the pedestrian right-of-way.
- f) Provide Park Rule signage, pedestrian caution signage, and no motorized vehicle warning signage where trail intersects with public roadways. Provide signage submittal with color rendering for Parks and Recreation Director, or designee, approval.

2) Trail Structure

- a) Trails along street rights-of-way
 - i) Trails along street rights-of-way shall be a minimum of 8 feet wide and constructed of concrete or pervious concrete/materials.
 - (1) The City of El Paso may elect to contribute to the cost of the trail if a width wider than 8.0 feet is deemed appropriate for that specific location.
 - ii) Concrete curb on roadway to be standard 6 inch concrete curb and gutter along street frontage that abuts trail right-of-way.
 - iii) Trails in the street rights-of-way shall include landscaping (trees and shrubs) on each side of the trail for the remaining area of parkway, from the back of the curb to the right-of-way line.
 - (1) Landscaped areas to have a minimum depth of 4 inches of screening material over non-woven polypropylene weed barrier pinned every 12 inches on center along overlapped edges and seams, and every 2 feet on center in field.

b) Trails within Parkland and Utility Corridors

- i) Trails within parkland shall be constructed of concrete, except as indicated below:
 - (1) Proposals for alternative surface trails in parkland and areas not designated as “Natural Open Space” may be submitted through the Alternative Design Process and require the approval of Parks and Recreation Director, or designee, prior to subdivision approval.
- ii) Landscaping (trees and shrubs) shall be-provided at a minimum of 5 feet wide along each side of the trail.
- iii) Install shrubs at a minimum spacing of 7 feet apart and provide drip irrigation.
- iv) Shade trees shall be spaced a minimum of 20 feet apart and be planted 5 – 7 feet from the trail. Trees shall have a drip irrigation system provided. Tree species shall be consistent with the street tree requirement as referenced on the approved tree list for El Paso.
- v) Minimum of one park bench shall be provided for each section of the trail or spaced at a minimum 600 feet apart.
 - (1) Park bench must have concrete pad to ensure compliance with accessibility requirement for companion seating.
- vi) Concrete
 - (1) Shall be a minimum of 10 feet wide.
 - (2) Option (a) or (b) below shall be selected.
 - (a) Minimum of 4 inches of reinforced concrete with #6-6X6 wire mesh, with eight inches of sub-grade to be scarified and compacted to minimum 95% density per ASTM D – 1557.
 - (b) Minimum of 6 inches of concrete, reinforced with fiberglass mesh at a rate of 2.0 lbs. per cubic yard, and eight inches of sub-grade to be scarified and compacted to minimum 95% density per ASTM D – 1557.
 - (3) Concrete strength to be 3,000 psi minimum or as specified on the design specifications.
 - (4) Rough broom finish.
 - (5) Cross-slope may not exceed one percent (1%), sloped into park.
 - (6) Expansion joint must be provided along back of concrete curb and be provided with 0.5 inch thick expansion joint material.
 - (7) Control joints shall be 0.25 inch wide. The depth of the control joint shall be 25.0% of the thickness of the slab. Control joints to be placed every 10 feet on center.
 - (8) Expansion Cold joint every twenty feet with 0.5 inch thick expansion joint material.
 - (9) Running slope of sidewalk may not exceed five percent (5%) in any direction.

c) Trails in natural open space areas

- i) Natural open space areas shall remain undisturbed except for trail corridors, as approved by the Parks and Recreation Director, or designee.
- ii) Use of concrete and/or asphalt is prohibited in natural open space areas.

- iii) In the event that natural open space is disturbed outside of the designated trail corridor, Parks and Recreation Director, or designee must be immediately notified and an inspection will be conducted to determine the appropriate remedy.
- v) The design, surface and treatment of trails in natural open space areas require the approval of Parks and Recreation Director, or designee prior to subdivision approval.
- vi) In natural open space areas, additional signage advising users to stay within the designated trail corridor is required.

3) Trail Surfaces – (Non Right-of-Way)

a) Concrete

- i) Shall be a minimum of 10 feet wide.
- ii) Use option (1) or (2) below.
 - (1) Minimum of 4 inches of reinforced concrete with #6-6X6 wire mesh, with eight inches of sub-grade to be scarified and compacted to minimum 95% density per ASTM D – 1557.
 - (2) Minimum of 6 inches thick concrete, reinforced with fiberglass mesh at a rate of 2.0 lbs. per cubic yard. Eight inches of sub-grade to be scarified and compacted to minimum 95% density per ASTM D – 1557.
- iii) Concrete strength to be 3,000 psi minimum or as specified on the design specifications.
- iv) Rough broom finish.
- v) Cross-slope may not exceed one percent (1%), sloped into the park.
- vi) Expansion joint must be provided along back of concrete curb and be provided with 0.5 inch thick expansion joint material.
- vii) Control joints shall be 0.25 inch wide. The depth of the control joint shall be 25% of the thickness of the slab. Control joints to be placed every 10 feet on center.
- viii) Expansion Cold joint every twenty feet with 0.5 inch thick expansion joint material.
- ix) Running slope of sidewalk may not exceed five percent (5%) in any direction.

b) Asphalt with concrete header curbs

- i) Must be 10 feet wide plus (2) 6 inch concrete header curbs, for an overall width of 11 feet.
- ii) Asphalt pavement shall be a minimum of 1.5 inches thick, type “D” HMAC, City of El Paso standards, seal coated (2 coats).
 - (1) Compacted to 98% minimum density as per ASTM D-1557.
- iii) Pavement structure shall be placed over a minimum 4.5 inches of base course (CSBC) material compacted at 100% density as per ASTM D-1557 and minimum 8 inches scarified sub-grade compacted at 95% minimum density as per ASTM D-1557.
- iv) Header curbs shall be 3,000 psi concrete strength and shall include:
 - (1) If hand poured and placed –
 - (a) 2 continuous #4 rebars.

- (b) With ½ inch expansion joints every 20 feet and control joints every 5 feet, and a broom finish.
 - (2) If machine installed
 - (a) 2 pounds of long fiberglass mesh per cubic yard.
 - (b) With 0.5 inch expansion joints every 20 feet and scored joints every 5 feet, and a broom finish.
- c) Alternative Surface
 - i) Alternative Surface proposals require the approval of Parks and Recreation Director, or designee prior to subdivision approval.
 - (1) Must be stabilized with 2 sacks of cement per cubic yard, and shall comply with all applicable TAS and ADA standards.
 - ii) Alternative Surfaces may include:
 - (1) Earthen.
 - (2) Organic or inorganic material, such as mulch, chat, gravel, or hardscape.
 - (3) Permeable pavement or other environmentally friendly material.

Chain Link Fence Standard

1) General

- a) Furnish and install chain link fences and gates complete. Extent of chain link fences and gates is indicated on all drawings.
 - i) Drawings and general provisions of the project, including, but not limited to, General and Supplementary Conditions, etc, apply to the work of this section.
- b) Submit manufacturers technical data, and installation instructions for metal fencing, fabric, and accessories.
 - i) All products are subject to compliance with requirements listed and approval of Parks and Recreation Director, or designee.
- c) Dimensions indicated for pipe are outside dimensions, exclusive of coatings.

2) Submittals

- a) Submit the following:
 - i) Product data in the form of manufacturers technical data, specifications and installation instructions for fence and gate posts; fabric, gates, gate operators and accessories.
 - ii) Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms gate swing, hardware and accessories.
 - iii) Samples of initial selection of PVC color in form of manufacture's color charts or 6 inch lengths of actual fabric wire showing colors available. Include similar samples of polymer coating applied on posts, rails and accessories.
- b) Quality Assurance
 - i) Installer must have at least five (5) years experience and completed as least ten (10) chain link fence projects with same material and of similar scope of that indicated for this project with a successful construction record of in-service performance.
 - ii) Obtain chain link fences and gates, including accessories, fittings and fastenings, from a single source.
- c) Project Conditions
 - i) Verify layout information for fences and gates shown on the drawings in relation to the property survey and existing structures.
 - ii) Verify dimensions by field measurements.

3) Products

- a) Steel Fabric provided as indicated on the drawings.
 - i) Selvage: knuckled selvage both ends (Knuckled - Knuckled).
 - ii) Steel chain-link fence fabric that is fabricated in one-piece widths for fencing in heights 12 feet and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual" and with requirements indicated below:
 - (1) Mesh and wire size shall be as follows: 2 inch mesh, 9 gage.
 - (2) Galvanized coating industrial grade zinc.

- b) Steel Framework
 - i) Top Rail: manufacturers longest lengths (17-21 feet) provide mechanical saddle cut ends and perfect fit length rails to be welded in place with full all around welds, cleaned primed and coated with zinc based paint; attaching top rail securely to each gate, corner, pull and end post by welding in place.
 - ii) Middle Rail: manufacturers longest lengths (21 feet) provide mechanical saddle cut ends and perfect fit length rails to be welded in place with full all around welds, cleaned primed and coated with zinc based paint; attaching middle rail securely to each gate, corner, pull and end post by welding in place.
 - iii) Bottom Rail: manufacturers longest lengths (21 feet) provide mechanical saddle cut ends and perfect fit length rails to be welded in place with full all around welds, cleaned primed and coated with zinc based paint; attaching bottom rail securely to each gate, corner, pull and end post by welding in place. Set maximum of 1 inch above finished grade.
 - iv) Top, Middle and Bottom Rails: Round Steel: 1.900-inch OD Type 1 steel Pipe.
 - v) Line Posts for Fabric Heights 6 feet and below: 2.375-inch OD Type 1 steel pipe.
 - vi) Terminal, Corner and Pull Posts fabric heights 6 feet and below: 3.5-inch OD Type 1 steel pipe.
 - vii) Gate Posts for fabric heights 6 feet and below: 4.5-inch OD Type 1 steel pipe.
 - viii) Line Posts for Fabric Heights 7 to 10 feet: 2.875-inch OD Type 1 steel pipe.
 - ix) Terminal, Corner and Pull Posts for Fabric Heights 7 to 10 feet: 4.5-inch OD Type 1 steel pipe.
 - x) Gate Posts for Fabric Heights 7 to 10 feet: 6.625-inch OD Type 1 steel pipe.
 - xi) Line and Terminal Posts (backstops) for Fabric Heights above 10 feet: 4.5-inch OD Type 1 steep pipe.

- c) Framing and accessories
 - i) Round member sizes are given in actual outside diameter (OD) to the nearest thousands of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) or the equivalent trade size in inches. The following indicates these equivalents all measured in inches:

Actual OD	NPS Size	Trade Size
1.315	1	1-3/8"
1.660	1-1/4	1-5/8"
1.900	1-1/2	1-7/8"
2.375	2	2-3/8"
2.875	2-1/2	2-7/8"
3.500	3	3-1/2"
4.000	3-1/2	4"
4.5	4	4-1/2"
6.625	6	6-5/8"
8.625	8	8-5/8"

- ii) Type 1 Round Posts: Standard weight Schedule 40 (Sch. 40) galvanized-steel pipe conforming to ASTM F 1083 according to heavy industrial requirements of ASTM F 669. Group IA, with minimum yield strength of 25,000 psi, not less than 1.8 oz. of zinc per sq. ft. Type A coating inside and outside according to ASTM F 1234, as determined by ASTM A 90, and weights per foot as follows.

Actual OD	Weight (lb/ft)	NPS Size
1.315	1.68	1
1.660	2.27	1-1/4
1.900	2.72	1-1/2
2.375	3.65	2
2.875	5.79	2-1/2
3.500	7.58	3
4.000	9.11	3-1/2
4.5	10.79	4
6.625	18.97	6
8.625	28.55	8

iii) Wire Ties:

- (1) Provide 9 gage galvanized steel wire to tie fabric to posts and braces, to match fabric core material. Tie wires to be at 12 inches on center on all posts and rails and with double looped pigtailed on both ends. Do not leave sharp protruding edges.
- (2) Provide 9 gage hog rings to tie fabric to tension wire where applicable.

iv) Post brace assembly

- (1) Manufacturers standard adjustable brace at end and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375 inch diameter rod and adjustable turnbuckle.

v) Stretcher bars and tension bands

- (1) One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16 inch x 0.75 inch. Provide one stretcher bar for each end post, and two (2) for each corner and pull post.
- (2) 0.75 inch wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft. Set space at nothing over 15 inches on center, to secure stretcher bars to end, corner, and pull posts.
- (3) Tension Bands: 0.074-inch thick (14 gage) minimum.
- (4) Brace Bands: 0.105-inch thick (12 gage) minimum.

d) Concrete

- i) Provide concrete consisting of Portland cement, ASTM C 150, aggregates, ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi using at least 6 sacks of cement per cubic yard, 1.0 inch maximum size aggregate, maximum 3.0 inch slump, and 2% to 4% entrained air.
- ii) Footing for Terminal, Line, Pull, Gate, and End Posts for fabric heights below 10 feet to be 12-inch diameter in size, 3 foot-3.0 inch deep, with a tapered cap to shed water. Tapered cap to be from 3 to 6 inches above finished grade and footing to be poured in a tube form to obtain a consistent finished appearance.
- iii) Footing for Terminal, Line, Pull, Gate, and End Posts for fabric heights below 10 feet to be 12-inch diameter in size, 3 feet-3 inch deep, with a tapered cap to shed water. Tapered cap to be from 3 to 6 inches above finished grade and footing to be poured in a tube form to obtain a consistent finished appearance.
- iv) Footing for Terminal and Line Posts (backstops) for fabric heights above 10 feet to be 18-inch diameter in size, 5 feet-3 inch deep, with a tapered cap to shed water. Tapered cap to be from 3 to 6 inches above finished grade and footing to be poured in a tube form to obtain a consistent finished appearance. Where applicable this footing may be integral with concrete stem wall (concrete curb).

e) Fittings and accessories

- i) Material: comply with ASTM F 626. Mill-finished galvanized iron or steel to suit manufacturers standards.
 - (1) Steel or Iron: unless specified otherwise, hot-dip galvanized pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A90.
- ii) Line Post Caps: Provide weather tight closure cap for each post of heavy-duty industrial grade steel products with galvanized finish. Provide 4 tack welds per cap.
- iii) End or Terminal Post Caps: Provide weather tight closure cap for each post of heavy-duty industrial grade steel products with galvanized finish. Provide 4 tack welds per cap.
- iv) Rail End Caps: do not provide weather tight closure cap at terminus of top rail. Rail to be welded in place with full, complete weld.

f) Gates

- i) All pedestrian gates shall be 5 feet wide. Fabricate perimeter frames of gates from same material and finish as fence framework.
 - (1) Assemble gate frames by welding.
 - (2) Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Unless stated otherwise, use the same fabric as for fencing.
 - (3) Secure fabric at vertical edges with tension bars and bands and to top, intermediate and bottom of frame with tie wires.
 - (4) Install diagonal cross bracing consisting of 5/16-inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
 - (5) Gaps between end posts and gate frame and between double gates shall not exceed 1.5 inches. Use welded insets, if necessary, to comply.
- ii) Swing Gates for vehicular access must comply with ASTM F 900.
 - (1) Steel Gates up to 8 feet wide:
 - (a) Gates up to 6 feet high: Fabricate perimeter frames of 1.660-inch minimum OD Type 1 steel pipe.
 - (b) Gates over 6 feet high: Fabricate perimeter frames of 1.900-inch minimum OD Type 1 steel pipe.
 - (2) Gates from 8 feet to 10 feet wide:
 - (a) Gates up to 6 feet high: Fabricate perimeter frames of 1.900-inch minimum OD Type 1 steel pipe.
 - (b) Gates over 6 feet high: Fabricate perimeter frames of 2.375-inch minimum OD Type 1 steel pipe.
- iii) Gate Hardware: Provide galvanized heavy duty industrial grade steel hardware and accessories for each gate according to the following:
 - (1) Hinges: Size and material to suit gate size, no-lift-off type, offset to permit 180-degree gate opening.
 - (a) Provide 3 hinges for gates greater than 6 feet in height or 4 feet wide.
 - (2) Latch: Latch to permit operation from either side of gate, with padlock eye as an integral part of latch.
 - (a) Forked type required for pedestrian gates.
 - (b) Plunger-bar type required for vehicular (double) gates. Set sleeve guide in concrete footing to accept plunger when gate is in closed position.
 - (3) Gate Stops must be provided for double gates consisting of mushroom-type flush plate with anchors or striker with anchor to secure gate. Gate Stops to be set in concrete and designed to engage a center drop rod or plunger bar. Include a locking device and padlock eyes as an integral part of the latch, permitting both gates leaves to be locked with a single padlock.

4) Execution

a) Installation

- i) Do not begin installation and erection before concrete footings (or concrete stem wall/curb) is completed and set in ground for minimum of 7 calendar days, unless otherwise permitted.

- ii) Holes for posts to be 12 inch minimum diameters (except 18 inch diameter for backstops) in firm, undisturbed or compacted soil.
 - (1) Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom.
 - iii) See Appendix for Details.
- b) Setting posts
- i) Place concrete around posts and vibrate or tamp for good, consistent, consolidation of concrete. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 - ii) Extend concrete footings 3 inches to 6 inches above grade and trowel to a crown to shed water.
 - iii) Concrete footings to have a consistent smooth finish on crown and exposed surfaces.
 - iv) Concrete footing to be formed with sonotube and tapered 1 inch to 3 inches at top to shed water. Top of concrete footing to be exposed and above ground.
- c) Top rails
- i) Run rail continuously between posts and weld at both ends using continuous welds.
 - ii) Provide top rail with either swedged-end or expansion-type coupling, approximately 6 inches for joining.
 - iii) Continuous weld all around, clean, prime and coat with zinc based paint.
- d) Center and bottom rails
- i) Provide Center (intermediate) and Bottom rails throughout.
 - ii) Cut rails to exact length to sit between posts with a maximum play of 0.25 inches after mechanically cut saddle ends are performed.
 - iii) Install in one piece between posts and flush with post on fabric side. Use continuous welds for this assembly method.
 - iv) Upon completion of welds, clean off splatter, welds, prime and coat with a zinc based paint.
- e) Brace assemblies are to be installed so that posts are plumb when diagonal rod is under proper tension.
- f) Fabric
- i) Leave fabric as close to finish grade as possible with a maximum gap of 1 inch allowed.
 - ii) Ensure that fabric has knuckle selvaged at both top and bottom ends, unless otherwise indicated.
 - iii) Install fabric on security side or play side of fence.
 - iv) Pull fabric taut and tie to posts, and rails as noted above and anchor to framework so that fabric remains in tension after pulling force is released.
 - v) For Backstops:

- (1) The lower center section directly behind batter's box is to be 6 gauge, 2-inch square, and chain link fabric up to a height of 10 feet.
 - (2) The lower section of backstop and wings is to be 9 gage, 2 inch square chain link fabric up to a height of 10 feet.
 - (3) The top section of backstop and wings is to be 11 gage, 2 inch square chain link fabric up to the top rail of the backstop and wings.
 - (4) The backstop and wings overhang is to be 11 gage, 2 inch square chain link fabric.
 - (5) Chain link fabric is to overlap minimum 12 inches and be tied with 9 gage hog rings set every 8 inches on center on top and bottom of overlap.
 - (6) Overlaps of chain link fabric are to be at rails.
- g) Stretcher bars must be threaded through or clamped to fabric 4 inches on center, and secure to posts with metal bands placed at 15 inches on center maximum.
- h) Tie wires
- i) Use U-shaped 9 Gage steel wire (no aluminum wire), conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns (pigtail). Bend ends of wire to eliminate hazard to persons or clothing.
 - ii) Tie fabric to line posts, with wire ties spaced 12 inches on center.
 - iii) Tie fabric to rails and braces, with wire ties spaced 12 inches on center.
- i) Fasteners
- i) Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Secure properly do not leave nuts loose.
 - ii) Tack weld nuts to bolts to secure properly, clean, prime and coat with zinc based paint at completion.
 - iii) Bolts may have peened ends or scored threads to prevent removal of nuts; coordinate with Parks and Recreation Director, or designee for approval of application.
 - iv) Grind all bolts to within 1/8 inch of nut.
- j) Gates
- i) All pedestrian gates shall be 5 feet wide. Install gates plumb, level and secure for full opening without interference.
 - ii) Install ground-set items in concrete for anchorage.
 - iii) Adjust hardware for smooth operation and lubricate where necessary.
 - iv) Install gates according to manufacturers instructions, plumb, level and secure with gaps not to exceed 1.5 inches between the end posts and gate frame.
 - v) After repeated operation of completed installation, equivalent to three (3) days use by normal traffic, readjust gates and gate operators and controls for optimum operating condition and safety. Lubricate operating equipment and clean exposed surfaces.
 - vi) Instruct City of El Paso staff on proper operation and maintenance of gate operators.
- k) Touch – up painting and cleaning

- i) Galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.
- ii) Site cleanup will be performed to remove all construction debris such as: wire ties, wire scraps, concrete splatter, concrete waste, welding rods, and pipe scraps.
- iii) Site clean up to include restoration of turf and landscape materials to original conditions.

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Park Amenities

Playground Design Criteria

The following are minimum requirements for playground equipment, specifications and installation at all park sites.

1) General

- a) All playgrounds and swings must be of commercial quality; no exceptions will be made.
- b) Acceptable playground manufacturer fastening types:
 - i) Clamp type fastening system for components to main structure.
 - ii) Direct-bolt type fastening system for components to main structure.
- c) Equipment must be superseded by submittal packets that have the following information for review and release by Project Designer and Parks and Recreation Director, or designee:
 - i) Project site plan reflecting construction drawings or actual field conditions.
 - ii) Site plan with construction control point.
 - iii) Site plan with dimensions for all use zones and between independent pieces of equipment.
 - iv) Location of containment wall or curb.
 - v) Location, limits and dimensions of accessible path of travel (rubberized resilient poured-in-place surfacing or tiles).
 - vi) Location and coverage (width) of any shade canopies as applicable.
 - vii) Equipment color selection chart.
 - viii) Equipment information including installation.
- d) Equipment and components to be IPEMA certified.
- e) Equipment manufacturer to comply with ISO 9001 and ISO 14001.
- f) Equipment manufacturer to provide installation manual and playground layout at completion of project: hard copy and digital file.
- g) Equipment and fall surfacing must comply with current Standards and Guidelines as listed:
 - i) CPSC Handbook for Public Playground Safety, Pub. No. 325.
 - ii) ASTM F 1487 Standard, Consumer Safety Performance Specification for Playground Equipment for Public Use.
 - iii) ASTM F 2223 Standard, ASTM Standards on Playground Surfacing.
 - iv) ASTM F 2373 Standard, Performance Specifications for Public Use Play Equipment for Children 6 months through 23 months.
 - v) ASTM 1292 Standard Specification for Impact Attenuation of Fall Surfacing Materials.

- vi) Accessibility Guidelines for Play Areas as described in ADAAG.
 - vii) 2.2 *ANSI Standards*: Z535.1 Safety Color Code, Z535.4 Products Safety-Signs and Labels.
 - viii) 2.3 *Federal Standards*: 16 CFR Part 1303, 16 CFR 1500 – Including Sections 1500.48 and 1500.49, 16 CFR Section 1501, 36 CFR Part 1191.
 - ix) 2.4 *UL Standards*: UL 969 Standard for Safety: Marking and Labeling Systems;
 - x) 2.5 *CSA Standards*: CAN/CSA-Z614 Children’s Playspaces and Equipment.
- h) Equipment to be called out with lengths for Overhead Activities, spacing between rails for Horizontal type ladders and Climbers, length between decks for Track Rides, etc.
 - i) Playground Equipment Manufacturer representative to be NPSI certified.
 - j) Playground Equipment sales representative to be NPSI certified.
 - k) Manufacturer to provide sealed maintenance kit to include: sand paper, owner’s manual (with equipment warranty, 2-D Plan, installation instructions for playground structure and components, and 3-D Color Plan), hardware (20 pieces each minimum of assorted sizes of vandal proof nuts, bolts, washers), fastening tools (1 each size - wrench and chuck keys), 2 cans of primer, 2 cans of each color of touch-up paint, plastic coating repair kit for each color, and one bottle of anti-graffiti remover.
- 2) Equipment installation to be performed by Contractor meeting the following requirements:
 - a) Minimum five years experience installing same equipment of similar size and complexity.
 - b) Complete and good quality installation of a minimum of 15 structures of same or similar size within the last 3 years.
 - c) National Playground Safety Institute Certification (NPSI) - Certified Playground Safety Inspector, in good standing.
 - d) Manufacturers Certified Installer must be present at site at all times during installation.
 - 3) Equipment installation to be inspected and certified for proper assembly by a NPSI certified Manufacturers Representative.
 - 4) Equipment and fall surfaces to be audited and tested by an independent NPSI Certified contractor with a minimum of 15 structure audits of same or similar size within the last three (3) years.
 - a) Any items found deficient in audit must be corrected and a re-audit performed to ensure that all deficient items are addressed.

- b) Any expense incurred due to modifications, adjustments, or revisions to the playground structure as a result of the auditor's report shall be the sole responsibility of the Contractor.
- 5) Playground area to be properly secured with a 6 foot high chain link fence throughout course of construction/installation up to acceptance of project.
- 6) Equipment to have a minimum 10 foot safety use (fall) zone or greater as required by ASTM F-1487 Standards.
- 7) Construction work on playground area will not commence until playground structure and all materials and supplies are in possession of contractor for installation.
- 8) Contractor will ensure that work progress will be ongoing and job site will not be left abandoned for any time period greater than 24 hours during the work week.
- 9) Contractor will ensure that job site is kept clean and clear of any construction debris on a daily basis.

Playground Equipment and Structure

1) Definitions

- a) Standards and Guidelines: applicable standards and guidelines will include but not be limited to most current editions of: ASTM F-1487; ASTM F-2223; ASTM 2373; CPSC Pub. No. 325; State of Texas Law for Public Playgrounds and Surfacing; USATBCB Guide to ADA Accessibility guidelines for play areas. (Will be referred to ASTM and CPSC as applicable.)
- b) Composite Play Structures: According to ASTM F 1487, this means "two or more play structures attached or functionally linked," creating one integral unit with more than one play activity.
- c) Critical Height: According to CPSC No. 325, this means "the fall height below which a life-threatening head injury would not be expected to occur."
- d) Fall Height: According to ASTM F 1487, this means "the vertical distance between a designated play surface and the protective surfacing beneath it." The fall height of playground equipment should not exceed the Critical Height of the protective surfacing beneath it as set forth by play activity or specified critical fall height, whichever is more restrictive.
- e) IPEMA: International Play Equipment Manufacturers Association.
- f) HDPE: High-density polyethylene.
- g) LLDPE: Linear low-density polyethylene.
- h) MDPE: Medium-density polyethylene.
- i) GFRC - Glass Fiber Reinforced Concrete used when Concrete Boulders and play components are specified as natural play elements.
- j) PFC – Polyfibercrete.
- k) Play Structure: According to ASTM F 1487, this is "a free-standing structure with one or more components and their supporting members."
- l) Protective Surfacing: According to ASTM F 1487, this means "impact-attenuating materials to be used within the use zone of any playground equipment" for playground surface systems. See Specification below.
- m) PVC: Polyvinyl chloride.

- n) Transfer Point: According to ASTM F 1487, this is "a platform or deck along an accessible route of travel or an accessible platform provided to allow a child in a wheelchair to transfer from the chair onto the equipment."
- o) Use Zone: According to ASTM F 1487, this is "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

2) Submittals

- a) For each type of product indicated, include: construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- b) For each type of playground equipment include: materials, plans, elevations, sections, and details, method of field assembly, connections, and installation details.
 - i) Indicate maximum number of users and number of play activities.
- c) Project site plan reflecting
 - i) Construction drawings or actual field condition.
 - ii) Construction control point.
 - iii) Dimensions for all use zones including use zones between independent pieces of equipment.
 - iv) Location of containment wall or curb.
 - v) Location, limits and dimensions of accessible path of travel (rubberized resilient poured-in-place surfacing or tiles where applicable).
 - vi) Location of any shade canopies/structures as applicable.
 - vii) Color selection chart.
- d) Coordination Drawings that include, but are not limited to:
 - i) Layout plans and elevations drawn to scale and coordinating playground equipment with playground surface systems and containment barrier.
 - ii) Show playground equipment locations, use zones, fall heights, and extent of protective surfacing.
 - iii) Critical Height(s) shall be specified by the Manufacturer and included on playground design layout plan.
- e) Color Selection Charts: Provide a complete color selection chart with each component and piece of equipment listed with available colors.
- f) Samples for Initial Selection: Manufacturers color charts or 6 inch (150-mm) lengths of actual units showing the full range of colors and textures available for components with factory-applied color finishes.

- g) Samples for Verification are required for the following products:
 - i) For each type of exposed finish required, prepared on samples of size indicated below and of same thickness and material indicated for the work.
 - ii) If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - iii) Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of playground equipment.
 - iv) Samples should be made available as follows:
 - (1) Posts and Rails: Not less than 6 inches (150 mm) long.
 - (2) Platforms, Stairs, Ramps and Bridges: Not less than 6 inches (150 mm) square.
 - (3) Molded Plastic: Not less than 3 inches (75 mm) square.
 - (4) Recycled Plastics (PVC) Products: Not less than 6 inches square.
 - (5) GFRC - Glass Fiber Reinforced Concrete.
 - (6) PFC – Polyfibercrete.
 - (7) Accessories: Not less than 6 inches square.
 - (8) Hardware: Sample one each.
 - h) Product Certificates: Signed by manufacturers of playground equipment certifying that products furnished comply with all requirements set forth in specifications and/or construction drawings.
 - i) Installer Certificates: Manufacturers Certification and NPSI Certification.
 - j) Manufacturer Certificates: IPEMA Certification of playground equipment and components.
 - k) Field Quality-Control Report: Playground Equipment Manufacturer to provide a report that indicates playground and playground equipment installation meet manufacturers installation requirements.
 - l) Maintenance Guidelines: For playground equipment and finishes to be included in maintenance manuals.
 - m) Maintenance Kit: For playground equipment with paint, primer, sandpaper, anti-graffiti remover, hardware, tools and storage container box.
- 3) Quality Assurance
- a) Installer Qualifications: An experienced installer who has specialized in installing work similar in material, design, and extent to that indicated for this project and who is acceptable to manufacturer of playground equipment.
 - i) Contractor must submit a résumé for review and approval by Consultant and Parks and Recreation Director, or designee, prior to installation of equipment.
 - b) Installer requirements

- i) Equipment installation to be performed by Contractor meeting the following requirements:
 - (1) Minimum five years experience installing same equipment of similar size and complexity.
 - (2) Complete and good quality installation of a minimum of 15 structures of same or similar size within the last 3 years.
 - (3) National Playground Safety Institute Certification (NPSI) - Certified Playground Safety Inspector, in good standing.
 - (4) Manufacturers Certified Installer must be present at site at all times during installation.

- c) All hardware, equipment, and components must be IPEMA certified and compliant with all specifications as set forth herewith.

- d) Manufacturer Qualifications: A firm whose playground equipment, components, and hardware have been certified by IPEMA's "3rd Party Certification" service.
 - i) Provide only playground equipment and play structure components bearing the IPEMA Certification Seal.
 - ii) See Construction Drawing for equipment list.

- e) Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct playground audit and the testing of fall surfacing materials according to ASTM E 548 & ASTM 1292.

- f) Standards and Guidelines: Provide playground equipment complying with or exceeding requirements in the following:
 - i) ASTM F 1487: To include warning labels, manufacturers identification.
 - ii) CPSC No. 325, "Handbook for Public Playground Safety."
 - iii) Playground Equipment and Structure Specifications.
 - iv) Signs – provide signs and labels for age appropriate equipment and recommendations for proper use with adult supervision.
 - v) 2.2 *ANSI Standards*: Z535.1 Safety Color Code, Z535.4 Products Safety-Signs and Labels.
 - vi) 2.3 *Federal Standards*: 16 CFR Part 1303, 16 CFR 1500 – Including Sections 1500.48 and 1500.49, 16 CFR Section 1501, 36 CFR Part 1191.
 - vii) 2.4 *UL Standards*: UL 969 Standard for Safety: Marking and Labeling Systems.
 - viii) 2.5 *CSA Standards*: CAN/CSA-Z614 Children’s Playspaces and Equipment.

4) Conditions

- a) Existing Utilities
 - i) Do not interrupt utilities serving facilities occupied by City of El Paso or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

- (1) Notify Designer and Parks and Recreation Director, or designee, at least eight days in advance of proposed utility interruptions.
- (2) Do not proceed with utility interruptions without Architect's and Parks and Recreation Director or designee's written permission.
- (3) Before excavating:
 - (a) Contact utility-locator service to locate all Public Utilities within the Project area.
 - (b) Contractor is responsible to pay for and coordinate site utilities locations within Park property.
 - (c) Any damage to existing utilities is the contractor responsibility to restore at their expense.
- b) Coordinate construction of equipment use zones and fall heights during installation of playground equipment with installation of protective surfacing specified. Sequence work so protective surfacing can be installed immediately after concrete footings have set.
- c) Coordinate construction of play area containment barrier to ensure specified and/or required use zones are kept free and clear of hazardous obstructions for users. Must provide most stringent use zone as specified or required.

5) Products

- a) All Products
 - i) Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the products specified in the Playground Equipment Schedule and as shown on drawings.
- b) Manufacturers
 - i) Manufacturers equipment, components and manufacturing procedures must comply with requirements specified. All products illustrated and referenced in construction drawings must comply with specifications requirements and applicable ASTM and CPSC standards and guidelines.

6) Materials

- a) Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and to comply with performance requirements for structural aluminum; mill finish or decorative baked-enamel powder-coat finish.
 - i) Extruded Bars, Profiles, Tubes and Posts: ASTM B 221 (ASTM B 221M).
 - (1) Equipment Support Structure will be 5 inches outside diameter in size with a 0.125 inches wall thickness (11 gage).
 - (a) Minimum yield strength of 35,000 lbf/sq.in. (241 MPa).
 - (b) Minimum tensile strength of 38,000 lbf/sq.in (262 MPa).
 - (c) Percentage elongation in 2 inches: 10%.

- (d) Modules of elasticity: 10×10^6 P.S.I.
- (e) Top caps for posts shall be aluminum die cast from 369.1 alloy and finished matching the post color. All caps shall be factory installed and secured in place with self sealing rivets- 3.0 rivets per cap recommended and preferred to secure cap tight with no wobble of cap.
- (f) A molded low-density polyethylene cap, with drain holes, shall be pressed onto the bottom end of the post to increase the footing area.

(2) Tubing:

- (a) Minimum yield strength of 35,000 lbf/sq.in. (241 MPa) and minimum tensile strength of 38,000 lbf/sq. in. (262 MPa); elongation in 2.0 inches: 10%; and modules of elasticity: 10×10^6 P.S.I.

b) Cast Aluminum: ASTM B 179.

- i) CLAMPS: All clamps shall be 'C' shaped, die cast with a 369.1 aluminum alloy and have the following mechanical properties:

- Ultimate Tensile: 47,000 PSI
- Yield Strength: 28,000 PSI
- Elongation: 7% in 2 inches
- Shear Strength: 29,000 PSI
- Endurance Limit: 20,000 PSI

360° Compression Clamp

- (1) Each functional clamp assembly shall have an appropriate number of half clamps and fastened to mating parts with (2) 3/8 inch x 1 1/8 inch hex-pin cap screws (SST) and (2) zinc/nickel plated carbon steel recessed "T" nuts. 0.25 inch aluminum drive rivet with stainless steel pin is used to ensure a secure fit to the post and additional shear strength.

- (2) Clamps have three functional applications and shall be named as follows:

- (a) Offset hanger clamp assembly.
- (b) Deck hanger clamp assembly.
- (c) Hanger clamp assembly.
- (d) Finish: powder coat finish with Epoxy Primer stage for added protection.

c) Steel Pipe Components:

- i) Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, hot-dip galvanized.
- ii) Steel Pipe: Standard-weight steel pipe complying with ASTM A 53 or electric-resistance-welded pipe complying with ASTM A 135, with minimum yield strength of 30,000 lbf/sq.in. (205 MPa); hot-dip galvanized internally and externally.
- iii) Steel Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513 or steel tubing fabricated from steel complying with ASTM A 569/A 569M and complying with the dimensional tolerances in ASTM A 500; with a minimum yield strength of 40,000 lbf/sq.in. (276 MPa) and a minimum tensile strength of 45,000 lbf/sq.in. (310 MPa); zinc coated internally and externally.
- iv) Steel Sheet: Commercial steel sheet complying with ASTM A 569/A 569M.

- v) Galvanized Steel Sheet: Commercial steel sheet, hot-dip galvanized, complying with ASTM A 653/A 653M for not less than G60 (Z180) coating designation; mill phosphatized.
 - vi) Stainless Steel Sheet: Type 304, complying with ASTM A 240/A 240M or ASTM A 666; cold rolled and finished on exposed faces with No. 2B finish.
- d) Decks, Platforms and Transfer Stations - Minimum Requirements.
- i) Fabricate from a single piece low carbon 12 gage steel sheet (0.105 inch) nominal thickness and a minimum of 4 slots in each face to accommodate face mounting of components.
 - ii) All decks shall be of modular design and have maximum 5/16 inch diameter punched holes in manufacturers standard perforation pattern not to exceed 1 inch spacing on center both ways.
 - iii) The sheet shall be perforated then flanged formed and reinforced properly to ensure structural integrity with little (1/16 inch maximum) to no flex.
 - iv) Upon completion of assembly and fabrication the perforated metal component shall be thoroughly cleaned in a hot phosphatizing pressure washer, and then primed with a water-based thermosetting solution. Primed parts shall be preheated prior to dipping in ultraviolet (UV) stabilized, liquid polyvinyl chloride (PVC), and then salt cured at approximately 400° Fahrenheit. The finished coat shall be 0.08 inch thick at an 85-durometer hardness and have a matte finish.
- e) Rails, Handloops:
- i) These parts shall be constructed of 1-1/8 inch O.D. Steel Tubing with a .120 inch wall thickness. Each end of the rail/hand loop shall have stainless steel knurled, welded insert with 5/8" internal threads. Exposed rails, and hand loops shall be either Powdercoat painted or be covered in a PVC type cover.
- f) Climber Components:
- i) Shall be constructed of 1.900" O.D. (.090 inch-.100 inch) galvanized steel tubing with a painted powdercoat finish. Painted finish is preferred to have an Epoxy primer stage before the powdercoat for better durability. Formed overhead rail is 1.315 inch O.D. RS-20 (.080 inch-.090 inch) galvanized steel tubing with a powdercoat (with Epoxy primer coat preferred) finish.
- g) Plastic Components:
- i) HDPE Parts: These parts shall be manufactured from 0.75 inch thick high-density polyethylene that has been specially formulated for optimum ultraviolet UV stability and color retention.
 - (1) Rotationally Molded Parts: These parts shall be molded using prime compounded linear low-density polyethylene with a tensile strength of 2500 psi per ASTM D638 and with color and UV stabilizing additives.
 - (2) Opaque Plastic: Color impregnated, UV stabilized, and mold resistant.

- (3) Polyethylene: Rotationally-Molded Poly Parts (components) such as: roofs, slides, tunnel slides, exit chutes, spiral slides, slide entrance hoods and climbers shall be fabricated using prime compounded linear low-density polyethylene from virgin plastic resin rotationally molded with UV stabilizing additives for color retention. These materials shall have a tensile strength of 2500 psi per ASTM D638. Wall thickness varies as noted:
- (a) Roofs – Double wall, with not less than 1/4-inch (0.250”) wall thickness.
 - (b) Slides – Double wall, with not less than 5/16-inch (0.312”) wall thickness.
 - (c) Activity Panels – Double wall, with not less than 1/4-inch (0.250”) wall thickness.
 - (d) Activity Panels Character Discs – Double wall, with not less than 3/16-inch (0.178”) wall thickness.
- (4) Polyethylene: Solid-Molded Poly Parts (components) such as: crawl tunnels, crawl tunnels entrance panels, activity panels, handhold panels, tunnel slides, and sign panels. Shall be fabricated using prime compounded linear high-density polyethylene from virgin plastic resin rotationally molded MDPE or HDPE with UV stabilizing additives for color retention. These materials shall meet density of 0.960 G/cc per ASTM D 1505, and have a tensile strength of 2400 psi per ASTM D638. Wall thickness varies as noted:
- (a) Tunnel Slides – single wall, with not less than 5/16-inch (0.312”) wall thickness and minimum 1 3/4 -inch (1.750”) wide flange at ends to allow for assembly by abutting up to adjacent surface. No slip assembly will be accepted on components.
 - (b) Crawl Tunnels – single wall, with not less than 5/16-inch (0.312”) wall thickness and minimum 1 3/4 -inch (1.750”) wide flange at ends to allow for assembly by abutting up to adjacent surface. No slip assembly will be accepted on components.
 - (c) Activity Panels and Handhold Panels – solid single wall, with not less than 0.75-inch (0.750”) wall thickness.
 - (d) Sign Panels – solid single wall, with not less than 3/4 -inch (0.750”) wall thickness.
- (5) Recycled Polyethylene: Fabricated from not less than 96.0% recycled, purified, fractional-melt plastic resin (provide information on percentage of recycled plastic and resin characteristics for review) for not less than 90.0% recycled post consumer waste by weight (provide information on recycled plastic characteristic such as percent post consumer recycled content) content HDPE.
- h) Transparent Plastic: Clear, colorless, abrasion-resistant, UV-stabilized monolithic polycarbonate sheet, not less than 3/16-inch (5 mm) thick.
 - i) Swing Chain and Fittings: 4/0 or 5/0, welded-straight-link coil chain complying with ASTM A 467/A 467M, Class CS; zinc plated and PVC color coated with colors as selected by Architect from manufacturers full range. With drop forged carbon steel, heat-treated and zinc plated Bolt Link, and Double Clevis steel connectors. Bolts shall be stainless steel per ASTM F 879, socketed and pinned tamperproof in construction.

- j) Post Caps: Cast aluminum, color to match posts. Caps to be factory installed and secured with self-sealing rivets.
- k) Hardware: Manufacturers standard hardware shall be stainless steel per ASTM F 879, socketed and pinned tamperproof in construction, with lock-tit adhesive on threads for extra securing measure. Hardware must have curved edges to prevent entanglement.
- l) Fasteners: Manufacturers standard hardware shall be stainless steel per ASTM F 879, socketed and pinned tamperproof in construction, with lock-tit adhesive on threads for extra securing measure. Fasteners must have curved edges to prevent entanglement.
- m) Drainage Fill: Washed coarse-aggregate mixture of crushed stone, or crushed or uncrushed gravel as required.
- n) Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 - i) Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81.0%, not less than 0.3-mil- (0.0076-mm-) thick, zinc pigmented coating.
 - o) Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.
 - p) Paint and PVC-Coat Finish: Comply with 16 CFR 1303 for limiting lead in paint.

8) Fabrication

- a) General: Manufacturer must provide equipment and components that are manufactured in their factory. Products will include: decks, ramps, stairs, platforms, roto-molded roofs, roto-molded slides, roto-molded panels, roto-molded activity panel disks, solid PVC panels, solid PVC tunnels, solid PVC slides, solid PVC handholds, barriers, handrails, and application of PVC coatings and paint finishes.
- b) General: Fabrication and Finishes - All assembly components with welds must be cleaned and kept free of slag and splatter. All PVC components, coated or fabricated, must have the same color and shade. PVC components and PVC coated components to include: slides, roofs, tunnels and activity panels.
- c) General: Provide sizes, strengths, thickness, wall thickness, and weights of components as indicated but not less than required to comply with structural performance and other requirements in ASTM F 1487. Factory drill components for field assembly. Unnecessary holes in components not required for field assembly are not permitted. Provide complete play structure, including supporting members and connections, means of access and egress, designated play surfaces, barriers, handrails, handholds, and other components indicated or required to comply with referenced standard(s) and as specified herewith for equipment indicated. No field modifications to equipment will be acceptable.

- i) Composite Play Structure: Provide complete play structure, designed to be modular, linked, and expandable, forming one integral unit for more than one play activity.
- d) Aluminum and Metal Frames: Fabricate mainframe upright support posts from aluminum with cross-section profile and dimensions as indicated in the Playground Equipment Schedule. Fabricate secondary frame members, bracing, and connections from either steel or aluminum. Unless otherwise indicated, provide each pipe or tubing mainframe member with manufacturers standard drainable bottom plate or support flange with structural performance and other requirements in ASTM F 1487.
- e) Rung Ladders, Stepladders, Stairways, Ramps, Step Platforms, and Transfer Points: Provide complete means of access and egress, with evenly spaced treads and rungs, easily grasped handholds, and slip-resistant foot surfaces. Provide manufacturers standard materials complying with requirements indicated and compatible with frame and play surfaces. Provide closed risers and protective barriers as indicated.
- f) Play Surfaces: Provide elevated decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed and framed to withstand loads and allowing for drainage: fabricated from perforated steel sheet with roll-formed edges; perforated steel sheet reinforced by steel strip welded to underside, with roll-formed edges; made into floor units with slip-resistant foot surfaces. Fabricate units in manufacturers standard modular sizes and shapes, to form assembled play surfaces as indicated on Drawings.
- g) Decks, Platforms, Landings:
 - i) All Decks, Platforms and Landings shall be fully braced with cross members on the underside to minimize vertical movement when loaded.
 - ii) Deck assembly and connections must fit snugly and wrap around support posts to eliminate entanglements and ensure that assembly provides for a properly supported deck at clamp.
- h) Ramps:
 - i) All Ramps shall be fully braced with cross members on the underside to minimize vertical movement when loaded.
 - ii) Assembly and connections of ramps with decks must fit snugly and securely to eliminate entanglements and tripping hazards.
- i) Elevated Play Surfaces: Provide protective devices, completely surrounding play surface except for access openings where play-surface heights above protective surfacing exceed the following based on age group indicated:
 - i) Two through five years: Unless otherwise indicated, provide protective barriers if play-surface heights above protective surfacing exceed 6.0 inches (152 mm).
 - ii) Five through 12 years: Unless otherwise indicated, provide protective barriers if play-surface heights above protective surfacing exceed 12.0 inches (300 mm).
- j) Stepped Play Surfaces: Provide protective infill between stepped platforms. Ensure that all stepped play surfaces comply with ADAAG requirements.

- k) Protective Barriers: Fabricated from welded metal pipe or tubing with vertical bars; sheet steel with openings for vision and ventilation; metal-pipe or tubing-framed, welded wire; solid-plastic panels; plastic panels with openings for vision and ventilation; plastic panels with flat, circular window made from transparent plastic; plastic panels with circular, three-dimensional bubble window made from transparent plastic; and fabricated with any openings within the barrier and between the barrier and the play surface precluding passage of the torso probe according to the most stringent requirements in ASTM F 1487 and CPSC No. 325. Provide barriers designed to minimize the possibility of climbing, free of hand- and footholds, and configured to completely surround the protected area except for access openings, no guard rails shall be used on the structure. Extend barriers to the following height above the protected elevated surface for use by age group indicated:
 - i) Two through Five Years: Top surface not less than 29 inches (740 mm) high.
 - ii) 5 through 12 Years: Top surface not less than 38 inches (970 mm) high.

- l) Handrails and Handhold Panels: Handrails - Welded metal pipe or tubing, OD between 0.095 to 1.55 inches (24.1 to 39.4 mm) and 0.125 inch (3.2 mm) thick. Handhold Panels – solid single wall, with not less than 3/4-inch (0.750”) wall thickness. Provide handrails at height between the following dimensions for use by age group indicated:
 - i) Two through 12 Years: 22 to 38 inches (560 to 970 mm).
 - ii) Two through Five Years: 22 to 26 inches (560 to 660 mm).
 - iii) Five through 12 Years: 22 to 38 inches (560 to 970 mm).

- m) Structural Plastic Panels, Tubes, Tunnels and Slide Chutes: Opaque plastic, unless transparent plastic is indicated. All structural plastics shall be fabricated by Playground Equipment Manufacturer and not supplied or purchased from separate manufacturer.

- n) Roofs and Canopies: Fabricated from opaque plastic; clear polycarbonate plastic; polyethylene; recycled polyethylene; metal; metal-pipe or tubing-framed with high-density polyethylene or welded wire, designed to be positioned overhead and to discourage and minimize climbing by users.
 - i) Roofs and Canopies must maintain a head clearance of 6 feet from deck surface or highest adjacent deck or stair surface to lowest underside portion of Roof and Canopy.

- o) To-Fro Swing Seats: Provide seat cushioned with soft edges, in style indicated, designed to accommodate one child at a time.
 - i) Belt Seats: Fabricated from flexible EPDM rubber encapsulating a slash-resistant metal insert, securely attached at each end to stainless steel end plates with galvanized steel fittings for attaching chains.
 - ii) Swings: Design single-axis swings with pivot points for suspended swing seats at no greater than 8 feet (2.4 m) above protective surfacing.

- iii) Molded Bucket Seats: Roto-molded double wall plastic not less than ¼ -inch (0.250”) wall thickness.
- p) Equipment for Users Two through Five Years Old: Comply with the following:
 - i) Infant/Tot Swing Seats: Provide encircling, full-bucket-type swing seats designed to support a child on all sides with no danger of strangulation or entrapment when tested according to ASTM F 1487. Provide chains and fittings or other means to suspend seat so the underside of the occupied seat is no less than 24 inches (610 mm) above protective surfacing.
 - ii) Swings: Design single-axis swings with pivot points for suspended swing seats at no greater than 8 feet (2.4 m) above protective surfacing.
 - iii) Overhead Fixed Horizontal Equipment: Design equipment with horizontal members spaced apart no more than 12 inches (305 mm) on center.
- q) Climbing Ropes, Cables, and Chains: Designed to be secured at both ends so length cannot be looped back on itself creating a loop with an inside perimeter greater than 5 inches (127 mm). Ropes, cables, and chains with length 7 inches (178 mm) or less may be attached at one end only.
- r) Flexible Net Climbers:
 - i) Flexible Climbers other than Nets must be constructed to securely connect flexible-climber components used as access to other components at both ends. For components with one end connected to ground level, provide flexible climbers designed with the anchoring connection to ground placed beneath the base of protective surfacing.
 - ii) Nets must be constructed of a galvanized six-stranded and tempered steel wire rope. The steel wire cores must be heated and tightly wrapped with plyamide yarn; the wrapping must be inductively melted on to each strand individually to ensure that surface fibers are removed through initial friction. Edges of ropes must be reinforced with additional steel wire core. Tempered ropes are used exclusively for climbing nets. All hardware must be as follows: Mast and mast foot of seamless steel (ST-37); S-clamps, hasps, chains, threaded rods, u-bolts and press-in shells of Stainless steel; Rope eyelets, anchor bars, turnbuckles and hammock anchors of Hot-dipped galvanized steel; Swages, end pressings, mast head, post clamps and bearers of Aluminum; and Post caps of Rubber.
- s) Steel and Iron Components: Galvanized, galvanized and color coated, color coated or PVC coated. Bare metal steel or iron components are not permitted.
 - i) Color-Coated Pipe and Tubing for Main Frame: Galvanized before applying baked-enamel powder coating.
 - ii) Play Surfaces: PVC or Baked polyester-enamel powder coated steel.
 - iii) Color-Coated Pipe and Tubing for Component Frames: PVC-coat or baked-enamel powder coat applied to steel or galvanized steel.

9) Cast-in-place Concrete

- a) Concrete Materials and Properties: Comply with requirements to produce normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi (20.7 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum size aggregate.
- b) Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C 387 and mixed at the site with potable water, according to manufacturers written instructions, to produce normal-weight concrete with a minimum 28-day compressive strength of 3000 psi (20.7 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum size aggregate.

10) Metal Finishes, General

- a) Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations on applying and designating metal finishes.
- b) Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- c) Steel, Galvanized Steel and Aluminum Finishes
 - i) All metal components finish shall be thoroughly cleaned and phosphatized through a five-stage power washer.
 - ii) Parts are then thoroughly dried, preheated and processed through a set of automatic powder spray guns where a recommended and preferred minimum .002 inch of epoxy primer is applied. A minimum .004 inch of architectural-grade Super-Durable polyester TGIC powder is applied. The average film thickness is .006 inch.
 - (1) Powdercoat Finish is formulated and tested per the following ASTM standards.
 - (2) Manufacturer to provide a list of standard colors.
 - iii) PVC Finish: Manufacturers standard, UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped, PVC-plastic finish, with flame retardant added, complying with coating manufacturers written instructions for pretreatment, application, and hardness.

11) Examination

- a) Site visit is required to examine areas and conditions, with Installer, Architect, and Parks and Recreation Director or designee present, for compliance with requirements for site clearing, earthwork, site surface and sub-grade drainage, and other conditions affecting performance.
 - i) Installer shall not begin any work until final grades have been approved by Architect and Parks and Recreation Director or designee.

- b) Proceed with installation only after unsatisfactory conditions have been corrected and approved by Architect and Parks and Recreation Director or designee.

12) Preparation

- a) Verify locations of playground perimeter and pathways. Verify that playground layout and equipment locations comply with requirements for each type and component of equipment.

13) Installation, General

- a) General: Comply with manufacturers written installation instructions, unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated on Shop Drawings.
 - i) Maximum Equipment Height: Coordinate installed heights of equipment and components with installation of protective surfacing. Set equipment so fall heights and elevation requirements for age group use are within required limits of construction drawings and shop drawings. Verify that playground elevations comply with requirements for each type and component of equipment.
- b) Post and Footing Excavation: Hand-excavate or mechanically excavate with augur all holes for posts and footings to dimensions, profile, spacing, and in locations indicated on Drawings, in firm, undisturbed or compacted sub-grade soil. Level bearing surfaces with drainage fill or brick to required elevation.
- c) Post Setting: Set mainframe equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Verify that posts are set plumb or at the correct angle and are aligned and at the correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
 - i) Concrete Footings: Smooth top, and shape to shed water.

14) Field Quality Control

- a) Protect all equipment to prevent from damaging factory applied finishes: PVC coatings, and Powder coat finishes, during installation. Damaged surfaces will be evaluated for extent of damage and Architect and Parks and Recreation Director or designee will determine corrective measures required to restore factory applied finishes.
- b) Contractor, Installer or Manufacturer will restore damaged equipment due to delivery, neglect, or vandalism, at no additional cost to Owner, as determined by Parks and Recreation Director or designee.
- c) Arrange for playground equipment manufacturers technical personnel to inspect playground and playground equipment and components during installation and at final completion and to certify compliance with the following:

- i) ASTM F 1487.
- ii) CPSC No. 325.
- iii) SECTION 02881 - PLAYGROUND EQUIPMENT AND STRUCTURE

d) Audit:

- i) Upon completion of equipment installation, the contractor shall hire an independent NPSI Certified company approved by Parks and Recreation Director or designee to inspect and audit equipment and installation for compliance with specifications and applicable standards and guidelines.
- ii) Notify Designer and Parks and Recreation Director, or designee, 48 hours in advance of date audit will be performed and of time for final inspection.
- iii) Audit agency may be PlaySafe, LLC.®, contact telephone number is (877) 529-7233.
- iv) Any deficiencies and discrepancies found must be corrected and re-audited to ensure that equipment and installation comply with all applicable specifications.

15) Adjusting

- a) Adjust movable playground equipment components to operate smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.

16) Cleaning

- a) After completing playground equipment installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component as determined by Architect and Parks and Recreation Director or designee.

17) Playground Equipment Schedule

- a) Swing Main Frame and Accessories: Comply with ASTM F 1487 and CPSC No. 325 requirements and the following:
 - i) Products: Tot-Swings.
 - ii) Products: Belt Swings.
 - iii) Products: Roto-Molded Swings.
 - iv) Traditional Style: Frame fabricated from aluminum steel pipe or tubing securely joined by aluminum pipe or tubing yokes for pipe connections and fasteners with one, two, three, or four connected frame section(s) as shown on the drawings. Support frames must be two-leg arch upright end supports.
 - (1) Pipe or Tubing OD: Not less than 5 inches (127-mm) OD, upright leg and overhead beam.
 - (2) Overhead Beam Height: 8 feet above protective surfacing.
 - v) Chain: Standard link or Short link not permitting finger penetration; link must be PVC coated; and chain length and number of chains as required to complete swing installation.
 - vi) Swing Connector Type: Double clevis and bolt link.
 - vii) S-Hooks are not acceptable.

- viii) Swing Hanger: Galvanized heavy-duty ductile iron designed for swing action indicated.
 - ix) Color-Coated Frames: Colors to be selected during submittal review.
- b) To-Fro Swings (infant/tot users younger than four years old): Comply with ASTM F 1487 and CPSC No. 325 requirements for the following:
- i) Products: Tot-Swing.
 - ii) Swing: Single-axis, single-occupant swing. Provide no more than two swings per support frame section, located as indicated on Drawings.
 - (1) Flexible Infant/Tot Seat: Full-bucket type, with insert consisting of steel sheet end plates with steel cable reinforcement and standard infant/tot-size leg holes.
 - (2) Colors: Colors to be selected during submittal review.
- c) To-Fro Swings (Two through five years old and from five to 12 years old): Comply with ASTM F 1487 and CPSC No. 325 requirements as shown on the drawings and according to the following:
- i) Products: Flexible Belt Swing.
 - ii) Swing: Single-axis, single-occupant swing. Provide no more than two swings per support frame section, located as indicated on Drawings.
 - (1) Flexible Belt Seat: U-shaped profile, not less than 6 inches (150 mm) wide by 24 inches (610 mm) long by 5/8 inch (16 mm) thick, with a 22 gage stainless-steel spring insert and (4.0) - 0.1.05" stainless steel washers.
 - (2) Colors: Colors to be selected during submittal review.
- d) Therapeutic To-Fro Swings (five through 12 years old): Comply with ASTM F 1487 and CPSC No. 325 requirements and the following:
- i) Products: Roto-Molded Seat.
 - ii) Swing: Single-axis, single-occupant swing, designed to support the body of the user as indicated, complete with safety restraint of torso and leg with harness and a pull device for setting swing in motion. Provide number of swing(s) as indicated on Drawings.
 - (1) Rigid Seat: Full-body or Head and torso support, fabricated from rigid molded polyethylene.
 - (2) Colors: Colors to be selected during submittal review.
- e) Rocking/Springing Equipment (two through 12 years old): Comply with ASTM F 1487 and CPSC No. 325 requirements and the following:
- i) Products: as shown on drawings.
 - ii) Single Seating: use standard Manufacturers equipment with a capacity to accommodate one user. Style based on equipment listed on drawings.
 - iii) Seat: Single in quantities as shown on drawings, fabricated from cast aluminum or high-density polyethylene; with handholds and footrests.
 - (1) Animal figures to be manufactured of cast aluminum.
 - (2) Fun Shapes – animals, autos, trains, and plains to be manufactured of high-density polyethylene material a minimum of 0.75 inch thick.

- (3) Colors: Colors to be selected during submittal review.
 - iv) Spring to be a minimum of 5-5/8 inch in diameter, steel wound, from 9/16 inch thick tempered steel with a guaranteed firm support, and designed to not have any pinch points when loaded.
 - (1) Colors: Colors to be selected during submittal review.
 - v) Support Frame: Consists of 3.5 inch outside diameter galvanized steel tubing that is a minimum of 0.120 inch thick and a 0.25 inch thick by 10 inch diameter zinc plated steel mounting plate(s) as required for installation by Manufacturer.
 - (1) Colors: Colors to be selected during submittal review.
- f) Freestanding Slide (two through 12 years old) : Comply with ASTM F 1487 and CPSC No. 325 requirements and the following:
- i) Products: as shown on drawings.
 - ii) Sliding Surface Configuration: Flat or curved to be inclined and/or wavy as shown on drawings.
 - iii) Sliding Surface Chute: Single, double-parallel or side-by-side, three-side rail, double-diverging, chute(s) as shown on drawings.
 - iv) Unit: Designed for sliding-down action along a straight-aligned, quarter-turn, half-turn or C-shaped, three-quarter-turn, full-turn spiral, S-shaped, or squiggle-shaped; descending chute with horizontal entrance transition platform and exit region. Provide roto-molded double wall hoods at entrance and roto-molded double wall chute at exit for assisting transition from standing to sitting at entrance and return to standing position at exit. Provide complete freestanding unit with elevated access and at-grade exit complete with stairs or ladders, enclosed entry platform, secure end, and intermediate or center support members, bracing, and connections. Equipment as shown on drawings.
 - v) Slide Fabrication: Flat with integral, full-length side rails; U-shaped with integral, full-length side rails; Round tube or tunnel, ID not less than 30 inches; Oval tube or tunnel, minor ID not less than 30 inches; formed into a one-piece slide from securely joined sections that assemble with flanges. Slide-in inserts (similar to a coupling) for assembly of slide sections are not acceptable.
 - (1) Sliding Surface and Slide Rails: Made from rotationally molded LDPE, MDPE or HDPE plastic, or molded HDPE plastic.
 - (2) Assembly points of slides with sections or deck will not have any gaps. Gaps are defined as an opening that allows light to be visible through it.
 - (3) Colors: Colors to be selected during submittal review.
 - vi) Slide Access: Stair or step-ladder with handrails, Vertical ladder, and Vertical ladder with side handrails, as shown on drawings.
 - vii) Sit-down Entrance: With opaque plastic roto-molded double wall hood with opaque plastic panel barriers where shown on drawings, to include at minimum an overhead handhold.
 - (1) Color: Colors to be selected during submittal review.
 - viii) Color-Coated Support Frame: Colors to be selected during submittal review.
 - ix) Color-Coated Access, Handrails, and Handholds: Match support frame with color as selected during submittal review.

- g) Freestanding Climbers (two to 5 years old, or two to 12 years old as shown on drawings): Comply with ASTM F 1487 and CPSC No. 325 requirements and the following:
- i) Products: as shown on drawings.
 - ii) Jungle Gym Type Units: Climbers with galvanized metal pipe and tubing frames or punch steel and molded panels (coated with Powder coating or PVC material) such as: arched ladders, inverted rung arched ladders, vertical ladders, serpentine ladders, or staggered-stacked blocks as shown on drawings.
 - iii) Theme Unit(s): Climbers with galvanized metal pipe and tubing frames supported by polyethylene theme panels designed for climbing action may have various theme type climbers as shown on drawings.
 - iv) Color-Coated Support Frame: Color to be selected during submittal review.
- h) Sand Manipulating Equipment (two through five years old): Comply with ASTM F 1487 and CPSC No. 325 requirements for range of users, and the following:
- i) Products: as shown on drawings.
 - ii) Sand Box: Designed for containing sand at ground level.
 - (1) Box: One-piece unit fabricated from opaque plastic with integral bottom and not less than four raised sides with perimeter benches; opaque plastic lid; vinyl lid; elevated, opaque plastic roof; as shown on drawings.
 - (2) Box: Secured-in-place, weather-resistant made of containment barrier interconnected modular units, forming perimeter raised side/edge not less than 12.0 inches (305 mm) high, for containing sand; fabricated from opaque plastic and anchored with manufacturers standard corrosion-resistant-coated metal or non-corrodible anchor stakes.
 - (3) Box: Wood products are not acceptable.
 - i) Accessible Sand Table: Elevated, three-dimensional, one-piece box designed for containing sand. Fabricate box from opaque plastic with integral bottom and not less than four raised sides with opaque plastic lid. Secure table and opaque plastic roof to support frame designed to be accessible to wheelchair users.
 - j) Sand Digger: Operable digger designed to dig and dump sand and rotate 360 degrees, consisting of steel pipe or tubing support frame and hand controls, steel sheet arms, and cast-aluminum seat and scoop; with oil-impregnated bearings at pivot points.
 - k) Accessible Sand Digger: Operable digger designed to dig and dump sand and rotate 360 degrees and to be accessible to wheelchair users, consisting of steel pipe or tubing support frame and hand controls, steel sheet arms, no seat, and cast-aluminum scoop; with oil-impregnated bearings at pivot points.
 - l) Sand Chute: Unit designed for pouring sand into and through funneling. Panel fabricated from opaque plastic and attached to upright support posts.
 - i) Colors: Colors to be selected during submittal review.

- m) Talk Tubes: Pair, designed for talking through, fabricated from steel pipe or tubing and steel sheet metal, and connected by flexible sound tube.
 - i) Products: Location of talk tubes as shown on drawings.
 - ii) Colors: Colors to be selected during submittal review.

- n) Signs or Signage: Manufacturers standard sign panels, fabricated from: PVC and/or opaque plastic with graphics molded in or polyethylene with graphics molded in, attached to upright support posts and complying with the following:
 - i) ASTM 1487
 - ii) Products: As shown on drawings.
 - iii) Text: To include wording for welcome and age-appropriate rules and adult supervision requirement for all ages; safety rules; contact information for damage observed; manufacturers identification and telephone number; Warning symbol and text related to installation over hard surfaces, and/or transfer point for accessibility. Provide sample of text for review.
 - iv) Sticker showing Warning Symbol and text related to installation over hard surfaces.
 - v) Sticker showing the age appropriate use of equipment.
 - vi) Colors: Colors to be selected during submittal review.

- o) Composite Play Structure: Provide composite play structure assembled from manufacturers standard modular-sized units, in arrangement indicated on Drawings. Provide all necessary components for a complete, coordinated structure, with bracing and connections designed for safe and secure anchoring, attaching, and joining of components and accessories. Comply with ASTM F 1487 and CPSC No. 325 requirements for range of users from two through five, five through 12, or two through 12 years old, and the following:
 - i) Products: As shown on drawings.

- p) Main Frame Posts: Straight or arched upright support posts fabricated from the following material(s) as shown on drawings. Profile and dimensions with permanent finish grade line marking or sticker furnished and installed at factory:
 - i) Aluminum Pipe or Tubing: Not less than 5-inch (127-mm) OD and not less than 0.125-inch (3-mm) thick wall.
 - ii) Aluminum or Galvanized Steel Pipe or Tubing: Manufacturers standard OD and wall thickness for secondary support frames of slides, tunnels, ramps, climbers and/or overhead activities.
 - iii) Aluminum Pipe or Tubing and Polyethylene or PVC Plastic Composite Construction as shown on drawings.
 - iv) Colors: Colors to be selected during submittal review.

- q) Play Platform: Modular – hexagonal; rectangular; octagonal; square; equilateral triangle; 45-degree triangle, or extension of shape(s) and any combination thereof as indicated on Drawings.

- i) Cushioned Surfacing: Where indicated, provide topside platform surface covered with manufacturers standard color PVC, non-slip, cushioned surfacing of thickness as specified.
 - ii) Deck Assembly: to provide a smooth, uniform joint, free of gaps and cover plates that create a tripping hazard.
 - iii) Large Span Deck Assembly: must provide support from underside without post supports protruding above play surface or cover plates that create a tripping hazard(s).
 - iv) Colors: Colors to be selected during submittal review.
- r) Activity Panel Play Component: Metal pipe or tubing and opaque plastic panel as shown on drawings, attached to play structure, providing a protective barrier or attached at ground level to upright support posts.
- i) Graphics: Molded on panel or molded on activity disk.
 - ii) Colors: Colors to be selected during submittal review.
 - iii) Activity Type: May include, but are not limited to: oval or round three-dimensional, transparent plastic bubble; round crawl hole; abacus; alphabet; counter or storefront; math; stainless-steel mirror; sand chute; steering wheel; tic-tac-toe; drums; maze; theme such as nautical, space, racing, earth, insects, animals, etc.; and table or bench as shown on drawings.
- s) Balance Play Component: Metal balance beam: beam in a straight line; beam in a curved line; beam in a serpentine line; beam in a zigzag line; and beam and parallel bar handrails in a straight line, with steel pipe or tubing support frame.
- i) Colors: Colors to be selected during submittal review.
- t) Bridge Play Component: Rigid, moving suspension-type; flat or arched with protective barriers, handrails, and edge protection at each side; aligned along an angled, curved, or straight-ahead course, of configuration as illustrated on drawings.
- i) Form: Arched; double-arched; or level, horizontal-type frame designed for spanning platforms installed at the same height.
 - ii) Form: Arched; inclined-ramp; accessible inclined-crawler-ramp; or wheelchair-accessible inclined-ramp type frame designed for spanning platforms installed at different heights.
 - iii) Travel Surface: Rigid platform; flexible belt or cable net, flexible PVC coated chain cargo net; suspended moving plank; single moving plank suspended by chains; boulder or rock-style bridge.
 - iv) Ridged bridges to have edge protection made of minimum 0.75-inch thick steel plates that are minimum 2 inches high above bridge walking surface and to be coated with PVC as specified herewith. Edge protection must run full length of bridge on both sides.
 - v) Colors: Colors to be selected during submittal review.
- u) Climber Play Component: Inverted-arch; inverted-hump; inclined; corkscrew; spiral; upright or vertical wave type frame designed for climbing action aligned along an angled; curved; serpentine; straight up and down or wavy course.

- i) Handholds: Fixed-in-place handholds consisting of parallel bars or polyethylene panels as called out and shown on drawings.
 - ii) Hand and Footholds: Fixed-in-place hand and footholds for climbing, consisting of parallel bars; a series of climbing bars; a corkscrew or spiral coil; a helical coil; a ladder; a half-arch ladder; a side-by-side double half-arch ladder; a sine wave, snake, or tree with center support post; a series of regularly spaced horizontal rings or loops supported by post(s); interconnected loops; corkscrew with center support post.
 - (1) Ladder Rungs: Straight, semicircular, U-shaped bars.
 - (2) Corkscrew or spiral climbers to have a clearance of 10 inches minimum between coils as measured perpendicular from rung to rung without obstruction to allow for unobstructed sliding feature.
 - (3) Protective barrier at a platform entrance/exit shall have an opening with a maximum horizontal dimension of 15 inches (380mm) and a minimum vertical clearance dimension at opening of 60 inches (1520 mm) to allow for transition to and from platform.
 - iii) Color: Colors to be selected during submittal review.
- v) Climber Play Component PC: A panel, series of panels, stepped series of blocks, cylinders, or other three dimensional shapes, ramp, step ramp, wall and series of walls designed for climbing.
- i) Hand and Footholds: to be integrally formed hand and footholds, or Metal pipe or tubing handholds.
 - ii) Protective barrier at a platform entrance/exit to composite structure shall have an opening with a maximum horizontal dimension of 15 inches (380mm) and a minimum vertical clearance dimension at opening of 60 inches (1520 mm) to allow for transition to and from platform.
 - iii) Colors: Colors to be selected during submittal review.
- w) Flexible-Climber Play Component: Non-rigid unit designed for climbing action along inverted-arch-shaped; inclined or vertical course with a handrail on each side.
- i) Hand and Footholds: Bar-and-chain-grid cargo net; bar-and-chain ladder; climbing chain fixed at both ends; chain ladder fixed at both ends; ladder with chain rungs; climbing cargo rope net fixed at both ends.
 - ii) Protective barrier at a platform entrance/exit to composite structure shall have an opening with a maximum horizontal dimension of 15 inches (380mm) and a minimum vertical clearance dimension at opening of 60 inches (1520 mm) to allow for transition to and from platform.
 - iii) Colors: Colors to be selected during submittal review.
- x) Climber/Sliding Pole Play Component: Designed for climbing-up and sliding-down action on a straight, wavy metal pipe or tubing along a single, dual parallel or banister direction track with inclined or vertical pathway.
- i) Protective barrier at a platform entrance/exit to composite structure shall have an opening with a maximum horizontal dimension of 15 inches (380mm) and a minimum vertical clearance dimension at opening of 60 inches (1520 mm) to allow for transition to and from platform.

- ii) Color: Colors to be selected during submittal review.
- y) Crawl Tube and Tunnel Play Component: A rotationally molded MDPE or HDPE plastic with transparent plastic inserts as called for on drawings with a tube or tunnel designed for crawling through, aligned along straight, curved, quarter-turn, half-turn, C-shaped, S-shaped, serpentine, squiggle course or with a directional off-set.
- i) Form: Arched level or horizontal shape designed for spanning platforms installed at the same height from ground entrance to ground exit level.
 - ii) Form: Arched inclined offset shape designed for spanning platforms installed at different heights from ground level to platform height or from platform to platform set at differing heights.
 - iii) Tube or Tunnel: Round with not less than 30 inch (760-mm) diameter, or oval with not less than 30 inch (760-mm) minor diameter.
- z) Tube or Tunnel: must be fabricated with integral flanges for assembly, pre-drilled and aligned at factory, no field modifications to flanges will be acceptable. Flanges must be manufactured so that assembly is similar to a male/female connection; coupling type assemblies are not acceptable.
- i) Entrance and Exit Panels: Designed to permit access at an accessible height of 8 inches (200 mm) or less.
 - ii) Entrance and Exit Panels: Tube or tunnel must assemble with flange onto ¾ - inch solid compression-molded plastic HDPE panel; coupling type assemblies are not acceptable.
 - iii) Vision and Ventilation Cutouts: As indicated on Drawings. To be factory cut, routed smooth and uniform in shape with smooth clean edges.
 - iv) Window: Oval or round with three-dimensional, transparent plastic bubble; dimensions and location as indicated on Drawings.
 - v) Graphics: as indicated on Drawings.
 - vi) Colors: Colors to be selected during submittal review.
- aa) Overhead Play Component: Designed for pull-up and hand-over-hand upper-body action along overhead chinning bar, parallel bars.
- i) Component as shown and called on drawings.
 - ii) Pull-up bar to be 1 3/8 inch minimum outside diameter tubing.
 - iii) Parallel bars to be 2.25 inch minimum outside diameter tubing.
 - iv) Colors: Colors to be selected during submittal review.
- bb) Overhead Play Component: Designed for pull-up and hand-over-hand upper-body action along overhead: single, dual side-by-side parallel, track(s) aligned along angled, circular, curved, serpentine, straight-ahead, or wavy course.
- i) Form: Arch, inverted-arch, level, horizontal, wave-type elevated frame designed for spanning above end supports or platforms installed at the same height; fabricated from a single bar or beam, or double bar or beam as shown on drawings.

- ii) Form: Arched, inclined, wave-type elevated frame designed for spanning above end supports or platforms installed at different heights; fabricated from parallel bars, single bar or beam as shown on drawings.
 - iii) Form: support frame for overhead play components to be 2.25 inch minimum outside diameter.
 - iv) Form: overhead play components to be a minimum length of 96 inches as measured from center of support posts to center of opposing support posts.
 - v) Fixed Overhead Handholds: Fixed-in-place handholds consisting of metal pipe or tubing for parallel bars, straight ladder rung bars, semicircular ladder rung bars, U-shaped ladder rung bars, serpentine-shaped bar, ring holds, D-shaped holds, triangular-shaped holds, U-shaped holds.
 - vi) Movable Overhead Handholds: Handholds, each suspended by movable fitting permitting limited movement; fabricated from metal pipe or tubing ring holds, D-shaped holds, triangular-shaped holds, U-shaped holds.
 - vii) End Climbers: Ascending/descending ladder as needed at one or both ends.
 - viii) Colors: Colors to be selected during submittal review.
- cc) Slide Play Component: Designed for sliding-down action along a straight-aligned, quarter-turn, half-turn or C-shaped, three-quarter-turn, full-turn spiral, 450 degree turn spiral, 540 degree turn spiral, S-shaped, squiggle-shaped descending chute with horizontal entrance transition platform and exit region. Provide roto-molded double wall PVC hoods with handholds and other positional aids at entrance for assisting transition from standing to sitting at entrance. Provide unit with properly secured assembly free of gaps at composite play structure and at grade exit secure end with intermediate and/or center support members, bracing, and connections as required to provide adequate strength of slide component.
- i) Products: As shown on drawings.
 - ii) Unit: Designed for sliding-down action along a straight-aligned, quarter-turn, half-turn or C-shaped, three-quarter-turn, full-turn spiral, S-shaped, or squiggle-shaped; descending chute with horizontal entrance transition platform and exit region. Provide roto-molded double wall hoods at entrance and roto-molded double wall chute at exit for assisting transition from standing to sitting at entrance and return to standing position at exit. Provide complete freestanding unit with elevated access and at-grade exit complete with stairs or ladders, enclosed entry platform, secure end, and intermediate or center support members, bracing, and connections. Equipment as shown on drawings.
 - iii) Sliding Surface Configuration: Flat or curved to be inclined and/or wavy as shown on drawings.
 - iv) Sliding Surface Chute: Single, double-parallel or side-by-side, three sides rail, double-diverging, chutes as shown on drawings.
 - v) Slide Fabrication: Flat with integral, full-length side rails; U-shaped with integral, full-length side rails; round tube or tunnel, ID not less than 30 inches; oval tube or tunnel, minor ID not less than 30 inches; formed into a one-piece slide from securely joined sections that assemble with flanges. Slide-in inserts similar to a coupling for assembly of slide sections are not acceptable.

- vi) Sliding Surface and Slide Rails: Made from rotationally molded MDPE or HDPE plastic, or molded HDPE plastic.
 - vii) Assembly points of slides with sections or deck will not have any gaps. Gaps are defined as an opening that allows light to be visible through it.
 - viii) Sliding Surface: Slide bed sections must be fabricated to ensure that gaps do not exist at any given point through the full length of the connections upon complete assembly of sections.
 - (1) Color: PVC colors must match shade and color of all PVC components.
 - ix) Sit-down Entrance: With roto-molded double wall PVC canopy or hood enclosure with an overhead handhold or combination of overhead and side handholds.
 - x) Window: Oval or round three-dimensional, transparent plastic bubble; dimensions and location as indicated on Drawings.
 - (1) Color: PVC colors must match shade and color of all PVC components.
 - xi) Colors: Colors to be selected during submittal review. All PVC colors to match with any PVC component of the composite playground structure.
- dd) Track Ride Play Component: Designed for hold-on-by-hand upper-body action for moving down an overhead track aligned along angled, curved, serpentine, straight-ahead or wavy course.
- i) Track: Sloped in a straight or curved line - downward direction. Provide unit with single metal track or two parallel metal tracks with resilient rubber bumpers/stops at each track end. Equipment as illustrated on design.
 - ii) Roller Assembly: Trolley and wheels with sealed ball bearings.
 - iii) Overhead Handholds: Handholds, each connected to a trolley assembly, and fabricated from metal pipe or tubing in a D - shape.
 - iv) Entrance: Manufacturers standard-type platform or end climber as shown on drawings.
 - v) Landing: Manufacturers standard-type platform or end climber as shown on drawings.
 - vi) Colors: Colors to be selected during submittal review.
- ee) Ladders, Step Ladders, Scrambler or Crawl Ramp as Play Structure Ingress/Egress Component: Designed to provide access to and travel between components, or from ground to component, aligned along angled, curved, spiral, straight-ahead, straight-up course spanning different elevations as illustrated on drawings.
- i) Handholds: Provide protective barriers and handrails or handrails and handholds on each side, as illustrated on drawings.
 - ii) Risers and Closure Plates: For closing vertical spaces between steps and multilevel platforms.
- ff) Accessible Platform Step or Stair, Ramp, Transfer Platform or Turn-around Platform.
- i) Handholds: Provide protective barriers with handrails or handholds on each side.
 - ii) Risers and Closure Plates: For closing vertical spaces between steps and multilevel platforms.

- iii) Accessibility: Provide unit designed to allow access from wheelchair at ground to platform or platform to platform as illustrated on drawings.
- gg) Play Structure Access Component: Designed to provide accessible access to and travel between components or between ground and components at different heights.
 - i) Handholds: Provide protective barriers, handrails or handholds on each side as illustrated on drawings.
 - ii) Risers and Closure Plates: For closing vertical spaces between steps and multilevel platforms.
 - iii) Accessibility: Provide unit designed to allow access from wheelchair at ground to platform or from platform to platform.
- hh) Roof or Canopy Play Component: Varied roof structure design, including arch, barrel vault, dome, gable, pagoda, four-square hipped, pyramid, or umbrella.
 - i) Roof or Canopy: Made from rotationally molded double wall MDPE or HDPE plastic, or molded HDPE plastic.
 - ii) Colors: Colors to be selected during submittal review. All PVC colors to match with any PVC component of the composite playground structure. Variations in color or shade are not acceptable.
- ii) Playground Equipment Warranties - Manufacturers Warranty requirements for equipment and components.
 - i) 3 years warranty on all moving parts, minimum.
 - ii) 15 years warranty on all plastics, minimum.
 - iii) Lifetime warranty on Aluminum or Steel 5 inches diameter Post Frames.
 - iv) Lifetime warranty on all steel elements.
 - v) Lifetime warranty on Cast Aluminum 'C' clamps.
 - vi) Warranty must be inclusive of replacement of any defective equipment and components.
- jj) Contractor's Warranty
 - i) One year for workmanship.

Playground Fall Surfacing

1) Playground Fall Surfacing

a) Engineered Wood Fiber

- i) Must meet Head Impact Criteria (HIC) of 570 or less for the maximum critical height of the structure's highest designated play surface plus 3 feet.
- ii) Engineered wood fiber shall be used as specified if applicable and shall comply with most current versions of ASTM-1292 and ASTM-F 1951 and F 2075.
- iii) IPEMA certificates of compliance, samples and test results shall be provided.
- iv) Test Reports in compliance with latest ASTM F1292, F1487, F2075, CPSC Handbook and ADAAG Standards:
 - (1) Sieve Analysis.
 - (2) Hazardous Metal Test.
 - (3) Tramp Metal Test.
 - (4) G-Max.
 - (5) HIC.
 - (6) Accessibility.
- v) Wood fiber to consist of 100% pre-consumed recovered wood of randomly sized wood fibers – refer to ASTM F2075.
- vi) Recycled wood from pallets, discarded construction lumber or bark mulched shall not be used.
- vii) Warranty Covers Playground Surfacing for following period:
 - (1) Engineered wood fiber Playground Surfacing: 15 years.
- viii) Installation Procedure
 - (1) Install the wood fiber in lifts. 6 inches loose, then wet and compact with mechanical compactor. Repeat steps until the desired final thickness (12 inches minimum) is achieved.
- ix) Playground Surfacing Wear Mat:
 - (1) Provide as specified on plans.
 - (2) Install as recommended by Manufacturer.
 - (3) Warranty: Five years.

b) Playground Safety Tiles:

- i) Must meet Head Impact Criteria (HIC) of 570 or less for the maximum critical height of the structure's highest designated play surface plus three feet.
- ii) Test Reports in compliance with latest ASTM F1292, CPSC Handbook and ADAAG Standards:
 - (1) G-Max
 - (2) HIC
- iii) IPEMA certificates of compliance, samples and test results shall be provided.
 - (1) Install as recommended by Manufacturer.
 - (2) Installation by Manufacturer certified installer.
- iv) See appendix for specifications and installation.

- v) Playground Safety Tiles Warranty:
 - (1) Warranty: 10 years.

- c) Resilient Poured-in-Place Rubber Surfacing:
 - i) Must meet Head Impact Criteria (HIC) of 570 or less for the maximum critical height of the structure's highest designated play surface plus three feet.
 - ii) Test Reports in compliance with latest ASTM F1292, F1487, F2479, CPSC Handbook and ADAAG Standards:
 - (1) G-Max
 - (2) HIC
 - iii) IPEMA certificates of compliance, samples and test results shall be provided. See appendix for specifications and installation.
 - (1) Install as recommended by Manufacturer.
 - (2) Installation by Manufacturers certified installer.
 - iv) Playground Safety Tiles Warranty:
 - (1) Warranty: Five years.

Park Furniture Specifications

1) General

- a) Park furniture includes items such as: park benches, picnic units, trash receptacles and pet waste dispensers as listed in this section.
- b) Products can be Powder Coated, or an acceptable alternative product approved by Parks and Recreation Director, or designee.
 - i) All products must be formulated to resist chemical attack, and retain weather ability, dielectric strength, fire resistance, abrasion resistance, and other properties as are applicable to park site conditions.
- c) See appendix for selection types.
- d) It shall be the Contractors responsibility to receive, inventory, store and secure all park furnishings to protect from weatherization and vandalism. Damaged equipment shall not be approved for installation.

2) Park Benches

- a) See appendix for approved selections.
- b) Frame must be fabricated to allow for in-ground mount installation or surface mounted by bolt down method through steel plate as required in drawings per field application.
- c) Color to be selected from manufacturers available color pallet.

3) Picnic Units

- a) Frame Supports must be tubular steel with finish specified herewith and to include the following features:
 - i) See appendix for approved selections.
 - ii) Frame must be fabricated to allow for in-ground mount installation or surface mounted by bolt down method through steel plate as required in drawings.
 - iii) Color to be selected from manufacturers available color pallet.
- b) Benches and Table Tops requirements
 - i) See appendix for approved selections.
 - ii) Forms and Shapes as available for Benches above and noted on drawings.
 - (1) Manufacturer to provide frame supports on the underside of the bench as is required for installation onto tubular frame anchor plate(s).

- iii) Table Tops must be fabricated by Manufacturer to provide frame supports on the underside of the bench as is required for installation onto tubular frame anchor plate(s) and to make top as rigid as possible.
 - iv) Color – sample of Manufacture colors needs be provided for selection.
 - c) Special Items
 - i) Game Tables may be required in project drawings and must be furnished as is applicable.
- 4) Trash Receptacles
 - a) See appendix for approved selections.
 - b) Trash receptacle specifications include:
 - i) 32 gallon capacity.
 - ii) An inner rigid plastic liner.
 - iii) Flat lid with 14 inch opening that can be secured to the main body.
 - iv) In-ground mounted.
- 5) Pet Waste Dispensers
 - a) See appendix for approved selections.
- 6) Installation
 - a) Installation must comply with manufacturers recommendations and in compliance with all applicable building codes and State and Federal mandates to include TAS and ADAAG.
- 7) Warranty
 - a) One year for workmanship.
 - b) Manufacturers Warranty.

Bicycle Rack Specification

- 1) Submittals
 - a) Product Data: For each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.
 - b) Provide available color samples for selection.
- 2) See appendix for details.
- 3) Warranty
 - a) Manufacturers standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include vandalism.
 - b) Warranty Period for workmanship: One year from date of Substantial Completion.
- 4) Execution
 - a) Examine areas with Installer present for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
 - i) Proceed with installation only after unsatisfactory conditions have been corrected.
 - b) Comply with manufacturers written installation instructions, unless more stringent requirements are indicated. Complete field assembly of bicycle racks, where required.
 - c) Install bicycle racks level, plumb, true, and securely anchored and positioned at locations indicated on Drawings.

Metal Shade Standard

1) Metal Shade Requirements

- a) Metal shade structures such as, gazebos, pergolas and canopies must be all steel construction with vertical columns, roof steel frame, 24 gage minimum metal roofing panel and multiple color choices for both frame and roof.
- b) Metal shade structure must be anchored by method that does not produce any exposed bolts or anchors. Metal shelter structure must be set so that concrete pad is monolithic.
- c) Metal shade structure must be constructed to allow for installation of wiring, conduits and lighting.
- d) Metal shade structure must have a metal eave beam with flashing along the lower edges of the roof panels to ensure that there are no sharp edges.
- e) Metal shade structure must have all welds applied by a certified welder.
- f) All metal shade steel frames must be primed at the factory prior to shipping. Care must be taken during installation to ensure that primer finish is not damaged. All primed surfaces shall be touched up prior to the application of finish coats.
- g) All surfaces of the metal shade structure shall be field-painted with a minimum of three finish coats of paint recommended by the manufacture.
- h) Metal shade canopy must have engineered drawings designed, stamped, signed and sealed by a Professional Engineer registered in the State of Texas. Drawings must be submitted for review and approval by Building Services and Permitting Department.
- i) Metal shade footings must be constructed as required by Profession Engineer design.
- j) Metal shade must be assembled and installed per manufacturer recommendations.
- k) Metal shade eaves will not be less than ten feet above adjacent ground or concrete pad. Structure height may be higher based on application.
- l) Maximum ridge height shall be 20 feet above finish grade.

Basketball Courts

- 1) General
 - a) Basketball court posts will be installed as recommended by Manufacturer and concrete will be minimum 3,000 psi strength.
- 2) The following requirements will be minimum standards for concrete slabs for basketball courts.
 - a) Structural requirements for post tension concrete pad to be designed by a Structural Engineer.
 - b) Maximum court dimensions shall be 84 feet long by 50 feet wide.
 - i) Concrete slab to be 94 feet long by 60 feet wide, with heavy broom finish.
 - ii) Concrete slab may be poured in 12 sections with 0.5 inch expansion joints with square edge (no rounded edges). Expansion joints to have 0.5 inch diameter dowels 24 inches long placed at minimum 18 inches on center.
 - iii) All expansion joints shall be sealed with colored silicone sealer.
 - iv) Concrete slab to be minimum 4 inch thick with re-enforcing as determined by Structural Engineer (re-bar or post tension slabs are acceptable); Slab shall have perimeter footings that are 12 inch deep and 12 inch wide with re-bar re-enforcing.
 - v) Concrete slab to be specified psi concrete strength at 28 days.
 - vi) Concrete to have a 3 inch slump plus or minus 1 inch.
 - vii) Concrete to have aggregate from 0.75 inch to 1 inch in size.
- 3) Basketball court colors and striping
 - a) Colored concrete mix to have integral color using a liquid dye. Colors to be coordinated with Parks and Recreation Director, or designee.
 - b) Court to be striped with 2 inch wide painted lines for out-of-bounds, mid-court, jump circle, shooting foul and three point shot line.
 - i) Paint to be appropriate for application on concrete surface for outdoor use.
 - ii) Provide submittal of color selection applied to court surface, and out-of-bounds areas suitable to differentiate these areas.
- 4) Basketball Posts, Boards, and Rims (refer to appendix)
 - a) All equipment to be approved by Parks and Recreation Director, or designee.
- 5) Warranty
 - a) Manufacturers Warranty.
 - b) One year for Workmanship.

Tennis Courts

- 1) General
 - a) Tennis court posts will be installed as recommended by Manufacturer and concrete will be minimum 3,000 psi strength.
- 2) The following requirements will be minimum standards for concrete slabs for tennis courts.
 - a) Slab shall be post tension concrete to be designed by a Structural Engineer.
 - b) Tennis Court to be 76 feet long by 36 feet wide and shall be built to US Tennis Association Standards.
 - c) Concrete pad to be post tension concrete with heavy broom finish.
- 3) Tennis court marking
 - a) Concrete mix to have integral color; color to be coordinated with City of El Paso staff.
 - b) Court to be striped with 2 inch lines for base line, service line, center service line, center mark, doubles side line and singles side line.
 - i) Paint to be appropriate for application on concrete surface for outdoor use.
 - ii) Provide submittal of color selection applied to court surface, and out-of-bounds areas suitable to differentiate these areas.
- 4) Tennis Court Posts and Net
 - a) All equipment must be approved by Parks and Recreation Director, or designee.
- 5) Warranty
 - a) Manufacturers Warranty.
 - b) One year for workmanship.

Sand Volleyball Courts

1) General

- a) Volleyball Posts will be installed per manufacturer requirements and with adequate concrete footings to ensure post alignment remains plum when net is stretched and secured. Concrete for footings will be 3,000 psi strength.

2) The following requirements will be minimum standards for Sand Volleyball Courts.

- a) Volleyball court to be 60 feet long by 30.0 feet wide.
- b) Concrete header curb to provide an area 100 feet long by 60 feet wide for sand.
- c) Concrete header-curb to be 6 inch wide by 24 inch high and imbedded in undisturbed ground a minimum of 8 inches; ½ - inch expansion joints to be at each corner and center of court and scored joints to be placed every 5 feet.
- d) Concrete Header Curb to be at specified strength at 28 days.
 - i) If header curb is machine formed it shall have long fiberglass re-enforcement at a quantity of 1.5 pound per cubic yard of concrete if machine set.
 - ii) If header curb is hand formed and placed the header curb shall have three number four re-bars placed horizontally the full length of the curb evenly spaced within the curb for re-enforcing; number three re-bars shall be installed every four feet on center to secure the horizontally placed re-bars.
- e) Concrete to have a 3 inch slump plus or minus 1 inch.
- f) Concrete to have aggregate in 0.75 inch size.
- g) Concrete shall be broom finished.
- h) Honeycombing or poor consolidation of concrete will not be accepted.
- i) Volleyball Court shall have minimum 12 inches of coarse, washed, mortar sand. Submit sample for Parks and Recreation Director, or designee approval.

3) Volleyball posts and nets

- a) All equipment must be approved by Parks and Recreation Director, or designee.

Athletic Facilities

General Site Preparation of Athletic Facilities

- 1) Related Work
 - a) Irrigation System – must be in place prior to planting, and meet all specifications outlined in the Irrigation section of the Design Standards.
- 2) General site preparations for installation of turf and landscape materials.
 - a) Comply with General Quality Control.
 - b) Contractor to provide and pay for all soil and materials testing.
 - i) Testing agency/lab shall be acceptable to Park and Recreation Director, or designee.
 - ii) Soil samples shall be extracted for analysis jointly by the Parks and Recreation Director, or designee, and the contractor/developer's representative.
 - iii) Enough material will be extracted to send one sample to lab and hold another as a back-up.
 - iv) Testing shall be performed in top 36 inches of the rootzone, both existing and any proposed imported materials, to determine the following:
 - (1) pH - potential hydrogen in the soil, which is a measurement of soil acidity.
 - (2) Determine soil's physical characteristics - soil type, infiltration, percolation, organic matter, salinity, etc.
 - (3) Any recommended soil amendments.
 - v) All recommendations from testing facility regarding amendments to existing soil, or imported materials, to make site sustainable for projected use will be considered by Parks and Recreation Director, or designee.
 - vi) For Irrigation Systems using Reclaimed water the Contractor shall provide a copy of Soils report to El Paso Water Utilities Reclaimed Water Division. Contractor shall furnish a verification receipt to Parks and Recreation Director or designee.
 - vii) If there is excessive soil to be moved during grading which can change the soil profile additional testing may be required after grade work is complete.
 - c) Soil preparation, grading, and inspections
 - i) Initial site work
 - (1) Before soil moving/earthwork occurs, a meeting between Contractor and Parks and Recreation Director, or designee, will take place to cover soil sampling/testing, elevations, slopes etc. on site.
 - (2) Grading
 - (a) To ensure quality of soil texture and percolation, adjustments could be made during grading to improve the quality of the soil; if approved by Parks and Recreation Director, or designee.
 - (3) After completion of rough grade/initial earth moving, Contractor must contact Parks and Recreation Director, or designee, to inspect elevations, slope, etc. prior to this phase of work being considered complete.

- (a) Contractor must contact Parks and Recreation Director, or designee, at least five working days prior to the desired inspection.
- ii) Soil surface preparation
 - (1) Soil Surface, for this design standard, will be the upper 12 inches of the soil profile.
 - (2) Tillage, any operations outlined by the contract, including the incorporation of soil amendments deemed necessary after soil testing occurs will be inspected by Parks and Recreation Director, or designee.
 - (a) Soil is to be worked with minimum soil moisture content to avoid excessive compaction.
 - (i) If due to water leaks or excessive rainfall, work will cease until site is back to good workable state.
 - (ii) Application of soil amendments or fertilizer shall be done so that consistent placement of amendments occurs though out the site as specified.
 - 1. Location for loading and unloading of all soils amendments, etc., will be approved by Parks and Recreation Director, or designee prior to deliveries.
 - (b) Depth control of tillage equipment must remain consistent throughout the site.
 - (i) If Contractor uncovers rocks, trash or debris, Parks and Recreation Director, or designee, should be immediately notified.
 - (3) Laser leveling
 - (a) Laser leveling is required for all athletic fields. The Park and Recreation Director, or designee has the right to inspect the dialed slope settings in transmitters.
 - (b) If there are any changes necessary to adjust slopes during laser leveling, such as rock, caliche, and unforeseen objects, Contractor will immediately notify Parks and Recreation Director, or designee.
 - (c) Laser Leveling:
 - (i) Once finish grade for all athletic fields have been inspected and approved, the fields will be laser leveled based on plan specifications for cross slope and drainage.
 - (ii) Irrigation system will be installed with mainline, laterals, and swing-joints capped prior to final laser level.
 - (iii) Final laser level will be inspected by Parks and Recreation Director, or designee.
 - (4) Inspections
 - (a) Finished sod bed and turf preparations will be free of rocks 1 inch and larger.
 - (b) Inspections of final grades will be made by Parks and Recreation Director, or designee, once grading is finished to ensure slopes and elevations meet specifications.

3) Submittals

- a) Submit the following material samples:

- i) Sod (Parks and Recreation Director, or designee may elect to visit sod farm to inspect material prior to delivery).
 - ii) Fertilizer.
 - iii) Mulch, topsoil, and any other proposed amendment.
 - iv) Any planting accessories.
 - b) Submit the following materials for certification:
 - i) Fertilizer(s) analysis.
 - ii) Sod
 - (1) Sod Growers Certification of turfgrass species, and identifying source location.
 - c) Submit materials test report.
 - d) Upon completion, submit written maintenance instruction recommending procedures for maintenance of areas.
- 4) Materials
- a) Fertilizer - A granular turf product that is non-burning and composed of slow release nitrogen with phosphorus and potassium.
 - i) Initial Fertilizer application to amend the soils, prior to sodding or planting, will be determined by the Landscape Architect/Designer based on the soil reports for the site. The blend and application rates shall be determined by the Landscape Architect/Designer.
 - ii) Turf Maintenance Fertilizer: will be applied after sodding and have a fertilizer ratio approved by the Landscape Architect/Designer, with an application rate of 1 pound of Nitrogen per 1,000 sq ft applied every four weeks
 - iii) Ammonium Phosphate for turf areas: if required, application rate of 300 lbs per acre (7 lbs. per 1000 sq ft)
 - b) Organic material - Composted material that is shredded to a fine workable state.
 - c) Water – Free of substances harmful to plant growth. All hoses or other methods of transportation furnished by Contractor.
- 5) Deliveries, Storage, and Handling
- a) General
 - i) Deliver all materials in original unopened containers with labels clearly showing weight, analysis, and manufacturer.
 - ii) Store in a manner to prevent packaging and materials from becoming wet, damaged, or deterioration.
 - iii) Handling of materials should be done in a manner that promotes worker safety and efficient use of materials.

b) Sod – refer to Turf Grass section for preparation, installation and maintenance.

6) Cleaning

a) Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soils, debris, and equipment. Repair damage resulting from planting operations.

Field and Court Lighting

- 1) General
 - a) These minimum performance specifications are for softball, baseball, soccer, football and other athletic lights.
 - b) Light fields with MUSCO Control-Link green system, or approved equal.

Facility Type	Area Lighted	Quantity	Quality	
			Uniformity Ratio	Smoothness
		Minimum		
Soccer/Football	Entire field	50 foot-candles	1.5:1	Over the entire field, the change in quantity of horizontal should not occur at a rate greater than 10% per 10 feet.
Baseball/Softball	Infield	50 foot-candles		
Baseball/Softball	Outfield	30 foot-candles		
Basketball Court	Entire area	20 foot-candles		
Volleyball Court	Entire area	20 foot-candles		
Tennis Court	Entire area	80 foot-candles		
Skate Park	Entire area	20 foot-candles		
Handball Court	Entire area	30 foot-candles		

- 2) Environmental control, aiming angles, poles
 - a) All fixtures shall be compliant with City of El Paso Municipal Code Chapter 18.18 (Outdoor Lighting).
 - b) The sports lighting designer shall determine the proper pole height, location and aiming angles.
 - i) The sports lighting designer shall submit their recommendations to the Parks and Recreation Director, or designee, for approval prior to installation.
 - c) All pole types will be considered, except the following.
 - i) No direct burial steel poles or wood poles will be approved by the City of El Paso.
 - d) The pole must be designed for 100 mph IBC-C 2003 code and will need to be submitted to Parks and Recreation Director, or designee, for approval prior to installation.

3) Security Lighting

- a) There shall be sufficient lighting in and around athletic facilities to prevent unsafe and inappropriate actions.
 - i) The parking area shall be maximum 5 foot-candles with a uniformity ratio of 3:1 average/minimum.
 - ii) Areas utilized for passage, and areas immediately bordering the facilities should be lit to a maximum of 2 foot-candles with a uniformity ratio of 4:1 average/minimum.

4) Method of Measuring Light Quantity

- a) The light meter shall be held 36 inches above the athletic field surface with the sensing surface horizontal to the ground.
 - i) The light meter shall be correctly calibrated.

5) Aiming Recapture Device

- a) Light fixtures shall have a positive latching device for each luminaire on the assembly. The device shall provide for automatic repositioning of the aiming after re-lamping.

6) Electrical Box

- a) The electrical box shall be located approximately 10 feet above grade on each pole.
 - i) This box shall contain ballasts, capacitors, and a thermal magnetic breaker/disconnect device, grounding lug and individual breaker for each fixture.
- b) The electrical box shall be a NEMA 3R rated gasket sealed enclosure to house the ballasts, capacitors, thermal magnetic breakers and distribution lugs. Fuses will not be allowed. Any fuses shall be replaced with breakers.
- c) Identification of Electrical Components
 - i) Enclosed wiring, ballasts and capacitors shall be labeled with permanent marking for easy identification.

7) Grounding Lug within Electrical Box

- a) One 10 gage grounding wire shall be provided within the electrical box which is rigidly fastened to the enclosure.
 - i) There shall also be provided a provision for a ground terminal of sufficient size to permit connection of the grounding conductors from the capacitors.

8) UL Listing

- a) The lighting equipment shall have a UL listing for all electrical components as an entire system and as an individual component.

9) National Electric Code

- a) The lighting equipment shall meet the National Electric and local code.

10) Insulation and Ground Resistance

- a) The insulation resistance of entire system, including all electrical components shall be above 100 mega ohm tested with 1000v megger.
- b) The ground resistance of remaining electrical system shall meet NEC Code.

11) Conductor Installation

- a) All main down conductors and all bonding conductors shall maintain a horizontal or downward coursing path, free from “U” or “V” (down and back up) pockets.
 - i) No bend of any conductor shall form an included angle of less than 90 degrees nor shall it have a radius bend of less than 8 inches.
- b) The wiring from the electrical box to the pole top shall be a factory wired, labeled and tested wire harness that is continuously spiral wound, wrapped in Mylar, and enclosed inside a plastic sheathing.
- c) The wires shall be color coded and match other wiring.
- d) The wire harness shall be supported at the top of the pole by a stainless steel wire mesh grip. There shall not be more than (13) conductors supported by a single wire mesh grip.
- e) The wire mesh grip shall be mechanically attached to a welded hook inside of the pole. The manufacturer is responsible for providing all necessary attachment hardware.

12) Lighting Contactor Cabinet

- a) The manufacturer shall provide a factory-assembled Lighting Contactor Cabinet (LCC).
- b) The LCC shall be factory assembled and wired by a UL listed panel builder and shall be a NEMA 4 rated gasketed enclosure.
- c) The electrical panel shall include the following components:
 - i) (2) Electrically held contactor with 120 volts coil, shall be GE, Square D or Seimen’s.
 - ii) (1) Capacitor back-up time clock Paragon, model #7004-120.

- iii) (2) Step down transformers - Primary 480/277, secondary 120V; with (1) 2-KVA, (1) 1-KVA. 1-KVA is for control and 2 KVA for outlet.
- iv) (1) SPDT switch with MANUAL, OFF and AUTO position.
- v) (1) Hour meter.
- vi) (1) 20A GFCI outlet mounted on the panel.
- vii) Breakers shall be GE, Square or Seimen's – (1) main breaker, (2) branch circuit breaks for electrically held contactors, (1) each for trans-formers primary and secondary, (1) each for control and outlet, (2) each, 277/120v spare breakers (as required.) No Fuses shall be allowed.
- viii) Any other component required for proper functioning of electrical power and control circuit of the lighting system.

13) Lamps

- a) Lamps shall be 1500 watts metal halide and shall meet ANSI designation.

14) Cabinet Labeling/Locking

- a) Each enclosure shall contain control and power wiring schematics as well as project-specific control schematics.
- b) Each lockable cabinet shall be permanently labeled to match the field diagrams, pole identification, breaker schedule, and other applicable components.

15) Electrical Load Balance

- a) The electrical load among the three phases shall be balanced.

16) Remote Monitoring and Wireless Activation

- a) All field lighting systems shall be equipped with remote electrical monitoring.
 - i) The remote electrical monitoring system shall monitor 'hand-off-auto' switch status and position, voltage and current of the system to determine the status of the circuit breakers, lamp/ballast outages, power failures, and all other electrical components of the lighting system that is subject to electrical failure.
- b) All field lighting systems shall be equipped with wireless activation.
 - i) The lighting system must be able to be activated via the Internet and/or by telephone.

17) Warranty and Long Term Service Requirements

- a) All equipment provided by the lighting manufacturer must be warranted by a comprehensive 20 year warranty and service package.

- b) Proof of a lighting manufacturers ability to meet this requirement must be submitted as part of the approval process.
- c) A copy of the warranty and service requirements shall be included in the specifications booklet.
- d) Warranty shall include, but is not limited to, replacement of lamp, ballast, socket, breaker, transformer, wiring, cleaning of reflectors and lens, and maintaining the light levels specified above for the duration of the warranty.
- e) The warranty date shall begin on the final completion date.

18) Penalties for Non-Conformance

- a) All lighting manufacturers must guarantee performance for light levels, uniformities, specifications related to spill and glare, delivery of product and assembly/erection in wiring.
- b) The warranty work shall be completed within 72 hours after notice from the owner excluding weekends and city holidays.
- c) Failure to meet the specifications listed and/or warranty will result in a penalty of \$100 per day until specifications and/or warranty are met.
- d) The lighting manufacturer will be responsible for all costs associated with modifying the system to achieve the specified performance.

19) Submittals

- a) All manufacturers/suppliers wishing to bid shall deliver the following submittal package:
 - i) Cut sheets of each proposed fixture.
 - ii) Photometric reports of each proposed fixture from an independent testing laboratory.
 - (1) In house generated photometric reports are not acceptable.
 - iii) Computer generated light level calculations showing compliance with the specifications. Include off-site spill calculations at 150 feet from field for both horizontal and vertical spill light values for review.
 - iv) Cut sheets of the lighting contactors and cabinet.
 - v) Cut sheets of all proposed lamps.
 - vi) Structural calculations for the pole base/foundation and pole when loaded with the proposed fixture quantity, including future fixtures.
 - vii) Detailed description of the warranty, service and re-lamping program.
 - (1) Include description of how the lighting manufacturer will deliver the required products and services, provide a sample contract that states in detail exceptions and conditions, and provide proof of insurance policy coverage.

- b) Written letter of guarantee is required to be submitted prior to release on shop drawings for manufacturing of lighting equipment.
 - i) Letter must state that all performance specifications and requirements will be met as part of the finished constructed work.
 - ii) Any and all necessary design and construction modifications must be fully detailed in letter and shop drawings and any deficient work must be corrected and completed within 30 days after notice from the owner and complies with these specifications.

Bleachers and Field Equipment

1) Bleachers

a) General

- i) All equipment must be approved by Parks and Recreation Director, or designee, and comply with all standards, codes, and regulations.

b) Installation

- i) To be performed as recommended by manufacturer.
- ii) Equipment must be assembled and installed in compliance with all applicable City of El Paso building codes, State and Federal requirements including, but not limited to, TAS and ADA.

2) Field Equipment

- a) All field equipment must be approved by Parks and Recreation Director, or designee.