TECHNICAL SPECIFICATIONS

FOOTHILL HIGH SCHOOL ATHLETIC FIELDS

OWNER:

EAST SIDE UNION HIGH SCHOOL DISTIRCT

830N. CAPITOL AVE. SAN JOSE, CA 95133

PREPARED BY:

LLOYD CIVIL & SPORTS ENGINEERING

PROJECT#18-115

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SECTION 31 22 00 GRADING

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The scope of this section relates to earthwork and grading operations.

B. Labor, materials, equipment, and services necessary to complete site preparation, grading, and related items as indicated on plans or in specifications.

1.2 SUBSTITUTIONS

A. Material substations or grading plan alterations are accepted only with written approval of Owner and or Engineer.

1.3 FINISHED GRADE

A. "Finished Grade" as used herein, refers to:

1. Top of synthetic turf infill.
2. Top of synthetic track surfacing.
3. Top of curb or finished grade of hardscape.

B. Unless otherwise indicated, provide uniform slopes between points for which finished grades are indicated or between such points and existing established grade.

C. The contractor is required to

1.4 GEOTECHNICAL REPORT

A. Refer to geotechnical report for additional information and requirements.

1.5 PROJECT CONDITIONS

A. The Contractor must verify existing conditions before starting work.

B. The Contractor must protect existing structures and facilities.

1. The Contractor must not interfere with use of adjacent buildings.
2. The Contractor must maintain free and safe passage to and from adjacent buildings and maintenance areas.
3. The Contractor must prevent movement or settlement of walls and structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.
4. The Contractor must cease operations and notify owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.
5. The Contractor must provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

1.6 QUALITY ASSURANCE

A. After completion of each grading operation the contractor must provide a conformance survey that verifies the field is within tolerance. The survey must be prepared on a (25’ x 25’) grid and submitted to the engineer for review and approval prior to starting next fill level / grading operation.

1. For synthetic track conduct conformance survey on subgrade, top of aggregate, top of base lift, top of finishing left and top of synthetic surface.
2. For synthetic turf conduct conformance survey on subgrade and top of aggregate base stone.

B. The contractor must, in the presence, of an Owners representative or the engineer perform a string line test on drain stone material prior to drain pad turf installation. The string line is to be run at 10' intervals over the entire field in both length and width directions. Any depressions or ridges exceeding 1/8" must be marked and then corrected by the contractor.

C. Conformance surveys are to be conducted and signed by licensed land surveyor.

D. String line testing may be performed by the contractor.

E. The Contractor must receive written approval of conformance survey prior to starting next fill level / grading operation. Proceeding without approval or working "at risk" is not acceptable.

PART 2 – MATERIALS

2.1 EXCESS OR UNSUITABLE MATERIAL

A. Excess or unsuitable material, broken asphaltic concrete, broken Portland cement concrete, pipes, etc., must be removed and disposed of by the contractor. Materials must be disposed of at an approved disposal site. Contractor must, prior to commencement of work, submit a letter to owner stating locations of disposal sites for excess materials, and certifying that they have obtained property owner's permission for disposal of surplus materials.

2.2 FILL MATERIALS

A. Soil Materials for subgrade, whether from sources on or off site, must be approved by the Geotechnical Engineer as suitable for intended use, and specifically for required location or purpose. Purchase and delivery of import materials, as required, will be the responsibility of the Contractor.

B. Trench spoils may be used for fill only when specifically accepted by Geotechnical Engineer and only when cut / fill requirements allow. The Contractor is responsible for spoils export as needed.

2.3 GRADE STAKES AND LINES

A. Grading, including sub-grading and finished grading of un-surfaced, as well as paved areas, must be controlled by such intermediate grade stakes and lines as may be necessary to obtain slopes and levels required by finished grade elevations shown on plans. Compacted sub-grades and finished grade surfaces must parallel and conform to control planes established by grade stakes and lines.

2.4 VERIFICATION OF QUANTITIES

A. Quantities shown on grading plans and sections are for contractor's convenience only and are guaranteed. Grading must be done in conformance with elevations shown on plans and in accordance with specifications. Discrepancies between such mentioned quantities and/or sections, and requirements of grading plans and/or specifications, will not entitle contractor to additional remuneration.

2.5 TOLERANCES

A. Sub-grade elevations may only vary within a tolerance of ± 1/2" in 10 feet, measure in any direction. Sub-grade elevations if not shown on plans are to be calculated by the Contractor based on finished grade and material thickness noted in construction details.

B. Top of drain stone elevations may only vary within a tolerance of ± 1/8" in 10 feet, measure in any direction. Top of drain stone elevations if not shown on plans are to be calculated by the Contractor based on finished grade and material thickness noted in construction details.

C. Finished grade elevations of playing field surfaces may only vary within a tolerance of ± 1/8" in 10 feet, measure in any direction.

D. Finished grade elevations of hardscape or pavement may only vary within a tolerance of ± 1/2" in 10 feet, measure in any direction. Regardless of tolerance allowed variance all general access walking surfaces must be ADA compliant (Americans with Disabilities Act).

E. The inside edge of the track perimeter sidewalk must meet track surface tolerances and provide smooth grade with no lips, dips or gaps from track to concrete sidewalk.

F. Finished grade elevations of track running and event surfaces may only vary within a tolerance of ± 1/8" in 10 feet, measure in any direction.

G. Regardless of tolerances the contractor is responsible for provide smooth transitions from varied surfaces such as hardscape to track or track to field.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Excavate areas shown on plans or as specified herein may include cutting for paving area and construction sub-grades, pipe line trenches, and turf areas.

B. Excavation must be kept free from water until compacted fills and structures are complete to above water, safe from uplift and horizontal water pressure and the backfill has been placed. De-watering equipment must be adequate to protect against flotation.

C. Excavated material not necessary to, or suitable for fill construction, must be removed from site.

3.2 GRADING

A. Prepare subgrade after stripping the existing remnants as required by Geotechnical Report. Subgrade preparation may include put is not limited to ripping, scarifying, moisture management and compaction. The contractor must prepare the subgrade and construct all subbase fill in a manner resulting in uniform water contents and densities after compaction. The presence of existing fill may require supplemental preparations that could include additional over excavation and re-compaction.

B. Placement and Compaction, the contractor must prepare the subgrade and place and compact any subbase fill per Geotechnical Report.

C. On-site soils and imported granular soils should be compacted at a moisture content near optimum. Depending on the actual soils and compaction equipment, compaction moisture contents may need to be changed to avoid or limit soil yielding or pumping.

D. At completion of grading work, site must be left in a clean and finished condition conforming to the drawing.

E. Sub-grade surfaces must be finished to uniform grades and slopes per drawings, and in such a manner as to drain properly and be free of depressions, which may cause areas of standing water.

3.3 GEOTECHNICAL TESTING AND INSPECTION

A. All earthwork operations including subgrade and backfill is to be tested and inspected by a Geotechnical Engineer prior to proceeding with work.

END OF SECTION

SECTION 31 23 33 – EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

Drawings and General Conditions of the contract, including Special Provisions and Special Conditions apply to this Section, but this section shall have precedence over Divisions “0” and “1” when regarding conflicts.

Part 1 General

A. Summary
   1. Furnish labor, materials, equipment, facilities, transportation and services to complete excavation, trenching, backfilling, compaction and related work as shown on the drawings and/or specified herein.
   2. Scope of work:
      The general extent of trenching, backfilling and compaction is shown on the drawings and may include, but is not necessarily limited to, the following:
      a. Storm Drainage System Installation
      b. Irrigation System Installation
      c. Concrete Paving Installation
   3. Related sections can include, but may not be limited to:
      a. Section 31 22 00 – Grading
      b. Section 33 46 00 – Stormwater Drainage

B. References & Regulatory Requirements
   State of California Department of Transportation Standard Specifications, latest revised edition, hereafter referred to as “Standard Specifications”.

C. Submittals
   Project Record Drawings:
   1. Conform to requirements of applicable Division One Specifications, General Conditions and Special Provisions.
   2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts and slope gradients as required.

D. Quality Assurance
   1. Control of Work: Comply with Section 5, CalTrans.
   2. Control of Materials: Comply with Section 6, CalTrans.
   3. Trench Safety: Comply with applicable portions of Sections 5 and 7 (CalTrans); requirements of OSHA (Occupational Safety & Health Administration) and of the California Department of Safety and Health (DOSH).

E. Sequencing And Scheduling
   Refer to other contract documents, determine extent and character of related work, and properly coordinate work specified herein with that described elsewhere to produce a complete operational installation.

PART 2 - PRODUCTS

1. Provide materials, as described below, free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles or other deleterious ad objectionable materials.
2. Select backfill material shall be sand conforming to Section 19-3.025B of the Standard Specifications.
3. Native backfill shall be acceptable soil material excavated from the project site. This material will be considered unclassified and no testing other than for

compaction will be required. Additional material required for backfill must be acceptable to owner's representative.

4. Permeable material shall be three-quarters inch (3/4") washed drain rock or approved equal.
5. Aggregate base shall be Class 2, ¾-inch maximum material conforming to Section 26-1.02A of the Standard Specifications.

Part 3 Executions

A. Preparation
   1. Prior to trenching, contractor shall pothole existing utilities at locations indicated or implied on plans, where new piping or utilities will cross existing utilities of uncertain depth to determine elevation of utilities in question and ensure new lines will clear potential obstructions.
   2. Contractor shall mark out construction areas in white, non-permanent paint and contact Underground Service Alert (U.S.A.) at 1-800-642-2444 to locate known utilities a minimum of 48 working hours prior to excavations.
   3. Should an existing crossing utility present an obstruction, proposed line shall be adjusted as acceptable to owner's representative to clear existing utility.

B. Trench Excavation
   1. GENERAL:
      a. Excavation shall include removal of water and any materials that interfere with construction. Remove water that may be encountered in trenches by pumping or other methods prior to laying pipe, bedding and backfill operations. Trenches shall be sufficiently dry to permit proper jointing and compaction.
      b. Direct vehicular and pedestrian traffic safely through or around the work area at all times.
      c. Relocate, replace, reconstruct or repair surface or subsurface improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by construction activities to an "as-was" or better condition than originally found.
      d. Except as specified in other sections or shown in drawings, this provision (referenced in #3 preceding) applies to surface improvements of whatever nature such as walls, fences, below-grade utilities, landscaping, paving, structures or other physical features whenever shown on drawings (or not) and to subsurface improvements such as utilities which may be indicated on drawings or marked in the field.
      e. Maximum allowable trench width at top of pipe shall be eighteen (18) inches greater than the pipe outside diameter.
   2. Walkway Areas: Backfill for trenches or other excavations within walkway areas should be compacted in six-inch (6") maximum layers or lifts, unless otherwise noted, with hand-held tampers to assure adequate sub-grade support.
   3. Compacted fill areas: Where trenches must be excavated in compacted fill, these trenches shall be backfilled with the fill materials excavated and re-compacted in the layers ant to the density specified for the particular area.
   4. Open trench:
      a. Leave no trench in an open un-protected condition at end of workday
      b. Protect open trenches at end of workday in a manner acceptable to owner's representative.

c. Make provisions for trench crossings and access at street crossings, driveways, water gate valves, and fire hydrants unless otherwise acceptable to owner's representative.

5. Excavated Material:
   a. Remove excess excavated material not required for backfill and legally dispose off-site at no cost to owner.
   b. Material excavated in streets and roadways shall be laid alongside trench no closer than two feet (2') from trench edge and kept trimmed to minimize inconvenience to public traffic.
   c. Provisions shall be made whereby storm and wastewater can flow uninterrupted in gutters or drainage channels to drainage structures.
   d. Excavated material shall not be stored on existing landscaping or paving without provisions being made to protect the surface below from being stained or otherwise adversely affected.

C. Pipe Bedding

Whenever the trench bottom is unsuitable for work due to wet or spongy foundation, trench bottom shall be de-watered as necessary. Sand, gravel or crushed rock will be needed to stabilize the foundation, subject to the approval of owner's approval.

D. Trench Backfill And Compaction
1. General:
   a. Construct backfill in two operations (initial and final).
   b. Do not backfill where the foundation material in trench is already saturated, except as acceptable to the owner's representative. Provide a minimum cover as may be specified.
   c. If settling occurs in trenches and pits that exceeds tolerances allowed for grading, excavate to a depth necessary to rectify the problem; then backfill and compact as specified herein and restore surface to required elevation.
   d. Where trenches cut across paved surfaces, place backfill in six-inch (6") maximum loose lifts. Compact backfill to 93 percent (plus or minus 2%) of ASTM D1557 maximum density.
   e. Compaction of the trench shall be accomplished in such a way that rolling and compacting the completed backfill along with the adjoining sub-grade material shall provide the specified density necessary to enable paving of the area immediately after backfilling has been completed.
2. Initial Backfill:
   a. Prior to trench backfill, owner's representative shall review and accept the condition of the trench and installation of pipe.
   b. Free-draining sand backfill material shall be used as initial backfill for utilities except irrigation piping, unless otherwise noted. After pipe has been properly installed and accepted by owner's representative, select backfill material shall be placed on both sides of the pipe and compacted to depth shown on Drawings. Initial backfill material shall be mechanically compacted in layers not exceeding six inches (6") in uncompacted depth and shall be brought up uniformly on both sides of pipe to avoid bending or distortional stress. Relative compaction of initial backfill material shall be at least 90% relative compaction.
3. Final Backfill:
   a. Native backfill material shall be used for final backfill, unless otherwise noted herein.

b. Final backfill compaction shall be accomplished by mechanical means with backfill material placed in layers not exceeding eight inches (8") in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of mechanical tampers, except manually held types, shall not be permitted.
c. Final backfill in paved areas shall be compacted to a relative compaction of 93% +/- 2 percent. In landscaped areas, provide acceptable topsoil to required depth and compact to 85% maximum relative compaction, or as directed by the soils report

4. Jetting: No jetting will be allowed.

E. Trench Surfacing:
1. General:
a. In unimproved areas, trench surface shall be restored to original conditions. No mounds of earth shall be left along the trench.
b. Backfill shall be flush with adjoining grade in a firm unyielding position with no visible settling for a period of one year after final acceptance.
2. In paved areas, temporary surfacing acceptable to owner's representative shall be laid within one day after backfilling until permanent paving is installed, unless contractor elects to place permanent surfacing within one day after finishing trench backfilling.

END OF SECTION 31 23 33

SECTION 32 12 00 ASPHALT PAVING

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

A. “Standard specifications” refers to “State of California Department of Transportation standard specifications” latest edition, and hereinafter referred to as “standard specifications”.

1.2 SCOPE OF WORK

A. Furnish labor, materials, equipment, facilities, transportation and services to complete asphalt paving and related work as shown in contract documents.

B. Work Included: The general extent of the asphalt paving is shown on the drawings and includes, but is not necessarily limited to, the following:

1. Asphalt Paving (for running track and for site hardscape)

2. Asphalt Overlay

C. Workmanship and material within this section shall conform to the standard specifications, except as modified herein.

1.3 JOB CONDITIONS

A. The pavement installer must review and accept the subgrade conditions and grading prior to installing base course or asphalt.

B. Construct asphalt concrete surface course when temperatures exceed 40 degrees F and when the base is dry.

C. Establish and maintain required grade lines and elevations.

1.4 PROTECTION OF WORK

A. Curbs, walls and other work shall be covered with suitable material and protected from injury by equipment and contact with oil, emulsion or asphalt. Manholes, catch basins and other gratings are shall be covered with suitable material so that no asphalt or emulsion will come in contact with the inside walls or floors of the structures. Damage to such work shall be repaired and/or replaced at the contractor's expense. Manhole rims and catch basin grates shall be adjusted, where necessary, to new finish pavement elevations.

1.5 TESTING AND INSPECTION

A. At owner's discretion, testing and inspection of asphalt pavement mixes and testing of placed stabilizing base course and asphalt pavement will be performed by independent testing laboratory appointed and paid for by owner.

B. If compaction tests indicate that stabilizing base course or asphalt paving do not meet specified requirements, contractor shall remove defective work, replace and retest at contractor's expense.

1.6 GENERAL REQUIREMENTS

A. Paving surfaces shall have positive drainage as indicated in the contract documents. Upon completion of the work, paved areas included in this section shall be subject to a water drainage test. Areas that fail to drain properly as determined by the owner or owners’ representative shall be corrected and repaired at no additional cost to the owner.

B. Asphalt concrete paving shall be free from cracking, pot holes, raveling, slippage, depressions, corrugations or other defects at the date of completion and acceptance of the project.

C. Repairs shall be made within ten (10) days of notification at no cost to the owner.

1.7 SUBMITTALS

A. Contractor to provide copies of material certificates signed by material producer and contractor, certifying that each material item complies with, or exceeds specified requirements.

1.8 REFERENCE

A. American Society for Testing and Materials: ASTM A-136, Sieve Analysis of Fine and Coarse Aggregates.

B. Contractor shall strictly adhere to all requirements of the Geotechnical Report.

1.9 QUALITY ASSURANCE

A. Codes and Standards: Comply with current Standard Specifications for Public Works Construction and with local governing regulations if more stringent than herein specified.

B. Manufacturer's Qualifications: Company with experience in manufacturing asphaltic concrete pavement for a period of five years minimum.

PART 2 – MATERIALS, PRODUCTS AND EQUIPMENT

2.1 MATERIALS

A. General: Use locally available materials, which exhibit a satisfactory record of previous installations.

B. Asphalt Aggregate Mixture: Provide plant-mixed, hot laid asphalt aggregate mixture complying with ASTM D3515 for asphalt concrete.

C. Asphalt Binder: Steam-refined paving asphalt conforming to CALTRANS section 92.

D. For track and dzone base course layer shall be 3/4" aggregate; finish course layer shall be 3/8" aggregate.

E. For site hardscape asphalt mix: plant mixed conforming to Caltrans Specification Section 39, Type B,1/2" maximum, medium grading. If elected by contractor site hardscape asphalt mix and section can be installed to match track section and mix.

F. For site hardscape outside of running track install asphalt at no less that 3" total in 2 lifts. Exposed asphalt to be sealed.

G. Soil sterilant shall be "Treflan" pre-emergence herbicide or approved equal.

H. Asphaltic emulsion shall be penetration type.

I. Primer for application on crushed stone base under layers (prime coat) shall be MC-1 or approved equal.

J. Primer for application on asphalt surfaces (tack coat) per CALTRANS 94.

K. If elected by contractor, the site hardscape asphalt mix and section can be installed to match track section and mix. Track mix and section may not be altered from plans and specs.

2.2 EQUIPMENT

A. Paving Equipment:

1. Approved power brooms, aggregate spreaders, bituminous material distributor and hauling vehicles.

2. Furnish equipment in such number and capacities as required to provide coordinated and uniform paving progress.

3. Aggregate spreaders shall be mechanical and either self propelled or attachable to the rear of a dump truck and be capable of spreading aggregate within the specified limits.

4. Bituminous material distributor shall provide controls for regulating and monitoring the spread of material at even temperatures and pressures on variable widths up to 15 feet.

B. Compacting Equipment:

1. Self-propelled vibratory steel drum rollers and pneumatic tired rollers shall be capable of exerting a ground pressure of not less than 80 pounds per square inch of contact area.
2. Manual pushed rollers will not be allowed.
3. Vibrating plate compactors shall be manually guided vibrating plate types.

2.3 SOURCE QUALITY CONTROL

A. Sieve Test: Sub-base and base aggregates in accordance with ASTM C-136 to determine particle size distribution.

B. Aggregate samples shall meet requirements of APWA for base aggregates.

PART 3 – EXECUTION

3.1 ACCEPTABLE APPLICATORS

A. Applicators: Company with experience in applying Asphaltic concrete pavement for a period of three years minimum. Additionally, the applicator shall have experience paving at least five (5) tracks within the past five (5) years, unless general contractor provides experienced personnel (Project Manager and/or Project Superintendent) who meet this requirement.

B. Soil Sterilant: Soil sterilant shall be applied in one (1) application: after base rock and before asphalt is laid. The material shall be uniformly applied according to the manufacturer's recommendations and at the minimum rate of 7.5 lbs. per 1000 sq. ft.

3.2 BASE

A. Base shall be placed and compacted in accordance with the pertinent provisions of the standard specifications.

B. Top of aggregate base rock layer shall receive prime coat conforming to standard specifications.

3.3 SURFACE PREPARATION

A. Remove loose material from compacted base rock surface (sub-base) immediately before applying prime coat.

B. Proof roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction with the owner or owner’s representative present.

C. Notify owner or owner’s representative in writing of unsatisfactory conditions. Do not begin paving work until deficient sub-base areas have been corrected.

D. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete. Distribute at a rate of .05 to .10 gallons per square yard of surface. Exercise care in applying materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged areas. A tack coat shall also be applied to the base course asphalt just prior to placing the top course asphalt.

3.4 LIQUID ASPHALT PRIME COAT

A. After base is ready to receive prime coat, contractor shall make a single, evenly distributed application of liquid asphalt at specified rates. Area shall be left for a period of twenty-four (24) hours to allow liquid asphalt to sufficiently penetrate the surface. Any excess liquid asphalt shall be absorbed with a covering of sand. Sand shall be placed to form an even surface without humps. Immediately in advance of placing asphalt concrete, additional prime coat shall be applied to areas where prime coat or paint binder has been destroyed.

B. Prior to the laying of the surfacing material, the base shall be thoroughly cleansed of all oil, dirt, loose material and excess sand. Either a power broom or hand brooms may be used.

3.5 PLACING MIX

A. General: Place asphalt concrete mixture on prepared surface, spread and strike off. Spread mixture at a minimum temperature of 275 degrees F for the base course layer and 266 degrees F for the finish course layer. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness. Asphalt placement shall be at the thickness shown on the plans.

B. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course.

C. Equipment: Spreading and rolling equipment shall be in accordance with the standard specifications.

D. Compaction shall be in accordance with the standard specifications.

E. Asphalt-leveling course shall cure a minimum of thirty days (30) prior to installation of the synthetic track surface.

3.6 ROLLING

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

3.7 FIELD QUALITY ASSURANCE

A. Asphalt surface shall meet the requirements of the NFHS and CIF.

B. Test in-place asphalt concrete courses for compliance with requirements for thickness, planarity and surface smoothness. Repair or remove and replace unacceptable paving as directed by owner or owner's representative.

C. Thickness: Tolerances for thickness shall be one eight (1/8) inch, plus or minus for running track and DZone (1/2" for site hardscape).

D. Planarity: Asphalt substrate shall not vary from designed cross-slopes by more than +/- 0.1%. Finished asphalt shall not vary, plus or minus more than 1/8" under a 10-foot straight edge in any direction for running track and DZone (1/2" for site hardscape).

E. In no case will polyurethane filler that is used to correct birdbaths be greater than 1/4" thick. (Running Track only)

F. Corrective Measures: It shall be general contractor's responsibility to determine if the planarity's, cross slopes, and general specifications have been met. If conditions have been met, general contractor shall notify owner's representative in writing of the acceptance of asphalt paving by track-surfacing contractor.

G. The Contractor shall water flood the surface of the asphalt in the presence of the owner or owner's representative. If after 20 minutes, "birdbaths" are evident in a depth more than 1/4", the track-surfacing contractor and the owner or owner's representative will determine the best method of correction at no cost to owner. All asphalt birdbaths between 1/8" and 1/4" in depth shall be filled by the synthetic surfacing contractor at the expense of the asphalt contractor. All asphalt

birdbaths less than 1/8” in depth can be filled by the synthetic surfacing contractor at his expense. (for running track only)

H. The sports surfacing contractor shall approve and accept the substrate prior to commencing preparation and installation of new track surfacing components.

I. Regardless of any stated tolerances above all hardscape must meet ADA slope and smoothness requirements.

END OF SECTION

SECTION 32 16 00 CONCRETE

PART 1 – GENERAL

1.1 CONTRACT DOCUMENTS

A. “Standard Specifications” refers to State of California Department of Transportation Standard Specifications, latest edition, hereinafter referred to as “standard specifications”.

1.2 SCOPE OF WORK

A. Furnish labor, materials, equipment, facilities, transportation and services for reinforced concrete pavement and related work as shown on drawings and includes, but is not necessarily limited to:

1. Concrete pavement
2. Concrete sidewalks
3. Concrete curbs & landscape walls
4. Fence post footings
5. Excludes concrete mix design for building foundations and structural elements.

1.3 STANDARDS

A. Materials and procedures for forming and reinforcing concrete shall conform to sections 51, 52 and 90 of the standard specifications, unless otherwise noted on the drawings or in these specifications.

B. Standard Plans for Public Works Construction, American Public Works Association, Southern California Chapter; and Associated General Contractors of California, Southern California Districts (also known as “The Green Book”).

C. ASTM C-94, Specification for ready-mixed concrete

D. ACI 347 Recommended Practice for Concrete Formwork

1.4 TESTS

A. An approved independent testing laboratory shall test structural concrete for conformance with the plans and specifications. Tests shall be submitted to Owner's representative for approval. Owner will pay for testing of structural concrete.

B. At the discretion of Owner, non-structural concrete like pavement may be tested by an independent testing laboratory for conformance with plans and specifications. Owner will pay testing services for non-structural concrete.

C. Concrete not conforming to requirements of plans and specifications shall be removed from site and replaced at contractor’s expense.

D. If concrete does not conform to requirements of contract documents as determined by testing, contractor shall reimburse Owner for testing costs relating to non-structural concrete.

E. Owner retains right to test replaced concrete and to require contractor to reimburse Owner for additional testing expenses.

PART 2 – MATERIALS

2.1 MINIMUM STRENGTH REQUIREMENTS

A. Contractor shall be responsible for designing concrete mixes to provide minimum requirements listed below. It is acceptable to increase cement content over that listed if necessary to obtain the specified compressive strength. Minimum ultimate compression strength of concrete for listed items at 28 days is as follows:

Description of Work	Strength Measured In psi	Max. Slump (ASTM C-143)	Size of Aggregate	Min. Cement Content (Lbs. Per C.Y.)	W/C Ratio
Sidewalk Concrete	3,000	4”	3/4”	517	0.50

2.2 CONCRETE MATERIALS

A. Concrete shall be Portland cement concrete conforming to standard specifications, section 90. Unless specified otherwise in specifications, continuous reinforced concrete pavement shall be Class B (6 sack/cy) concrete.

B. Cement shall be Type II, or Type V if required by soils engineer, cement conforming to ASTM Designation C-150 as modified by the standard specifications.

C. Air Entrainments shall conform to ASTM C-260, if required.

D. Water shall be clean and free from oil, acid, alkali, and organic matter.

E. Mix concrete in accordance with ACI 304.

F. Deliver concrete in accordance with ASTM C-94.

G. Select proportions for normal weight concrete in accordance with ACI 301.

H. Use accelerating admixtures in cold weather only when approved by Engineer.

I. Use of admixtures will not relax cold weather placement requirements.

J. Use calcium chloride only when approved by Engineer.

K. Use set-retarding admixtures during hot weather only when approved by Engineer.

2.3 OTHER MATERIALS

A. Formwork materials shall conform to standard specifications, section 51-1.05, and as specifically outlined, unless otherwise noted on the drawings.

B. Exposed sharp edges shall be chamfered with triangular fillets not less than ¾” x ¾” to prevent mortar runs and to preserve smooth, straight lines, unless otherwise directed by Owner or the drawings.

C. Use forming materials that will not discolor concrete.

D. Use forming materials of sufficient strength and with appropriate backing to insure that all lines are straight, true, and plumb and that all dimensions shown on the plans will be complied with once the formwork has been removed.

1. Curved surfaces shall be formed with materials of sufficient strength to provide that all lines

are straight, true, and plumb and that all dimensions shown on the plans will be complied with once the formwork has been removed.

E. Base rock shall be Class 2 as specified in standard specifications, section 26-1.02B.

F. Doweling shall be 18" Greenstreak Speed Dowel #4 or approved equal.

G. Pervious backfill shall conform to standard specifications, section 19.3.065.

H. Expansion joint material shall be pre-molded joint filler conforming to standard specifications, section 51-1.12C.

I. Expansion joint caulk shall be an approved polyurethane sealant, conforming to standard specifications, section 51-1.12F.

J. Reinforcing bars (re-bars) shall be intermediate grade deformed bars conforming to standard specifications, section 52-1.02A. Bars shall be clean new stock, free of rust, scale or other coatings that could affect the bond between bars and concrete. Bars shall be fy'60,000.

K. Water-stops shall conform to standard specifications, section 51-1.14, unless noted otherwise on drawings.

PART 3 – EXECUTION

3.1 EXCAVATION

A. In addition to general excavation required under Section 31 22 00, "Site Preparation & Grading", contractor shall excavate to the required depths in locations shown for walkways, footings, foundations and etc. Excess excavation shall be replaced with an 800 psi 2-sack slurry mix prior to placement of the wall or pavement, at no additional cost to Owner.

3.2 FORMING

B. Forming shall comply with standard specifications section 51-1.05 and shall result in surface finished as follows:

C. Surfaces which will be below finished grade or totally hidden from view shall conform to "Ordinary Surface Finish", Section 51-1.18A.

D. Surfaces exposed to view shall conform to "Class I Surface Finish", Section 51-1.18B. Contractor shall build forms with degree of care, and shall select from materials of adequate strength and smoothness to produce smooth, even surfaces of uniform textures and appearances, free of unsightly bulges, depressions, or other imperfections. Owner's representative shall be sole judge in this respect.

E. Transition of curves to straight lines and from curves to curves shall be formed as smooth, continuous and uninterrupted, with typical ninety-degree (90-degree) radius alignment at points of tangency.

3.3 CONCRETE JOINTS

A. Joints shall be constructed at locations specified below. Where expansion material is specified, cut expansion material back and caulk exposed surfaces with an approved polyurethane joint sealant, color to match concrete, or approved by Owner. Dowel expansion joints with plain bars wrapped on one side with building paper.

B. Construct Concrete Joints as Follows:

1. Cold Joints

a) Concrete slabs shall be poured in alternate sections of maximum two hundred (200) square feet each section or per plans.

b) Joints between each section shall have reinforcing dowels at minimum three (3) feet on center with speed dowel sleeve.

c) Edge of joints between sections of concrete slabs shall have one-quarter inch radius

toweled edge.

2. Expansion Joints
   a) Expansion joints shall have reinforcing joints per plans and details.
3. Contraction and Score Joints
   a) Construct control joints per plans and details.
4. Contractor shall submit shop drawings of control & expansion joints for approval.

3.4 EDGING

A. Paving Joints shall be tooled with one-quarter (1/4) inch radius edging tools.

B. Edge of slabs, curbs and other structures shall be tooled with one-half (1/2) inch radius edging tools, unless otherwise specified on drawings.

C. Flange marks resulting from tooling of edges shall be carefully troweled out, unless specifically detailed otherwise on details or plans.

D. Walls & curbs shall have edges trowel or chamfered per plans and details.

3.5 REINFORCEMENT

A. Reinforcement installation shall conform to standard specifications as follows:
   1. Cleaning – Section 52-1.05.
   2. Bending – Section 52-1.06.
   3. Placing – Section 52-1.07.
   4. Splicing – Section 52-1.08.
   5. Lapped Splices – Section 52-1.08A

3.6 OBSERVATION

A. Owner shall observe and approve forming and reinforcing prior to pouring concrete. Contractor shall notify Owner five (5) working days in advance for observation of concrete forms.

3.7 Concrete Placement

A. Conform to standard specifications, section 51-1.09.

3.8 BONDING

A. Construction joints shall conform to standard specifications, section 51-1.13.

3.9 PAVEMENT

A. Concrete pavement shall be constructed in accordance with standard specifications, section 73-1.06. Pavements shall be marked or jointed as shown on drawings. Provide weakened plane joints minimum eight (8) feet on center and/or as detailed on drawings.

3.10 SURFACE DRAINAGE

A. Pavement shall have a pitch between one half percent (1/2%) and one and one-half percent (1-1/2%). Verify with the Owner on site where pitch exceeds two percent (2%). Finish surface shall drain properly with no areas of standing water. Tops of walls and curbs shall be level unless otherwise specified.

3.11 CURING

A. Cure new concrete in accordance with standard specifications, section 90-7.02 (“Curing Concrete”) by “Pigmented Curing Compound Method” or “Waterproof Membrane Method”. Method used must be compatible with sealers, concrete colors, exposed aggregate (if applies), other finishes and materials specified in this and other sections of the Contract Documents. Air entraining agent shall conform to standard specifications, section 90-4.07. Add to concrete mix at a rate of three to six (3-6) fluid ounces per cubic yard during mixing period.

3.12 PROTECTION

A. New concrete shall be protected in accordance with standard specifications, section 90-8, and “Protecting Concrete”. Contractor shall provide necessary security to protect concrete from vandalism before it sets and hardens. Contractor shall replace concrete that is defaced or damaged during course of this contract at no additional cost to Owner.

3.13 CONCRETE FINISHES

A. Concrete work shall have even surfaces of uniform texture and appearance, free of unsightly bulges, depressions, and other imperfections. The Owner shall be the sole judge in this respect.

B. Patching concrete to disguise flaws, imperfections or other damage shall commence only with approval from Owner's representative. Patching color and finish shall conform to original adjacent concrete color and finish, and Owner shall be sole judge in this respect.

C. Provide concrete finishes as follows:

1. Trowel Finish - Finish surface shall be smooth and clean with no obvious trowel marks.

2. Broom Finish:

a) Concrete shall be poured to line and grade as shown on plans.

b) Trowel and work the concrete to smooth even finish.

c) Brush with bristled broom across width of path to a uniformly roughened surface. Finished surface shall be clean with uniform and reasonably straight lines.

d) Broom finish shall be in accordance with the drawings and details. Broom in a uniform direction as shown on the drawings and details. Provide smooth flanged bands at concrete joints as shown on details.

3.14 SAMPLES

A. Contractor shall provide one finish sample for every location on plans requiring decorative surfacing other than steel trowel finish. Owner’s representative will select types of finish in field after review of samples.

3.15 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division I of these specifications.

B. Three concrete test cylinders shall be taken for every 75 or less cubic yards of concrete placed each day.

C. One additional test cylinder shall be taken during cold weather and cured on-site under same conditions as concrete it represents.

D. One slump test will be taken for each set of test cylinders taken.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.16 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury or graffiti until sufficient hardening occurs.

END OF SECTION

SECTION 32 18 13 SYNTHETIC TURF

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The Contractor must provide all labor, materials, equipment, tools and taxes necessary for the complete installation of a new synthetic turf designed to provide the look, feel, safety, and performance of optimally maintained natural grass. The synthetic turf system(s) must consist of, but not necessarily be limited to, the following:

1. Synthetic Turf: Low-friction, polyethylene-blended fibers, tufted to a permeable or perforated backing.
2. A resilient infill system.
3. Field striping and markings.
4. Field logos.
5. Complete installation of the synthetic turf.
6. Complete installation of drain pad system
7. Warranty
8. Testing
9. Maintenance equipment as outlined in this specification.

B. The synthetic turf and its components must meet all requirements including markings and layouts must meet all requirements of NFHS and CIF.

C. The Turf Installer if other than the primary contractor must coordinate with the Owner's Representative and all other contractors per specifications and as necessary to successfully install synthetic turf.

1.2 JOB CONDITIONS

A. The Turf Installer must review and accept all synthetic turf base conditions and grading prior to installation.

B. The Turf Installer is responsible for maintaining required grades in all areas to receive the synthetic turf.

C. The field aggregate base must not be contaminated with other soil. Any stone contaminated by other soil will be removed and replaced at the contractor's expense.

D. All products and materials must be approved for use in the state of California.

E. The contractor must protect the drain pad as needed during installation of the synthetic turf.

F. Verification of Quantities:

1. Quantities shown on plans, sections and details are for contractor's convenience only and all synthetic turf installation must be done in conformance with plans and in accordance with specifications.
2. Discrepancies between such mentioned quantities and/or sections, and requirements of plans and/or specifications, will not entitle contractor to additional enumeration.

1.3 DELIVERY, STORAGE, AND HANDLING

A. The contractor must coordinate the delivery and storage of materials with the Owner prior to shipping.

B. Materials must be protected at the job site to insure that they do not become contaminated by other materials, vandalized or stolen.

C. Materials must not be placed in such a way to obstruct any activities adjacent to the field or any paths of travel adjacent to the installation site.

1.4 SUBMITTALS

A. All material and equipment submittals must comply with NFHS and CIF regulations.

B. Re-submittals must reference the previous submittal transmittal number and must include responses to comments on the previous submittals; responses to comments must be summarized as well as identifying where in the re-submittal they are addressed.

C. The Contractor must submit the following information as part of bid.

1. A description of key installation methods, such as method of connecting the turf panels.
2. Synthetic Turf Warranty (Copy).
3. Maintenance program details.
4. Material data or product cut sheet(s) must be submitted with the following information:
   a) Product name and description
   b) Pile Height ASTM D5823-05A
   c) Face Weight ASTM D5848-07
   d) Total Weight ASTM D5848-07
   e) Fiber Denier ASTM D1907-07
   f) Grab Tear Strength ASTM D5034-09
   g) Tuft Bind ASTM D1335-05
   h) Machine Gauge ASTM D5793-05
   i) Infiltration Rate BS7044 Method 4
   j) Flammability ASTM D2859-06
   k) Fiber manufacturer and product name
   l) Primary Backing system type and weight
   m) Secondary backing system type and weight
   n) Pile height above infill
   o) Color uniformity
   p) UV inhibiting protection
   q) Type of infill and material properties
   r) Results of Lisport Test
5. Material data sheet for drain pad system.
6. A description of key installation methods for drain pad installation.
7. Drain Pad Warranty (Copy).

D. The Contractor must submit the following within 15 days of the Notice to Proceed date.

1. A 7½” x 12” minimum sample of the exact synthetic turf and infill system that is specified for this project.

2. Turf samples/swatches (no-infill) for all colors required for the synthetic turf, this includes striping and logos. The swatches must be a minimum of 25 linear feet of fiber.
3. Operation and Maintenance Manuals. Two (2) paper copies and an electronic CD of the initial Operation and Maintenance manual are to be submitted for approval. The manuals must be submitted in 3 ring binders with the Project Name, Vendor information, name, address, phone number and contact name, local representative contact information. The O/M must have an index with tabbed sections.
4. Complete Shop Drawings
5. The contractor shall provide a complete material testing certification from an independent laboratory. The testing shall be performed on the exact turf which will be shipped to the project for installation.

PART 2 – MATERIALS

2.1 SYNTHETIC TURF PRODUCTS

A. ActGlobal XtremeTurf

2.2 The synthetic turf system must meet the following requirements

1. Synthetic turf must be considered a premium product.
2. Synthetic turf system must be designed to maintain integrity and visual aesthetic appeal for high, multisport use for a minimum duration of 8 years.
3. The polyethylene turf fibers must be manufactured using a C6 or C8 resin.
4. The synthetic turf pile height must be 2.25” unless specifically noted otherwise in base bid products.
5. The denier of the synthetic turf fiber must not be less than 10,000 per ASTM D1577.
6. G-max must not be less than 90 or more than 120 at time of project acceptance. The G-max range must be between 90 and 165 for the life of the warranty
7. At the time of the bid or at any time prior to installation all products used must be free of patents rights infringements or trademark copyright infringements.

2.3 SYNTHETIC TURF INFILL

A. The infill for the synthetic turf must consist of SBR and sand. The minimum infill weight must be 6.0 lbs/sf.

B. Cryogenic SBR or ambient cut SBR can be used in accordance with turf manufacture requirements.

C. The SBR infill must be free of all metal, tire chords and other deleterious material. The rubber must be certified to have less than 50ppm of lead.

D. Infill mix ration must be 40% minimum sand and 60% SBR cryogenic rubber

E. The infill materials must be mixed at a ratio and installed so that the field provides a firm and unyielding surface underfoot prior to substantial completion. If the surface is not deemed firm and unyielding by the Owner than the field must be remediated at the contractors expense until the Owner is satisfied.

F. All granulated rubber must be washed after processing and be certified to be 100% metal and fiber free; any other rubber will not be accepted. The rubber infill must be sized between the 10 - 20 sieve openings, unless otherwise specified by the turf contractor as part of their proprietary system.

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

H. The total depth of the initial infill must be no less than 3/4” below the top of the highest turf fiber.

2.4 LINES/MARKINGS

A. The Contractor must submit complete shop drawings and color samples for Owner review. Shop drawings must include:

1. To scale, color drawings of all text, logos, lines and markings.
2. Dimensions of all turf extents, text, logos, lines and markings.
3. Enlarged details of logos, text, line intersections and other markings.
4. Turf panel layout plan.

B. Letters, numbers, logos, arrows, hash marks or other markings other than lines must be inlaid.

C. Refer to plans for approximate size and color of field markings. The Owner reserves the right dictate changes to the size, location, quantity, font and color of all text, logos or markings during the submittal review process.

D. The Contractor must not purchase turf prior to full written acceptance of physical samples and shop drawings from the Owner.

2.5 SEAMS

A. All seams between turf panels must be sewn or glued, inlays may be glued

B. All seaming materials including glue and thread must be premium quality and compatible with the synthetic turf product.

C. The contractor shall protect the drain pad where seams and inlays are glued; this may include plastic or other sheeting below all glued seams to prevent turf from binding to drain pad.

2.6 DRAIN PAD BID PRODUCT

A. Schmitz Foam Proplay Sport20 (D) Ecosport

PART 3 – EXECUTION

3.1 INSTALLATION

A. The turf manufacturer and installer must accept the existing conditions prior to the installation of the synthetic turf system. The turf installer is encouraged to perform a string line test to verify for themselves that the base surface meets their expectations and planarity does vary more than 1/8” over 10’.

B. The Turf Installer must maintain the stability, planarity, and grades of the (drain mat and aggregate base) during the entire synthetic turf installation process. The Turf Installer is responsible for the repair of the base surface should it become disturbed during the installation of the synthetic turf.

C. The Turf Installer must strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the manufacturer’s onsite representative, and submitted to the Engineer and Owner’s Representative, verifying that the changes do not in any way affect the warranty.

D. The carpet rolls are to be installed directly over the drain pad.

E. The synthetic turf must be delivered in 15' wide rolls with all white lines, soccer side lines and soccer end lines tufted into each roll. The rolls must be of sufficient length to extend the across the playing field limits. Head seams, between the sideline rolls, will not be acceptable.

F. The full width rolls must be laid out across the field. Utilizing standard attachment procedures each roll must be attached to the next in the manner as recommended by the manufacturer. When all of the rolls of the playing surface have been installed, the sideline areas must be installed at right angles to the playing field turf.

G. The turf must be securely attached to the nailer board. Synthetic turf must be mechanically fastened to the nailer board at a maximum spacing of 6 inches.

H. The infill must be installed according to the manufacturer's recommendations. When the infill is placed to within 3/4" of the top of the synthetic grass fibers, the Turf Installer must notify the Owner's Representative for inspection. The balance of the infill must be placed in the presence of the Owner's Representative to a height or level determined by the Owner.

I. The planarity of the infill must not vary more than 5mm when measured using a 3m straightedge. If the infill settles to a depth exceeding 10% of initial install within 2 years after final completion the contractor must install additional infill to a depth consistent with that during final completion.

J. The contractor must water settle the infill after installation.

K. The contractor must thoroughly clean the site after completion of the installation. This includes loose turf fiber, turf fragments, tools, debris, fasteners, glue and other foreign materials.

L. It is the Contractor's responsibility to install turf and infill so that it provides a smooth transition between the field and adjacent surface. Lips, dips, gaps, or elevation differentials are not accepted at any field edge.

M. After completion of the synthetic turf installation the contractor must drag the field with a magnet specifically designed to remove metal objects from synthetic turf fields. This procedure must be performed a minimum of two times.

N. An alternate installation supervisor and crew is to be provided if for any reason the Owner is dissatisfied with the installation process.

3.2 MAINTENANCE, TESTING AND WARRANTY

A. Warranty

1. The contractor must provide the following warranty:

a) The turf manufacturer must provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a minimum period of eight years from the date of final completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements.

b) The manufacturer's warranty must cover damage caused by general wear and damage caused from UV degradation.

c) The warranty must not have any qualifications or exclusions limiting total time of use, sport type specific use, athletic level (professional, recreational) use, or any other intended purpose limits.

d) The warranty may only specifically exclude vandalism, and acts of God beyond the control of the Owner or the Manufacturer which occur after final acceptance of installation and the start of the warranty period.

e) The warranty must cover defects in the installation workmanship, including the integrity of seams, straightness of lines and symmetrical layout of letter, numbers and logos.

f) The warranty must include remediation or replacement of the synthetic turf in its entirety if the HIC value exceeds 1000 or the Gmax exceeds 165 during the duration of the warranty.

g) All turf warranties must be non-prorated, must include all necessary materials, labor, transportation costs, etc. to complete said repairs.

h) The warranty must be prepaid and insured by an A rated, third party insurer.

B. Testing

1. All testing must be performed by a third party ISO 17025 certified laboratory.

2. The contractor must provide Head Injury Criterion (HIC) testing per ASTM F1292 and Gmax testing per ASTM F1936 upon final completion.
3. The Contractor must provide the necessary testing data to the Owner that the finished field meets or exceeds the required shock attenuation. G-max must not be less than 90 or more than 120 at time of project acceptance. The G-max range must be between 90 and 165 for the life of the warranty, in accordance with ASTM 355.

C. Repairs

1. In circumstances were field repairs are needed including failure to meet HIC tolerance, seam repair or infill repairs the contractor must have qualified personnel and materials onsite and ready to make repairs within 24 hours of notification by the Owner during the regularly scheduled football season.
2. The contractor must be onsite within 5 business days when outside of the regularly scheduled football season.

D. Extra Materials

1. Prior to final completion the contractor must provide the following materials and equipment to the Owner. Copies of written documentation of delivery must be provided to the Owner.
2. Provide a separate piece of turf for each color used for the field, each piece of turf must be at least 15’ x 15’.
3. Provide a minimum of (5) heavy duty 32 gallon containers and lids which are filled with the crumb rubber and sand mixed in accordance with the ratio used for this project.
4. Provide a minimum of 5 gallons of the glue which was used for inlays.

END OF SECTION

SECTION 32 18 14 – SYNTHETIC TURF BASE

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and tools necessary for the complete installation of a synthetic turf base system, which shall consist of, but not necessarily be limited to, the following:

1. Base course permeable aggregate / drain stone
2. Geotextile liner
3. Nailer Board

1.2 JOB CONDITIONS

A. Prior to installation of drain stone the contractor is to accept conditions of subgrade and drainage systems.

B. The drain stone must not be contaminated with other soil. Any contamination of soil or other debris into drain stone will result in material rejection.

C. The Contractor is responsible for maintaining waterproofing, drainage, irrigation, utilities or any other system below the field.

1.3 REFERENCES

A. The Contractor must follow all requirements and recommendations of any Geotechnical Reports issued as part of the project.

1.4 SUBMITTALS

A. The Contractor must submit drain stone materials to owner approved testing laboratory within 15 days from notice to proceed. Test results must be submitted for review within 30 days from notice to proceed. Testing requirements are per this specification section Part 2 and Part 3.

B. The Contractor must submit material data or product cut sheets within 15 days from notice to proceed for the following:

1. Geotextile liner
2. Nailer Board

1.5 QUALITY ASSURANCE (TESTING AND INSPECTIONS)

A. Compaction testing must be provided by a certified geotechnical inspector.

B. The Contractor must submit for review conformance surveys of both the subgrade and top of drain stone per athletic field grading specifications.

C. Initial material testing and continued quality control testing must be submitted for review before and during construction per material requirements in this specification section.

1.6 SEQUENCING AND SCHEDULING

A. Prior to construction the Owner must approve any necessary shutdowns or interruptions of service to existing facilities. Only authorized personnel may open, close, engage or disengage any valves of power sources.

PART 2 – MATERIALS

2.1 BASE COURSE PERMEABLE AGGREGATE / DRAIN STONE

A. Drain stone must meet the following criterial

1. Gradation Requirement Table 1

Drain Base Gradation Requirements	
Sieves	Gradations
2"	
1½"	100
1"	95-100
¾"	75-90
½"	55-75
3/8"	40-70
#4	25-40
#8	15-30
#16	10-25
#30	5-12
#50/60	3-9
#100	2-7
#200	0-3

2. Structural stability requirement
   a) D_{60}/D_{10} must be greater than 5
   b) $D_{30}^2/(D_{10}xD_{60})$ must be greater than 1 and less than 3
   c) ("Dx" is the size of the sieve (in mm) that lets pass x% of the stone. For example D_{60} is the size of the sieve that lets 60% of the stone pass. These sizes, for calculation purposes, may be obtained by interpolation on a semi-log graph of the sieve analysis.)
3. Permeability or Infiltration Rate of drain stone must be greater than 45 in/hr when stone is saturated and compacted to 95% proctor.
4. Porosity of drain stone must be greater than 25% when stone is compacted to 95% proctor.
5. Drain stone material must be 100% fully fractured. Rounded stone is not acceptable. Photos of material are to be submitted with testing data.
6. Soft limestone and shale materials are not acceptable.
7. Sulfate soundness must be less than 12% loss.
8. LA abrasion must be less than 40.
9. Sand Equivalent must be greater than 75.
10. The drain stone shall contain no more than 1% free shell.

B. Nailer Board

1. Nailer board must be plastic composite boards, Woodflex by PSP or approved equal. Nominal dimension 2”x4”, minimum actual dimensions must be greater than 1 3/8”x 3 ½”.
2. Splitting of 2x6 boards is not accepted.

C. Geotextile Fabric

1. Geotextile fabric must be Mirafi 500x or approved equal.

2.2 TESTING PROTOCOL FOR BASE COURSE PERMEABLE AGGREGATE / DRAIN STONE

A. The Contractor must submit results for all tests listed. The Contractor must utilize an owner approved third party testing laboratory to perform all material testing. The testing agent must be qualified to perform all of the following testing protocols:

1. ASTM C136 – Sieve Analysis of Fine and Coarse Stones
2. ASTM D854 – Specific Gravity of Soils
3. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock
4. ASTM D2434 - Saturated Hydraulic Conductivity (KSAT) or Constant Head Permeability
5. ASTM C-88 – Sulfate Soundness
6. ASTM C-131 – LA Abrasion
7. ASTM D2419 – Sand Equivalent
8. FM 5-555 (or equivalent) – Percent Free Shell

B. The Contractor must submit all test results for review and acceptance a minimum of 45 days prior to shipping and installation. Neither the owner nor the engineer are responsible for delays or costs incurred by shipping or installation of untested or rejected materials.

C. Testing requirement for Sulfate Soundness, LA Abrasion or Percent Free Shell may be waived in geographic areas where limestone, shale, or shell are not considered significant concerns. Testing is waived only with sports field engineer approval.

D. The Contractor must submit proposed drain stone supplier and source location and certification that the supplier can deliver the total quantity of material needed to complete the project within the constraints of the project schedule.

E. All drain stone must be sourced from a single supplier and a single location. Use of multiple drain stone sources is not accepted.

F. During construction the drain stone must be tested every 500 tons by the approved testing laboratory for quality control or QC. After initial testing and source selection only sieve analysis (gradation testing) and infiltration rate testing is required for quality control (QC) testing.

G. If irregularity of materials are noted during installation the engineer reserves the right to request additional testing of institute material.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Subgrade Preparation

1. The Contractor must prepare the subgrade in accordance with athletic field grading specifications.
2. To avoid material contamination the Contractor must not install drain stone until all subgrade is graded, irrigation and drainage systems are installed.
3. The Contractor must install geotextile liner per construction documents with a minimum overlap of 1’ at all seams.

B. Nailer Board Installation

1. Attach nailer board to concrete curb with 3/8” x 3” concrete expansion bolts spaced at a maximum of 4’ O.C.
2. Fasten synthetic turf to nailer board with 1” roofing nails spaced at a maximum of 1’ O.C.
3. Set Nailer board height based on specified infill depth. The Contractor is responsible for providing smooth transition grade from turf to concrete turf curb.

C. Installing the Drain Stone

4. The weight and type of all construction equipment which will be used to install the drain stone must be submitted to the engineer for review and approval.
5. The drain stone must be laid without damaging the subgrade and liner. The specified stone or stone supplied must conform to the specifications, and must be stable and permeable.
6. In performing this work, the Contractor must avoid damage to any existing structures or features of the playing fields or features under construction, such as drainage and irrigation systems. The Contractor is responsible for repair of any such damage.
7. The drain stone must be carefully and evenly spread to avoid segregation of materials. Excess water should not be applied when dumping and rough grading.
8. The drain stone must then be carefully smoothed and uniformly compacted to the appropriate grade by alternately raking, watering, and rolling. All surfaces must then be checked for irregularities due to settling and brought back to a uniform grade. Refer to athletic field grading specifications for grade conformance and tolerance requirements.
9. The drain stone layer must be a uniform thickness. The stone shall be placed in maximum 4” lifts. The drain stone must be compacted in both directions and water settled to attain uniform 92-95% compaction. Maintain 8-10% moisture content during installation. Vibratory compacting is not permitted.
10. The finished surface of the drain stone must comply with grading tolerances required by athletic field grading specifications. The finished surface shall be firm and unyielding. The measure of “firm and unyielding” is as follows: When using reasonable and industry-standard equipment or light-duty track (<1/2 ton) the finished drain stone surface will not deflect or displace more than 1/8”.
11. Contractor must provide a survey of the completed drain stone base that verifies the field is within tolerance for grade and planarity per athletic field grading specifications.
12. The synthetic turf contractor must visit the site and inspect the drain stone base for grade and planarity and provide a written acceptance of the surface prior to beginning the installation of the synthetic turf.
13. The synthetic turf manufacturer’s representative must accept the visit and inspect the drain stone base prior to turf installation.

END OF SECTION

SECTION 32 31 13 – CHAIN LINK FENCE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Contractor must provide all labor, materials, equipment, tools and taxes necessary for the complete installation of a new chain link fence. Project requires removal of fence fabric and removal of loose paint or vinyl coating from rails and posts for preparation and application of paint.

1.2 JOB CONDITIONS

A. The Fence Installer must review and accept all existing and improved site conditions, including existing fence connection conditions and grade prior to installation.

B. All products and materials must be approved for use in the state of California.

C. Verification of Quantities:

1. Quantities and dimensions shown on plans, sections and details are for contractor's convenience only. Contractor is responsible for their own quantity take offs and must provide all materials necessary for installation of fence and gates as shown on Construction Documents.

2. Discrepancies between such mentioned quantities and/or sections, and requirements of plans and/or specifications, will not entitle contractor to additional enumeration.

1.3 REFERENCES

A. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

B. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

C. ASTM F552 Standard Terminology Relating to Chain Link Fencing

D. ASTM F567 Standard Practice for Installation of Chain Link Fence

E. ASTM F626 Specification for Fence Fittings

F. ASTM F900 Specification for Industrial and Commercial Swing Gates

G. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework

H. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

I. Washoe County Orange book.

1.4 DELIVERY, STORAGE, AND HANDLING

A. The contractor must coordinate the delivery and storage of materials with the District prior to shipping.

B. Materials must be protected at the job site to ensure that they do not become damaged by other materials, vandalized or stolen.

C. Materials must not be placed in such a way to obstruct any activities adjacent to the field or any paths of travel adjacent to the installation site.

1.5 QUALITY ASSURANCE

A. Use new materials and products, unless existing materials are products are specifically indicated in the Construction documents as salvage and repair.

B. Utilize one manufacturer for all fencing products whenever possible.

C. All materials, hardware, assemblies and workman ship, including footings are subject to District's representative or inspectors review. Work not observed is subject to uncovering and if so required replacement.

1.6 QUALIFICATIONS

A. The Fence Installer must have a minimum of five (5) years experience in the installation of chain link fence.

B. The Contractor must provide an experienced site supervisor and crew. An alternate installation supervisor and crew is to be provided if for any reason the District's Representation is dissatisfied with the installation process.

1.7 SUBMITTALS

C. Material specifications and cut sheets: Contractor must provide cut sheets for all gates, mesh, and hardware.

D. Material Samples:

a. Chain link mesh with specified size, gauge, coating and color.

b. 6" section of railing with paint.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vinyl fencing chain link fabric and wires:

1. Single piece fabric widths required up to manufactures maximum standard production width.
2. 9 ga. Steel wire x 3" mesh, coated with poly-vinyl chloride permanently fused bonded to galvanized wire by fusion method with breaking strength of 1200 lbs. 9 ga thickness is for core wire and does not include coating. Color to be black unless otherwise noted.
3. Knuckled top and bottom selvage only. Twist or barb salvage is not acceptable at any location.
4. Painted finishes on fabric are not acceptable. The color for this job is the manufacturer's standard black unless otherwise directed by the District.

B. Line Posts, Gate Posts, End Posts, Top Rail and Bottom Rail

1. SCH 40 steel Hot-Dipped Zinc-Coated (Galvanized)
2. Apply one coat of primer and one coat of Dunn Edwards Premium Exterior paint for metal. Color shall be black unless otherwise stated.
3. Color to match chain link fabric unless otherwise approved by District.
4. Top and bottom rail must be Manufacturer's longest length.

C. Gates

1. Fabric to match fence
2. Frames to be SCH 40 steel or approved equal
3. Color to match chain link fabric unless otherwise approved by District.
4. All frame pipe diameters are to be specified and supplied by Contractor supplied structural calculations and detail. Calculations are to be signed and sealed by Structural Professional Engineer registered in the state of California.
5. Install diagonal bracing as required per Manufacture's recommendations.
6. Install stretcher bars as required per Manufacturer's recommendations.

D. Gate Hardware

1. Repair or replace to match existing.

E. Fittings and Accessories:

1. Material:

a) Comply with ASTM F1043-00 for SS040 galvanized steel fence tubing.

b) Steel and 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 A-90.

2. Finish

a) Apply one coat of primer and one coat of Dunn Edwards Premium Exterior paint for metal. Color shall be black unless otherwise stated.

3. Post and Line Caps:

a) Provide weather tight closure cap for each post.

b) Provide line post caps with loop to receive tension wire or top rail.

4. Post Brace Assembly:

a) Manufacturer's standard adjustable brace per Contractor provided shop drawings.

5. Tension or Stretcher Bars:

a) Manufacturer's standard per Contractor provided shop drawings.

6. Tension and Brace Bands:

a) Manufacturer's standard per Contractor provided shop drawings.

7. Tension Wires:

a) 9 gage minimum

b) Manufacturer's standard per Contractor provided shop drawings.

8. Tie Wires:

a) Manufacturer's standard per Contractor provided shop drawings.

9. Concrete Footings

2.2 VINYL COATING

1. Colors shall be stabilized, and shall have a light fastness to withstand a minimum Weather-O-Meter exposure of at least 1500 hours without deterioration when tested in accordance with ASTM D 1499.

2. Vinyl coating shall be exposure-resistant to dilute solutions of most common mineral acids, sea water, salts, and alkali.

3. Vinyl coating shall be continuously bonded to the wire before the wire is woven into fabric.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate all post locations with onsite utilities existing and proposed including landscape irrigation mainlines and laterals prior to installation.

B. Report conflicts between post locations and any other on site utility or features to District immediately.

3.2 INSTALLATION

A. Install framework, fabric, accessories, and gates in accordance with best trade practice for sports field / recreational installations.

B. Make welds neat and secure, grind off excess exposed metal.

C. Securely set posts plumb in alignment at proper depth and height.

D. Install rigid bracing where required for stable, secure fence.

E. Install fabric under tension and securely tie to posts, rails and braces.

F. Gates must move freely without sag.

G. Space line posts at intervals not exceeding 10 feet.

H. Slope top of concrete footings for water runoff.

I. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.

J. Install center and bottom brace rail on corner and gate leaves.

K. Position bottom of fabric ½" above finished grade.

L. Install fabric on the ballfield interior side of posts.

M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with 11-AWG galvanized wire ties 24 inches (610 mm) maximum on centers.

N. Attach fabric to end, corner, and gateposts with tension bars and tension bar clips.

O. Install bottom rail supported at each line and terminal post in such a manner that a continuous brace between posts is formed.

P. Install gate fabric to match fence.

Q. Install tie wires with one tight turn to hold fabric firmly to frame, bend ends of wire inward to avoid person or clothing snag points.

R. Install fasteners, nuts for tension bands and hardware bolts on the side of the fence opposite fabric side. Spoil ends of bolts to prevent removal of nuts.

END OF SECTION

SECTION 32 33 00 – SITE FURNISHINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to install all sports equipment.

B. Unless specifically stated otherwise the Contractor is responsible for the purchase and installation of all site furnishings.

1.2 SUBMITTALS

A. The following information shall be submitted prior to installation of specified work.

1. Manufacturer published specifications, diagrams, drawings and cut sheets depicting the installation instructions, directions and dimensions for all specified sports equipment.

2. Material safety data sheets on all products, as necessary.

3. The Contractor shall provide as required shop drawings and complete footing design. Footing drawings and sizing calculations must be signed and sealed by a Registered Professional Engineer.

1.3 QUALITY ASSURANCE

A. The Contactor must provide and install all materials as required by these specifications and shown on the project drawings.

B. The Contractor must provide equipment from vendors or manufacturers that have been pre-approved or have been identified in writing as approved equals. The Owner is responsible for the determination of what products are considered equal.

C. The Contractor shall provide a formal written request for substitution for any equipment, product or material that is different or in substitution of the specified product and manufacturer. It shall be the responsibility of the Contractor to prove that the requested substitution is an equal to the specified material. All substitutions must be given written approval by the owner prior to delivery or installation.

PART 2 – PRODUCTS

2.1 MATERIALS

2.2 IN-GROUND SPORTS EQUIPMENT

A. The Contractor is responsible to provide and install all permanent and loose equipment as specified and shown on the project drawings.

B. All equipment must comply with all State and Local Codes

C. The following equipment shall be provided an installed by the Contractor:

a) Quick Coupler Box in Synthetic Turf Sportsfield Specialties (TCITQCV)

2.3 DRINKING FOUNTAINS

A. The Contractor is responsible to provide and install ADA compliant drinking fountain as specified and shown on the project drawings.

1. All equipment must comply with ADA and DSA accessibility requirements.

a) Elkay Outdoor EZH2O Bottle Filling Station Tri-Level Pedestal, Non-Filtered Non-Refrigerated - LK4430BF1L (Evergreen Color)

PART 3 –EXECUTION

3.1 INSTALLATION OF SPORTS EQUIPMENT

A. Installation of the sports equipment shall follow the directions of the manufacturer and/or vendor. The Contractor must report any discrepancies in construction plans or specification and manufacturer instructions or requirement prior to installation of equipment.

B. Shop drawings of all equipment installations are required for approval prior to installation of equipment unless specifically waived by manufacturer or engineer.

C. Any equipment requiring concrete footings must have footing shop drawings and size calculations submitted for approval. All concrete footing drawings and size calculations are to be signed and sealed by a Registered Professional Engineer.

D. The Contractor is responsible for all costs associated with shop drawings and footing size calculations required.

3.2 INSTALLATION OF DRINKING FOUNTAIN

A. Installation of the drinking fountain shall follow the directions of the manufacturer and/or vendor. The Contractor must report any discrepancies in construction plans or specification and manufacturer instructions or requirement prior to installation of equipment.

B. Drinking fountains are replacements of existing to be removed.

END OF SECTION

SECTION 32 84 00 – PLANTING IRRIGATION

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall furnish all labor; materials, tools, equipment, and services necessary for the execution and completion of the irrigation system work as indicated on the drawings and as described in these specifications and the General Conditions.

B. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan work accordingly, furnishing such offsets, fittings and sleeves as may be required to meet such conditions. All work called for on the drawings by notes and/or details shall be furnished and installed whether or not specifically mentioned in the specifications.

C. The work of this Section generally includes provisions of an automatic underground sprinkler system including but not limited to the following:

1. Trenching, stockpiling excavation material and backfilling trenches.
2. Complete system including but not limited to piping, valves, fittings, sprinkler heads, bubblers, drip emitters, controllers and wiring, and final adjustments to insure complete coverage.
3. Replacement of unsatisfactory materials.
4. Clean-up, inspection, and approval.
5. Testing the system to assure that all landscape areas are efficiently and uniformly irrigated and that the system performs, as required, by the plans and specifications.
6. Warranties and guaranties.

D. No irrigation work shall be performed until all areas are finished to proper grade and until soil preparation is completed, and has been approved by the Owner's Representative.

1.2 REFERENCES

A. Perform Work in accordance with requirements and Conditions of the Contract and Specification as well as the provisions of all applicable Federal, State, and local laws, codes, ordinances, rules, and regulations.

B. Conform to the latest requirements of reference information listed below except where more stringent requirements are shown or specified in Contract Documents.

1. American Society for Testing and Materials (ASTM)-Specifications and Test Methods specifically referenced in this Specification Section.
2. Underwriters Laboratories (UL) - UL Wires and Cables.
3. American Water Works Association (AWWA)-Specifications specifically referenced in this Specification Section.
4. American National Standards Institute (ANSI)-Specifications specifically referenced in this Specification Section.
5. National Sanitation Foundation (NSF)-Specifications specifically referenced in this Specification Section.
6. American Society of Agricultural Engineers (ASAE)-Specifications specifically referenced in this Specification Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications - Installer shall have experience and demonstrated ability in the installation of irrigation system(s) in accordance with recognized laws, codes and standards of workmanship.

To demonstrate ability, experience necessary for this Project, submit if requested by the Owner, prior to contract award the following:

1. List of 3 projects completed within the last 2 years of similar complexity to this Project. Description of projects shall include the following:
    a) Name of project.
    b) Location.
    c) Owner.
    d) Description of work.

B. SPECIAL REQUIREMENTS

1. Tolerances - Specified depths of mainline and lateral pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, re-compaction, and repair of finish grade treatment.
2. Coordination with Other Contracts - Protect, maintain, and coordinate Work with the Work under other Sections.
3. Damage To Other Improvements - Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, or planting done under other Sections during Work associated with installation of irrigation system at no additional cost to the Owner.
4. A licensed and bonded plumber shall execute work involving substantial plumbing for installation of backflow preventers, copper service and related work.
5. A licensed and bonded electrician shall execute Work-involving connection to, installation, or extension of 120 volt or greater electrical services.

1.4 SUBMITTALS

A. SHOP DRAWINGS

1. Submit Shop Drawings if noted on the construction drawings. Include a complete materials list indicating manufacturer, model number, and description of all materials and equipment to be used. Show all appropriate dimensions and adequate detail to accurately portray intent of construction.

B. MANUFACTURE LITERATURE

1. Contractor to submit manufacturer cut sheets for all material and equipment components required for installation of the irrigation system as indicated in specification or on the construction drawings, for approval by the Owner's Representative prior to installation.
2. Provide an index sheet for each set of material cut sheets outlining; item, manufacturer, and model number in order of cut sheets.
3. Highlight or circle specific model or item to be approved on cut sheets, which feature more than one model or item.

C. RECORD DRAWINGS (AS-BUILTS)

1. The Contractor must keep a full size, hard copy prints on site throughout construction for the purpose of red line – as-built drawings. At end of every day, revise prints for Work accomplished that day in red ink. Upon completion of the Project prior to final acceptance, submit for review, a final set of as-built to the Owner's Representative. Dimension from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures), the location of the following items:
    a) Point-of connection.
    b) Routing of mainline pipe (dimension every 50 feet and at all angle points).

c) Master control valves.

d) Electric control valves.

e) Quick coupling valves.

f) Isolation valves.

g) Control wire routing (if not installed with mainline pipe).

h) Communication cable routing.

i) Control wire and communication cable splices (if not inside field satellite unit)

j) Flow sensors.

k) Control wire splice boxes.

l) All potable water line and/or service crossings (document type of extra crossing protection installed).

m) All backflow prevention devices installed within the project boundaries (including potable water service and fire connections).

n) All water meters installed within the project boundaries (including potable water service and fire connections).

o) Other related equipment as directed by the Owner's Representative.

2. Owner's Representative will not certify any pay request submitted by the Contractor if the as-built drawings are not current, and processing of pay request will not occur until as-builts are up to dated.

3. Prior to scheduling the walk-through for substantial completion, the Contractor shall submit all as-built and pressure test information to Owner's Representative for approval.

D. Controller Drawings – Do not prepare controller drawings until record (as-built) drawings have been approved by the Owner's Representative.

1. Provide one controller drawing for each automatic controller installed.

a) Controller drawings may be the same size reproduction as the record drawing, if scale permits fitting inside controller door without folding drawing. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility.

b) Controller drawings shall be blueline print of actual "as-built" system, showing area covered by that controller.

c) Identify the areas of coverage of each remote control valve, using a distinctly different color for each zone. Highlight heads, lateral piping, and control valves.

d) Following review of the controller drawings by Owner's Representative, hermetically seal each drawing between two layers of 20-mil thick clear plastic.

e) Controller drawings shall be completed and approved by the Owner's Representative prior to final completion walk-through of the irrigation system.

f) Attach approved controller drawing to the inside of each controller door using self-adhesive Velcro strips.

E. PRESSURE TESTING

1. Contractor shall submit pressure testing certification for each mainline segment constructed to Engineer and Owner's Representative for approval. Certification shall document the test; date, time, duration, pressures and mainline segment location. All pressure testing shall conform to requirements noted in these specifications.

F. CROSS – CONNECTION TESTING

1. Contractor shall submit cross - connection testing results for each mainline segment constructed to the Engineer for approval certification. Testing documentation shall include the test; date, time, duration, and mainline segment location. All cross - connection testing shall conform to requirements noted in these specifications.

G. OPERATION MANUAL

1. Index sheet stating project name, and listing company, address, phone number and contact person of Owner and Contractor, including Primary Subcontractors.
2. Written instructions for operation and maintenance of pumping equipment, fertilizer/ chemical injectors (if applicable).
3. Manufacturer Technical Manual for controllers.
4. Manufacturer cut sheets for heads, control valves, quick coupling valves, gate valves, controllers, drip irrigation components, and valve boxes.
5. Written documentation of all irrigation schedules developed for the project by the Contractor.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Product, Storage and Handling - Deliver, unload, store, and handle materials, packaging, bundling and products, in dry, weatherproof, waterproof conditions to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism. Deliver in original unopened packaging containers prominently displaying manufacturer name, volume, quantity, contents, and instructions in conformance with local, state, and federal laws. Remove and replace cracked, broken, or contaminated items prematurely exposed to moisture, inclement weather, snow, ice, temperature extremes, fire, or jobsite damage.

B. Handling of PVC Pipe - Exercise care in handling, loading and storing of PVC pipe. All PVC pipe shall be transported in a vehicle, which allows length of pipe to lie flat so as not to subject it to undue bending or concentrated external loads. All sections of pipe that have been dented or damaged shall be discarded, and if installed, shall be removed and replaced with new piping.

1.6 JOB SITE CONDITIONS

A. Protection of Property

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to Work of this Section. In the event damage does occur, items shall be completely repaired or replaced to the satisfaction of the Owner.
2. Protect buildings, walks, walls, and other property from damage. Barricade open trenches. Damage caused to asphalt, concrete, or other building material surfaces shall be repaired or replaced at no cost to the Owner. Restore disturbed areas to the original condition

B. Protection and Repair of Underground Utility Lines

1. Request proper utility company to stake exact location (including depth) of all underground water, sewer, electric, gas, cable TV or telephone lines. Take whatever precautions are necessary to protect these underground lines from damage. In the event damage does occur, the Contractor must repair all damage or must pay all costs of repairs.

C. Replacement of Paving and Curbs

1. Where trenches and lines cross under existing roadways, paths, curbing, etc., damage to these shall be kept to a minimum and shall be restored to original condition as deemed acceptable by the Owner’s Representative.

1.7 WARRANTY/GUARANTY

A. – The Contractor shall warrant all materials against defects for a period of one (1) year from date of Substantial Completion. The Contractor shall also guarantee workmanship for the same one (1) year period. The Contractor shall also be responsible for coordinating all material warranty items with the manufacturer/distributor.

B. Settling of backfilled trenches, which may occur during the guaranty period, shall be repaired by contractor at no expense to Owner, including complete restoration of damaged property

C. Expenses due to vandalism before substantial completion shall be borne by the Contractor.

D. The Owner or Representative Maintenance Company shall maintain all turf and planting areas during the warranty period.

1.8 MAINTENANCE

A. Furnish the following maintenance items to Owner prior to final Acceptance:

2. Two (2) Sets of all special tools required for removing, disassembling, and adjusting each type of sprinkler head and valve supplied on this Project.

3. Two (2) six (6)-foot valve keys for operation of isolation valves (if applicable).

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

5. Two (2) quick coupler keys and two (2) matching hose swivels for each type of quick coupling valve installed.

PART 2 – PRODUCTS

2.1 MATERIALS

A. GENERAL PIPING

1. Irrigation mainline pipe - SCH 40 PVC solvent weld (1" through 2 1/2")

B. Copper Pipe and Fittings

1. Copper Pipe – Type 'K' hard tempered, in accordance with ASTM B4284.

2. Fittings – Wrought copper, solder joint type (ANSI B16.22).

3. Joints – Soldered with solder, 45% silver, 15% copper, 16% zinc, and 24% cadmium and solidus at 1125' F and liquids at 1145' F.

C. Plastic Pipe and Fittings

1. Identification Markings: - All pipe shall be identified with the following indelible markings:

a) Manufacturer's name.

b) Nominal pipe size.

c) Schedule or class.

d) Pressure rating.

e) NSF (National Sanitation Foundation) seal of approval.

f) Date of extrusion.

g) Note: When installed, markings shall be face up.

2. Solvent Weld Pipe – Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B, Type 1, Grade

3. Mainline fittings – Standard weight, Schedule 80, injection molded PVC; complying with ASTM D1784 and D2466, cell classification 12454-B.

a) Lateral fittings – Standard weight, Schedule 40, injection molded PVC; complying with ASTM D1784 and D2466, cell classification 12454-B.

b) Threads – Injection molded type (where required).

c) Tees and ells – Side gated.

d) Threaded Nipples – ASTM D2464, Schedule 80 with molded threads.

e) Joint Cement and Primer – Type as recommended by manufacturer of pipe and fittings. Solvent weld joints shall be made in accordance with ASTM D-2855.

D. Isolation Valves

1. Isolation valves (Control Valves) for ¾-inch through 2-Inch Pipe – Bronze two-piece full port construction with PTFE seats rated at rated at 400 PSI.

2. Isolation valves (Sub-Mainline) for 1-inch through 2 1/2-Inch Pipe – Brass two-piece full port construction with cast brass ball with TFE coating and Buna-N seats rated at rated at 300 PSI. The valve operation shall be by a flathead cap and stem with internal 90 degree check stops. The valve shall include a brass 2-inch square operating nut pinned to the flathead stem.

E. Quick Coupling Valves

1. Brass two-piece body designed for working pressure of 150 PSI. Type and size shown on the drawings.

F. Valve Boxes

1. As indicated in drawings

G. Low Voltage Electrical Control Wiring

1. Electrical Control Wire - AWG UF UL approved No. 14 gauge direct burial copper wire for all control wires, and No. 12 gauge direct burial copper wire for all common and spare wires.

a) Control Wires - Red.

b) Common Wires - White.

c) Master Valve Wires - Blue.

d) Spare Wires - Green (labeled at terminations).

e) Future Wires – Same as control and common wire (labeled at terminations).

2. If multiple controllers are used, and wire paths of different controllers cross each other, both the common and the control wires from each controller shall be different colors approved by the Consultant.

3. Control wire connections and splices shall be made with Nothstar Industries Suresplice direct bury splice kits or equal.

H. Line Voltage

1. Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

I. Electric Control Valves

1. As indicated on the drawings.

J. Sprinkler Heads

1. As indicated on the drawings. Pre-fabricate risers or swing joints in accordance with the details on the drawings - with riser nipples of same size as riser opening in sprinkler body.

K. Pipe bedding material

1. Construction grade sand or clean native soil.

L. Irrigation Satellite Controller

1. As indicated on the drawings:

M. Mainline Piping Locating Tape:

1. 3" wide detectable tape, place 18" below finish grade.

N. Inline Drip Components

1. As indicated on the drawings.

PART 3 – EXECUTION

3.1 INSPECTION

A. The Contractor is to examine all areas and conditions under which Work of the Section is to be performed. The Contractor may not proceed with Work until any unsatisfactory conditions have been corrected. Conditions to be considered include but are not limited to rough grading, new or existing utility installations that directly conflict with proposed work, excavations not related to current work, hardscape or landscape and potential safety hazards.

3.2 PREPARATION

A. Staking and marking must be done with flags, powdered lime or marking paint.

B. The Contractor must mark the routing of mainline pipe, lateral pipe, heads and control valve locations as directed by Owner's Representative. Contact Owner's Representative 48 hours in advance and request review of staking. Owner's Representative and Engineer will review staking and direct changes if required. Staking review does not relieve installer from coverage problems due to improper placement of heads after staking.

C. The Contractor must install sleeving under asphalt paving and concrete walks, prior to concreting and paving operations, to accommodate all piping and wiring. Compact backfill around sleeves to 95% Standard Proctor Density within three (3) percent of optimum moisture content in accordance with ASTM D1557.

1. Refer to design drawings for sleeving schedule and sizing requirements.

2. At a minimum the diameter of all sleeve pipes must be 2 times larger than the nominal diameter of carrier pipe or 3-inch, whichever is greater.

3. No single sleeve is to contain more than a single carrier pipe.

4. Pipes and control wires must be installed in separate sleeves.

D. Trench excavation must follow, as much as possible, layout shown on the drawings. Dig trenches straight and support pipe continuously on the bottom of the trench. Trench bottoms shall be clean and smooth with all rock and organic debris removed. Mainline trenches shall be over-excavated as required to allow for bedding material. Trench depth shall be uniform as required to meet minimum depth requirements for type of piping.

E. Boring will be permitted only where pipe must pass under obstruction(s), which cannot be removed, and must be approved by the Owner's Representative if not specifically indicated on construction drawings. Final density of backfill shall match that of surrounding soil. Use of sleeves of suitable diameter is acceptable if installed first by jacking or boring, and pipe laid through sleeves. Observe same precautions as though pipe were installed in open trench.

3.3 INSTALLATION

A. PVC PIPING

1. Snake pipe in trench to allow for expansion and contraction.

2. When pipe laying is not in progress, or at end of each day, close pipe ends with tight plug or cap. Perform work in accordance with good practices prevailing in piping trades.
3. Lay pipe and make all plastic-to-plastic joints in accordance with manufacturer's recommendations.
4. For piping 3-inches and larger, trenches must be a minimum of 12-inches or large enough to properly assemble and position pipe in trench.
5. For piping smaller than 3-inches, trenches must be a minimum of 6-inches or large enough to properly assemble and position pipe in trench.
6. The Contractor must install minimum pipe clearances of 6-inches between irrigation lines or 12-inches between lines of other trades. The contractor must increase line clearance as required by local, county, state or utility service regulations.

B. Low Voltage Wiring

1. Bury control wiring between controller and electric valves in mainline trenches, with wires consistently located below and to one side of pipe, on top of initial pipe bedding.
2. Control wire not installed in mainline trench must be installed in PVC conduit. Conduit to be sized to allow for wire pulling.
3. Bundle all 24 volt wires at ten (10)-foot intervals with electrical or duct tape.
4. Provide an expansion loop at pressure supply line angle fittings, every electric control valve location (in valve box), and at minimum 500 feet intervals. Form expansion loop by wrapping wire at least eight (8) times around a 3/4-inch pipe and withdrawing pipe.
5. Control wire connections and splices shall be made with waterproof, below grade rated splice kits.
6. Splices in control wire outside of remote control valve are not accepted. In the event of two wire path damage during installation the contractor is to notify the engineer and installed repair splice in dedicated valve box. Record all repair splice locations on record drawings.
7. Install one control wire for each control valve.
8. Run two spare #12-1 control wires from controller pedestal to last electric control valve operated by controller on each and every leg of mainline pipe. Label spare wires at controller and wire stub box. Loop a minimum of 24" from all spare wires inside every control valve box operated by controller.
9. Run all future control wires from controller pedestal to point indicated on drawings. Coil a minimum of ten (10) feet at termination and install in 10" round valve box. Label all wires at termination.

C. Line Voltage Wiring

1. Provide 120-volt power connection to automatic controller. A licensed Electrician must make 120-volt power connection.

D. Irrigation Satellite Controller

1. Contractor must verify existing controller functionality and station capacity.

E. Electric Control Valves

1. Install cross handle two 2-inches below finished grade where shown on the drawings and as detailed.
2. When grouped together, allow at least twelve (12) inches between valve box sides.
3. Install each remote control valve in a separate valve box unless construction details specifically indicate multi-valve boxes.

4. When parallel to roadway, sidewalk, or other permanent element or structure, control valve and box to be installed perpendicular to element or structure, spaced equally.

F. Quick Coupling Valves

1. Install quick couplers on prefabricated swing-joint assemblies plumb to grade. Angled nipple relative to pressure supply line shall be no more than 60 degrees and no less than 30 degrees. Quick coupling valves must be installed in separate dedicated valve box unless construction details specifically indicate alternate installation.

G. Valve Boxes

1. Valve box extensions are not acceptable except where specifically called for in construction details.
2. All valve boxes are to be set on 2x4 inch stabilization bricks.
3. Install gravel sump after compaction of all trenches. Place final portion of gravel inside valve box after valve box is backfilled and compacted.
4. Install valve boxes relative to finished grade as indicated in construction details.
   a) Sod = 1/4 inch below top of sod
   b) Seeded = 1/4 inch above finished grade
   c) Landscape or Decomposed Granit = 1/2 inch above finished grade
5. All valve boxes are to have T-Style lids. Flush lids are not accepted.
6. All valve boxes are to be green in grass or tan in landscape unless purple reclaimed water warning boxes are required.
7. Brand all valve box lids. Letter and number size shall be no smaller than one (1)-inch and no greater in size than 1 1/2 inches. Depth of branding shall be no more than 1/8 inch into valve box lid as follows:
   a) Control valves – Brand controller letter and station number on lid of each control valve box.
   b) Quick Coupling Valves – Brand quick coupling valve box lids with letters "Q.C."
   c) Wire Splices – Brand all wire splice box lids with letters "W.S.".
   d) Drip Piping Blowout Stubs - Brand controller letter and station number on lid of each drip tubing blow out box lid.
   e) Isolation Gate Valves – Brand all isolation gate valve box lids with letters "G.V.".
   f) Air Release Valves – Brand all air release valve box lids with word "AIR".

H. Isolation Valves

1. Separate isolation valves from thrust or bearing blocks with polywrap. Do not encase valves in concrete.
2. Isolation valves smaller than 3 inch are to be bronze. PVC ball valves are not accepted unless specifically called for on construction details.

I. Sprinkler Heads

1. Install sprinkler heads where designated on the drawings or where staked. Spacing of heads shall not exceed the maximum indicated on Drawing unless re-staked as directed by Owner's Representative. In no case shall the spacing exceed maximum recommended by manufacturer.

2. Set plumb to finish grade as detailed. Install heads on prefabricated swing-joint risers as detailed. Angled nipple relative to lateral pipe shall be no more than 60 degrees or less than 30 degrees. Adjust heads to 1/4 below top of sod after finished grade is established.
3. Adjust part circle heads for proper coverage. Plant placement shall not interfere with intended sprinkler head coverage, piping, or other equipment. Owner's Representative may request nozzle changes or adjustments without additional cost to the Owner. No overspray or wind drift shall be permitted onto public streets, walls, drinking fountains, backflow prevention assemblies, tables, barbeques and/ or other structures.
4. Install sprinkler heads 6-inches away from curbs walks and vertical surfaces such as walls and fences.

J. Backfilling

1. Do not begin backfilling operations until required system tests have been completed. Backfill shall not be done in freezing weather except with prior approval Owner's Representative. Leave trenches slightly mounded to allow for settlement after backfilling is completed. Trenches shall be finish graded prior to walk-through of the irrigation system by the Owner's Representative.
2. All mainline pipe shall be bedded with construction grade sand or clean on-site soil 4-inches below invert of pipe, to 6-inches above top of pipe and width of trench.
3. Materials - Excavated material is generally considered satisfactory for backfill purposes after completing bedding requirements. Backfill material shall be free of rubbish, vegetable matter, frozen materials, and stones larger than one (1) inches in maximum dimension. Do not mix subsoil with topsoil. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if excavated material is unacceptable
4. Open excavations must be protected in accordance with OSHA regulations.
5. Compact backfill to 90% maximum density in 6-inch lifts, determined in accordance with ASTM D155-7 utilizing the following methods:
   a) Mechanical tamping.
   b) Puddling or ponding. Puddling or ponding and /or jetting is prohibited within 10'- 0" of building or foundation walls.

K. Piping Under Paving

1. Provide for a minimum cover of 24-inches between the top of the pipe and the bottom of the aggregate base for all irrigation mainline and lateral piping installed under asphaltic concrete or concrete paving.
2. Piping shall be bedded with construction grade sand 6-nches below pipe to 6-inches above pipe and width of excavation.
3. Compact backfill material in 6-inch lifts at 95% maximum density determined in accordance with ASTM D1557 using manual or mechanical tamping devices.
4. Set in place, cap, and pressure test all piping under paving, in presence of the Owner's Representative prior to backfilling and paving operations.
5. Piping under existing walks or concrete pavement shall be done by jacking, boring, or hydraulic driving, but where cutting or breaking of walks and/or concrete is necessary, it shall be done and replaced at no cost to Owner. Obtain permission and prior approval to cut or break walks and/or concrete from the Owner's Representative.

3.4 FIELD QUALITY CONTROL

A. Flushing

1. After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupling valves, and air release valves, thoroughly flush piping system under full head of water pressure from dead end fittings. Maintain flushing for ten (10) minutes through furthermost valves. Cap risers after flushing.

B. Pressure Testing

1. Conduct tests in presence of the Owner's Representative. Arrange for presence of reviewer a minimum of 48 hours in advance of testing. Supply force pump and all other test equipment.
2. After center load backfilling, (All pipe joints and fittings shall remain uncovered) and installation of all control valves, quick coupling valves, drain valves, and air release valves, fill mainline pipe with clean clear water, and pressurize to 50 psi over the designated static pressure or 125 psi, whichever is greater, for a period of 6 hours.
3. Pressure test is acceptable if no leakage or loss of pressure is evident during test period.
4. If leaks or pressure loss are detected than the Contractor is to repair and retest system until test pressure can be maintained for duration of pressure test.
5. No more than 2,000 feet of mainline is to be tested in a single pressure test.
6. Before substantial completion all mainline pipe shall remain under pressure for a minimum period of 48 hours.

C. Walk-Through for Substantial Completion

1. Arrange for the Owner's Representative's presence a minimum of 5 business days in advance of the walk-through.
2. Entire system shall be completely installed and operational prior to scheduling of walk-through. All sodded areas shall be complete with head height and valve boxes adjusted accordingly.
3. Operate each zone in its entirety from the controller for the Owner's Representative at time of walk-through and open all valve boxes.
4. Owner's Representative shall generate a list of items to be corrected prior to Final Completion.
5. Furnish all materials and perform all Work required to correct all inadequacies due to deviations from Contract Documents, and as directed by the Owner's Representative.

D. Walk-Through for Final Completion

1. Arrange for the Owner's Representative's presence a minimum of 5 business days in advance of walk-through.
2. Show evidence to the Owner's Representative that Owner has received all accessories, charts, record drawings, and equipment as required before the Final Completion walk-through is scheduled.
3. Operate each zone identified as deficient at the Substantial Completion walk-through for Owner's Representative at time of the Final Completion walk-through to insure correction of all incomplete items.
4. Items deemed not acceptable to the Owner's Representative shall be reworked to the complete satisfaction of the Owner's Representative.
5. If after request to the Owner's Representative for walk-through for Final Completion of the irrigation system, the Owner's Representative finds items during the walk-through that have not been properly adjusted, reworked, or replaced as indicated on the list of incomplete items from the Substantial Completion walk-through, the Contractor shall be charged for all subsequent walk-throughs. Funds will be withheld from the Final payment and/or Retainage

to the Contractor, in the amount equal to the additional time and expenses required by the Owner's Representative to conduct and document further walk-throughs as deemed necessary to insure compliance with the Contract Documents.

3.5 ADJUSTING –

A. Upon substantial completion of installation, "fine-tune" the entire irrigation system by regulating valves, adjusting patterns and break-up arms/screws, and setting pressure reducing valves or throttling control valve flow controls at proper pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent over spray onto walks, roadways, and buildings as much as possible. Heads of same type shall be operating at same pressure +/-7%.

B. If it is determined that irrigation adjustments will provide proper and more adequate coverage, make such adjustments prior to Final Acceptance, as directed, at no additional cost to Owner. Adjustments may also include changes in nozzle sizes, degrees of arc, and control valve throttling.

C. All sprinkler heads shall be set perpendicular to finish grade unless otherwise designated.

D. Areas that do not conform to designated operation requirements due to unauthorized changes or poor installation practices shall be immediately corrected at no additional cost to the Owner.

3.6 CLEANING

A. Maintain continuous cleaning operations throughout the duration of Work. Dispose of, off-site at a legal dumpsite and at no additional cost to Owner, all trash or debris generated by the installation of the irrigation system.

END OF SECTION

SECTION 32 93 00 - PLANTING

PART 1- GENERAL

1.1 SCOPE OF WORK

A. Work includes layout and installation of all plant materials per the planting plans & details in coordination with irrigation installation.

1.2 REFERENCES

A. American Standard for Nursery Stock - ANSI Z60.1–2004

1.3 SUBMITTALS FOR REVIEW

A. Plant Data – Including species, size and source

PART 2 - PRODUCTS

2.1 TOPSOIL:

A. Existing soil on the site shall be amended and used as topsoil for planting purposes as available on site and shall be free of debris, stones larger than one inch, metals, oil, weeds, or other foreign matter.

B. Contaminated soil shall be removed and replaced with acceptable existing soil or approved imported soil.

C. Imported soil shall be from the area and sandy loam textured. Silt plus clay content of this soil shall be not greater than 15% by weight. The boron content of this soil shall be not greater than 1 part per million as measured on the saturation extract. The sodium absorption ratio (SAR) shall not exceed 3.0 milliohms per centimeter at 25 degrees C.

D. In order to ensure conformance, samples of the imported soil shall be submitted to an agronomic soils testing laboratory for analysis prior to use. Components of the test shall include all major nutrients, pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron, adsorption rate, organic content and texture.

E. Results of testing shall be delivered to the Landscape Architect for approval. Soil test to include analysis and recommendations.

F. Planting in Bio-Retention Basin to be planted in retention basin soil per details.

2.2 SOIL AMENDMENTS & FERTILIZERS:

A. All planting back fill shall be shall be amended with composted organic humus soil amendment.

1. Ground Pine, Redwood or Ground Fir Bark with the following properties:

Percent Passing	Sieve Designation		
100	9.51 mm	3/8"	
50-60	6.35 mm	1/4"	
20-40	4.76 mm	No. 4	
0-20	2.38 mm	No. 8	8 mesh

2. Redwood Sawdust

a) Dry bulk density, lbs. per cu. yd., 260-280

b) Nitrogen stabilized - dry weight basis, min. 0.4%

c) Salinity (ECe): 4.0 maximum

d) Organic Content: 90% minimum

e) Reaction (pH): 4.0 minimum

3. Ground Fir and/or Pine Bark
    a) Dry bulk density, lbs. per cu. yd., Min. 350
    b) Nitrogen stabilized - dry weight basis, min. 0.5%
    c) Salinity (ECe): 4.0 maximum
    d) Organic Content: 90% minimum
    e) Reaction (pH): 4.0 minimum
4. Cattle Manure
    a) Dry bulk density, lbs. per cu. yd., Max. 200
5. Humus amendments and native soil and organic fertilizer shall be tilled or mixed together for all plant back fill and topsoil applications at a rate noted herein.
6. Fertilizer for sod lawn shall be granular with a minimum of 15% nitrogen, 6% phosphoric acid, and 6% potash.
7. Deliver mixed fertilizer in standard bags, marked with weight, analysis and name of manufacturer.
8. Keep fertilizer in dry storage.

2.3 PLANT MATERIALS:

A. All plant materials shall be healthy, well-developed representatives of their species of varieties, free from disfigurement with well developed branch and root systems, and certification of nursery inspection that plants are free from all plant diseases and insect infestation.

B. Tag plant materials with name and size in accordance with standards of practice recommended by American Association of Nurserymen.

C. Size of tree and shrub containers shall be as stated on the planting plan. Container stock shall have grown in containers for at least six (6) months, but not over two (2) years. Samples shall be shown to prove that no root-bound conditions prevail. No container plants that have cracked or broken balls of earth, when taken from containers shall be planted, except upon specific approval.

D. Do not prune, prior to delivery, except by specific approval. Plants shall be subject to inspection for size, variety, condition, latent defects and injuries, at place of growth and at the project site at any time before or during progress of work. Remove rejected plants from the project site immediately and replace it with acceptable material.

E. Protect all plants from damage by sun, wind or rain at all times before planting.

F. Substitutions will not be permitted; except, when proof is submitted that any plant specified is not obtainable. In this case, a proposal will be considered for use of the nearest equivalent in size or variety with an equitable adjustment of contract price. All substitutions will be subject to the Landscape Architect's approval.

G. Plants shall have grown under climatic conditions comparable to those of the project sit, unless otherwise specifically approved by the

H. Landscape Architect.

2.4 BIORETENTION SOIL MIX:

A. Bioretention soil mix shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour and support vigorous plant growth as required by the City of San Jose / County of Santa Clara C.3 Stormwater Handbook.

B. Consist of the following mixture of fine sand and compost, measured on a volume basis: 60%-

70% Sand 30%-40% Compost

C. Available at TMT Enterprises, LH Voss Materials and Lyngso Garden Materials.

2.5 MULCH:

D. Mulch all planting bed areas with 3” clean chip mulch.

E. Mulch shall be free of noxious weeds.

2.6 SOD LAWN:

A. Sod shall be a Native No-mow blend from Delta Bluegrass or approved equal.

2.7 TREE STAKING:

A. Tree ties for use with lodge pole pine stakes or metal tree stakes used in conjunction Vinyl Clad Steel Guy Wire passed through 1/2 inch new rubber hose.

B. Tree stakes: Two (2) - 2 inch diameter x 10 foot pressure treated stakes for all fifteen gallon and larger trees single trunk trees.

PART 3 - EXECUTION

3.1 PLANT INSTALLATION:

A. Site clearance: Clean up and remove from the planting areas weeds and grasses, including roots, and any minor accumulated debris and rubbish before commencing work.

B. Storage: Secure permission from the Owner to store plants on the project site, and insure that they are protected from damage by the sun, wind, and construction work, theft and vandalism.

C. Finish grading of planting areas. Grading shall be done as indicated on the grading plans and as follows:

1. Do not work on the soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form or clods will not readily break up.
2. Remove and dispose of all soil in planting areas that contains any deleterious substance such as oil, plaster, concrete, gasoline, paint, solvents, etc., removing the soil to a minimum depth of six (6) inches or to the level of dryness in the affected areas. The affected soil shall be replaced with native or imported soil as required. The contractor shall be responsible for any damage to installed plants caused by such substances.
3. If an area to be landscaped is not acceptable to the contractor, the contractor shall notify the Landscape Architect, in writing.
4. Prior to start of finish grading; loosen all planting areas to a depth of two (2) inches. Finish grades shall allow for addition of soil amendments.
5. Make minor grade adjustments as directed by the Landscape Architect.
6. Where designated drainage meets an obstruction, warp grades so that no water collects.
7. Use sprinklers as required to control all airborne dust caused by planting and fine grading operations.
8. Finish grade all planting areas to a smooth and even condition to drain, making certain that no water pockets or irregularities remain. Remove and dispose of all foreign materials, clods and rocks over 1 inch in diameter within 3 inches of surface.
9. Provide a grade which, after conditioning and planting, is one (1) inch below the tops of curbs and walks in lawn areas and one (1) inch below for shrub areas sloping to drain to adjacent roadway, drain swale or catch basin.

D. Planting shall be completed as follows:

1. Determine location of the trees and shrubs by scaling from the planting plan and under the direction of the Landscape Architect.
2. Excavate planting pits with vertical sides for all plants.
   a) Shrub pits shall be three (3) times the diameter.
   b) Tree pits shall be three (3) times the diameter.
   c) Biorentention pits shall be (2) times the diameter.
3. If planting pits are cut with power auger, vertical sides of pit shall be additionally broken with balling bar or spade to interrupt continuous curve influence on root development. All pit sides shall be scarified prior to backfilling.
4. Plant material shall be planted in such a way that after settling, the crown of the plant is ½" above the finished grade.
5. Backfill planting pits with a prepared mix as follows:
   a) Tree, shrub/perennial 50% native on site soil, 50% composted organic humus.
   b) Form a shallow basin around the edge of planting pits.
   c) Backfill bioretention plants with bioretention soil mix.
6. Thoroughly water all plants and probe backfill with a spade to insure that all air pockets are filled immediately after planting.
7. Grade area around plants to finish grades and dispose of excess soil.
8. Location for street trees adjacent to any light standards or utility equipment shall be adjusted to maintain a suitable clearance, as approved by the Landscape Architect.

3.2 SOD LAWN:

A. Till three inches of organic composted humus to a depth of six inches in all sod areas.

B. Water all sod areas thoroughly and compact with a hand sod roller. Grade all sod areas with smooth and gradual grade changes to be approved by the Landscape Architect prior to laying of sod.

C. Irrigate areas prior installation. Soil shall be moist to a depth of two inches with no standing water.

D. Lay sod within twenty four (24) hours after it is delivered. Protect rolls from drying out as necessary.

E. Unroll sod carefully and place in staggered rows. Tamp each roll against the adjacent strips to eliminate joints and edges.

F. Trim sod to conform to turf shapes designated on the planting plans.

G. Roll all sod areas with an approved sod roller no later than twenty four (24) hours after installation. Sod shall be flush with the finish grade of existing walk, curbs, etc.

H. Additional rolling may be required to meet this requirement and Landscape Architect's approval.

I. Mow turf when it reaches 3 inches in height, to not less than 2 inches. During the maintenance period do not allow the turf to exceed 3 1/4 inches in height. Collect and remove all grass clippings from the site.

J. Hand roll sod immediately after installation and water thoroughly. Allow sod to settle, dry over night and roll a final time in the morning and irrigate thoroughly.

K. Irrigate all new sod with a minimum of ¼" of precipitation a minimum of twice per day for the first 30 days.

L. Maintain turf edges adjacent to walks with a mechanical edger in a neat condition until the acceptance of the work.

M. Take sufficient measures to ensure the turf against damage resulting from pedestrian traffic. If any type of barrier is used, it shall meet with the approval of the Landscape Architect.

N. Acceptance of turf areas will not be made until turf has received the second mowing and all bare spots have been re-sodded. Contractor shall be responsible for the maintenance of the turf areas until acceptance.

O. Repairs to all damaged turf will be necessary before acceptance will be made.

3.3 PRUNING:

A. Prune minimum necessary to remove injured twigs, branches, dead wood, sprouts and suckers.

B. Prune plants according to standard horticultural practices, by qualified personnel.

C. No topping of any trees will be permitted. Trees that have been topped will be replaced at the contractor's expense.

3.4 CLEAN-UP:

A. During the course of the work, daily remove surplus materials from the site and leave premises in a neat and clean condition.

B. Prior to acceptance of the project for maintenance, clean up and remove all remaining debris and surplus materials upon completion of work, leaving the premises neat and clean.

C. Remove all tags, labels, nursery stakes and ties from all plant material only after the approval of the Landscape Architect.

3.5 MAINTENANCE

A. Maintain all areas included in the contract on a weekly basis during the progress of the work, the maintenance period, and until the final acceptance of the work is received in writing. Maintenance to include trash and weed removal on a weekly basis and a raking of the granite areas every other week.

B. After all the work indicated on the drawings or herein specified has been completed and inspected and approved by the Landscape Architect on a 30 calendar day schedule; maintain all areas within the project boundary for period of 90 calendar days.

C. Tree and Shrub Care:

1. Watering:

a) Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering, use a wand to break the water force.

D. Tree & Shrub Pruning:

1. Prune trees to select and develop permanent scaffold branches that are smaller in diameter to the trunk or branch of which they are attached, which have vertical spacing of from 18 to 48 inches and radial orientation so as not to overlay one another; to eliminate narrow V-shaped branch forks that lack thinning out crowns; to maintain growth within space balance crown with roots.

2. Under no circumstances will stripping of lower branches or "raising up" of young trees be permitted. Retain lower branches in a "tipped back" or pinched condition with as much foliage as possible to promote trunk growth (tapered trunk). Lower branches may be removed only after the tree is able to stand erect without staking or other support.

3. Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Perform primary pruning to deciduous trees during the dormant season. Prune damaged trees or those that constitute health or safety hazards at any time of the year as directed by the Landscape Architect. Topping is not allowed.

E. Staking:

1. Remove stakes & guys as soon as they are no longer needed. Inspect stakes to prevent girdling of trunks or branches, and to prevent rubbing that causes bark wounds.
2. The contracting crew at the time of maintenance shall remove the stakes and cut the stakes so they are not protruding into the canopy.

F. Weed control:

1. Keep basins and areas between plants free of weeds manually.
2. Eradicate all noxious weeds.

G. Replacement of plants:

1. Remove dead and dying plants and replace with plants of equal size and variety of original planting plan at no additional cost to the Owner and as approved by the Landscape Architect.
2. Groundcover Care: Apply a pre-emergent herbicide having a life no less than six (6) months to all ground cover and shrub areas. Herbicide shall be registered for use on the species of plant material specified in planting plans and applied by a licensed pest control applicator.

H. Turf care

1. Mowing and Edging:
   a) Mow all turf areas to a minimum height of 1 1/4” inch and a maximum of 2 inches.
   b) Mow at least once every seven (7) days during spring and summer seasons and as needed during other seasons.
   c) Trim edges at least twice monthly or as needed with a power edger for a neat appearance. Vacuum or blow clippings off walks.
2. Watering:
   a) Water turf areas at such frequency as weather conditions require, replenishing soil moisture below root zone. Irrigation shall be scheduled between 4 a.m. and 7 a.m. following turf establishment.

I. General Maintenance:

1. Remove trash and weeds weekly.
2. Edge ground cover to keep in bounds and trim top growth as necessary to achieve an overall even appearance.
3. Exterminate vertebrate pests gophers mole etc.; and repair damage as required.
4. Provide schedule of maintenance visits and procedures to the Owner’s representative.

3.6 INSPECTIONS

A. Inspections shall be made by the Landscape Architect. Contractor shall be on the site when inspections are made. Requests for inspections shall be made at least 48 hours in advance or per the approved inspection schedule.

B. If the work is not ready for inspection when the Landscape Architect arrives, contractor shall pay for the Landscape Architects visit at the Landscape Architect’s standard billing rate.

C. Any work completed without proper inspection by the Landscape Architect shall be removed and replaced at no expense to the Owner.

3.7 GUARANTEE

A. The Landscape Architect shall determine the health and viability of the plant materials within the specified warrantee period and decide whether any plant shall be replaced under the guarantee.

1. All trees (15 gallon and larger) shall be guaranteed for a period of one year.
2. All shrubs (5 gallon and larger) shall be guaranteed for a period of one year.
3. All shrubs & perennials (3 gallon and smaller) shall be guaranteed for a period of 90 days.
4. All guarantee periods commence from the time of final acceptance by the Landscape Architect at the completion of the 90 calendar day maintenance period.
5. Replace, as soon as weather permits, all dead plants not in vigorous condition as noted during the maintenance period. Said plants shall be maintained for a period of 90 calendar days from the replacement date.
6. Plants used for replacements shall be same species, variety and size as originally planted. They shall be furnished, planted and fertilized as specified and guaranteed within these documents.

END OF SECTION

FOOTHILL HIGH SCHOOL ATHLETIC FIELDS

SECTION 33 46 00 - DRAINAGE

PART 1 – GENERAL

1.1 CONTRACT DOCUMENTS

A. “Standard specifications” refers to “State of California Department of Transportation standard specifications” latest edition, and hereinafter referred to as “standard specifications”.

1.2 SCOPE OF WORK

A. Furnish labor, materials, equipment, facilities, transportation and services to complete drainage and related work as shown on contract documents.

B. Work Included: The general extent of drains lines and structures are shown on the drawings and include, but are not necessarily limited to, the following:

1. Solid corrugated high density polyethylene (CHDPE) storm drain lines
2. Perforated corrugated high density polyethylene (CHDPE) storm drain lines
3. Drainage cleanouts
4. Connections to drainage structures
5. Catch basins and drains
6. Trench/Slot drains
7. Geotextile fabric

1.3 SUBMITTALS FOR REVIEW

A. Product Data: Provide data on pipe, pipe fittings, grates, manholes, lids, catch basins, trench drains, slot drains and storm sewer appurtenances.

1.4 SUBMITTALS FOR INFORMATION

A. The following information must be submitted prior to installation of specified work.

1. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. The following information must be submitted at the time of project closeout.

1. Accurately record actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations with tie in distances from at least two surface features.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 GENERAL

A. Verification: Prior to trenching, contractor shall check invert elevations of existing drain structures and pipes to which connections are to be made and report discrepancies to Owner representative.

PART 2 – MATERIALS

2.1 CEMENT MORTAR

A. Mortar shall be composed of one (1) part Portland cement and two (2) parts sand by volume.

2.2 CORRUGATED HIGH DENSITY POLYETHYLENE DRAIN LINE (CHDPE), SOLID AND

PERFORATED

A. CHDPE pipe, couplings and fittings shall be high density corrugated polyethylene smooth interior pipe, manufactured by Advanced Drainage Systems, Inc., Model ADS N-12; or equal.

   a. 4 through 10-inch diameters shall meet the strength requirements of AASHTO M252.

   b. 12 through 36-inch diameters shall conform to AASHTO M294 Type S. Material shall conform to ASTM D1248 Type III, Category 4, Grade P33, Class C, or ASTM D3350 cell classification 324420 C.

   c. Minimum conveyance factors shall be 7.3 for 6" pipe and 293.9 for 18" pipe.

   d. Pipe to concrete drain basin connections shall be A-LOK water-stop connectors or approved equal. Grout in per manufacture recommendations.

2.3 FRAMES, COVERS AND GRATES

A. Provide all covers from the same manufacturer. Where required provide “Pedestrian Safe” covers to meet ADA requirements.

B. Provide iron frames and covers as a total unit, sized as shown on the Drawings, and with the wording "STORM DRAIN" cast into the cover for storm drain manholes.

C. All manhole covers and grates shall be heavy duty with bolt down or locking devices.

2.4 DRAINAGE CLEANOUTS

A. A. Provide medium traffic weight covers and frames where cleanouts are within pavement, with the letters "SDCO" cast into the cover. Where required provide “Pedestrian Safe” covers to meet ADA requirements.

B. Size of cleanout shall be equal to the size of the drainpipe on which it is installed.

C. Drainage cleanouts and installation shall conform to requirements of the International Plumbing Code. Cleanout plug shall be a non-corrosive metallic type to allow future detection with a metal detector. Cleanout plugs shall be installed per plans.

2.5 CATCH BASINS AND DRAINS

A. Catch Basins and Drains shall be Oldcastle precast drain structures.

2.6 GEOTEXTILE FABRICS

A. Geotextile Filter Fabric for perimeter trench drain shall be Mirafi 140N, or approved equal.

B. Geotextile Filter Fabric installed below drain pad shall be Mirafi 140N, or approved equal. Geotextile filter fabric below drain pad must meet drain pad manufacturer’s requirements.

2.7 TRENCH DRAIN

A. SportsEdge 8” Terminator synthetic turf edge and slot channel trench drain system or approved equal. Locations shown on plans. Interlocking units to be nominal 1 meter in length with 0.5” longitudinal slot.

B. Interlocking units to outfall to inline catch basins. Catch Basin shall be pre-cast units specifically manufactured for connection to SportsEdge 8” Terminator edge drain.

PART 3 – EXECUTION

3.1 EXISTING CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Contractor shall verify existing invert elevations for storm drain construction prior to site work.

Work for storm drain installation shall begin at downstream connection point. This will allow for necessary adjustments to be made prior to installation of entire line. If contractor fails to begin at the downstream connection point and works up-stream, contractor shall be responsible for necessary adjustments.

C. Uncover and expose existing utility and sewer lines where they are to be crossed above or below by new work being constructed to verify grades and to assure sufficient clearance. Pipe shall not be installed until crossings have been verified for clearance. If contractor fails to follow this procedure, contractor will be solely responsible for extra work or material required if modifications to the design are necessary.

D. Contractor shall take special care in locating and protecting existing utilities.

3.2 FIELD MEASUREMENTS

A. Make necessary field measurements to assure precise fit in accordance with approved design.

3.3 GENERAL CONSTRUCTION

A. Trenches

1. Excavate trench and trench bed for storm drains in accordance with pertinent provisions of section 19-3 of the standard specifications.
2. Unless otherwise shown, provide separate trenches for pipelines. Minimum cover shall be twelve inches (12").
3. Lay pipe in open trenches except when Owner representative gives permission for tunneling.
4. Excavate trenches to widths no greater than necessary for proper installation of the work.
5. Material excavated for utility trenches shall be non-classified and shall include earth or other material encountered. Contract price is understood to cover removal of such materials to depths and extents indicated in contract documents and necessary to complete the work.
6. Grade bottom of trenches evenly in preparation for placement of bedding and to insure uniform bearing for full length of pipes. Cut holes as necessary for joints and joint-making.

B. Pipe Installation

1. General: Carefully examine each pipe prior to placing.
2. Promptly set aside defective pipe and damaged pipe.
3. Do not install defective pipe or damaged pipe.
4. Continually remove extraneous material from pipe.
5. Do not place pipe in water, nor place when trench or weather is unsuitable for such work.
6. Pipe of size and type noted on drawings shall be laid on firm bearing, aligned, and graded in direction of flow. Suitable fittings shall be provided where various lines connect together and where changes in pipe size occur. Connections shall be made to catch basins and etc. as indicated.
7. Make or have made required connections to existing drains, including new manholes and other new work required.
8. Commence pipe installation at lowest point in system and install pipe with bell end upgrade. Clean interior and joint surfaces and test pipe for soundness before lowering pipe into trench.
9. Lay pipe in straight lines and on uniform grades between points where changes in alignments or grades are shown. Fit pipes to form a smooth uniform invert. Keep a stopper in pipe mouths when pipe installation is not in progress. Pin flat pipes into subgrade, as recommended by manufacturer, to maintain uniform grade prior to placement of the permeable aggregate base stone.

10. Flush closed lines with water in sufficient volume to obtain free flow through each line. Remove obstructions and correct defects discovered. Remove silt and trash from catch basins and inlets prior to inspection of work.
11. Backfill trenches only after piping has been inspected, tested and the location of pipes and appurtenances has been recorded. Backfill material, placement and compaction shall conform to the requirements of Section 31 23 33 trenching and backfilling.
12. Install area drains and cleanouts per section 70 of the standard specifications.

C. Filter Fabric Installation:

1. Overlap joints a minimum of twelve (12) inches. Joints shall be overlapped in direction the stone aggregate is to be spread.
2. Joints shall be securely held in place in accordance with liner manufacturer's recommendations. Joint bonding may be delayed until aggregate placement is completed to minimize joint stress.
3. Place suitable amount of ballast on liner to prevent movement by wind. Ballast shall be in a form that will not damage liner.
4. Direct traffic loading on fabric will not be allowed.
5. Overlapping additional fabric and jointing shall be in accordance with manufacturer's recommendations. Repair punctured or torn fabric.
6. Liner must completely cover sub-grades under crushed aggregated and inside trenches.

3.4 JOINTS

A. General

1. Before making pipe joints, clean and dry surfaces of pipe to be joined.
2. Use lubricants, primers and adhesives recommended by pipe manufacturer.
3. Place, fit, joint, and adjust joints to obtain degree of water tightness required.

B. Flexible Watertight Joints:

1. Equal materials may be used when specifically approved in advance by Owner's representative.
2. Install gaskets and joint materials in accordance with manufacturer's recommendations as approved by Owner's representative.
   a) Protect from sun, blowing dust and other deleterious agents.
   b) Align pipe with previously installed pipe, and pull joints together. If gasket or joining material becomes loose and can be seen through exterior joint recess when joint is pulled to within 1" of closure, remove pipe and remake joint.
   c) Inspect gaskets and replace loose and improperly affixed gaskets and joining materials.

3.5 EXISTING MANHOLES, INLETS AND CLEANOUTS

A. Storm drains and structures including, but not limited to, manholes, catch basins and cleanouts that lie within areas affected by work on this project shall be adjusted to grade by contractor except where noted otherwise in contract documents.

3.6 TESTING AND INSPECTING

A. Provide personnel and equipment necessary, and perform tests required to demonstrate that work of this section has been completed in accordance with specified requirements.

B. Do not allow or cause any work of this section to be covered up or enclosed until after it has been

inspected, tested and approved.

3.7 DRAWINGS OF RECORD

A. Contractor shall provide and keep up-to-date completed "as-built" record on blue line prints that show every change from the original contract documents, including exact locations, sizes and kinds of equipment. “As-built” set shall be kept on job site and used only as a record set.

B. These drawings will also serve as work progress sheets, and contractor shall make neat and legible annotations thereon daily as the work proceeds, showing the work as actually installed. These drawings shall be available for inspection and shall be kept in a location designed by the Owner representative.

C. On or before the date of final review, contractor shall deliver corrected and completed "as- built" drawings to Owner representative. Delivery of the drawings will not relieve contractor of their responsibility of furnishing any required information.

END OF SECTION