SECTION 01 78 29

CONFORMANCE SURVEY (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Conformance surveying required for proper completion of the work including, but not necessarily limited to, the following:
   1. Synthetic turf construction, including subgrade and base preparation, and edges/curbing.
   2. Asphalt play court construction including asphalt overlay and new curbing/edgebands.
   3. Other applicable Project components.

B. Related Requirements:
   1. Section 01 33 00 – Submittal Procedures
   2. Section 01 71 23 – Field Engineering
   3. Section 01 78 39 – Project Record Drawings
   4. Section 31 20 00 – Earth Moving
   5. Section 32 11 00 – Base Courses
   6. Section 32 12 16 – Asphalt Paving
   7. Section 32 18 13 – Synthetic Turf Playing Field

1.02 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.03 ACTION SUBMITTALS

A. Conformance Survey: In addition to required prints, submit 1 electronic copy in AutoCAD or scaled PDF image of all conformance surveys for the Project. Review response by the Owner Representative shall identify any areas out of tolerance.

1.04 INFORMATIONAL SUBMITTALS

A. Name and address of Contractor's licensed surveyor to the Owner's Representative.

1.05 QUALITY CONTROL AND REWORK

A. Contractor shall retain a California Licensed Land Surveyor to obtain survey data and supervise preparation of the Conformance Surveys as specified.

B. Portions of a survey that does not conform to the grading tolerance requirements identified in this Section will be corrected by the Contractor at its expense. Areas out of conformance shall be resurveyed at the Contractor's expense by its Surveyor. Revised points shall be added to the original digital file for resubmittal, review, and acceptance by the Owner Representative.

C. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor. At any time during construction and following acceptance of a portion of the survey by the Owner, the Owner reserves the right to recheck the surface grades at its expense to verify it is still in conformance.

D. It is the Contractor's responsibility to protect the grading and compaction tolerances of surveyed surfaces after Conformance Surveying operations are complete and accepted, and prior to installation of subsequent materials.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 LAYING OUT THE WORK

A. Prior to beginning work, Contractor shall secure the electronic grading plan from the Owner for use by the Surveyor.

B. The Contractor's Surveyor shall provide all conformance survey drawings. The drawings shall provide both the design elevations and the as-constructed spot elevations. These elevations shall be for comparison to those on the Contract Documents for the same location. Contractor shall also show the difference in these two numbers. Unique reference numbers shall be assigned to each point for reference purposes. For spacing requirements, refer to specific type of improvement identified in this Section.

C. Accuracy of the Contractor's surveys provided under this Section shall be to 0.01 feet.

D. The Contractor's Licensed Surveyor shall provide all conformance survey drawings and all 25-foot grid or other grid conformance grades based on the designed grades shown on the Drawings.

3.02 SYNTHETIC TURF SUBGRADE AND BASE CONFORMANCE SURVEYING

A. General: The stone grades shall not vary from the specified grades more than 1/4-inch (0.02) feet at any location when measured in any direction. In addition, no two adjacent points within the grid shall cumulatively deviate more than 1/2-inch (0.04 feet) from point to point of the design grades.

B. Edgebands/ Curbs:
   1. A digital file of the curb elevations shall be provided on a minimum 20-foot spacing, including points at all beginning, mid-, and end points of curve, and changes in direction including those at the end of the chutes.
   2. Required Tolerance: No point along the curbing shall be greater than 1/4 inch (0.02 feet) outside the design grades and no spot shall deviate more than 1/2 inch (0.04 feet) from any other adjacent point within the 20-foot spaced curb survey.

C. Subgrade:
   1. Contractor shall verify that subgrade has been prepared according to the Specifications with regard to compaction and grade tolerances and is free of debris, non-compactable material, topsoil, or organics prior to beginning work.
   2. Prior to acceptance of the subgrade, a Conformance Survey shall be prepared by the Contractor and a digital file submitted to the Owner Representative as specified. The survey shall be based on a 20-foot grid showing the field crown, the center of the subgrade elevation of the subdrain trench edges, perimeter of the field at edge finish grade and curb finish surface. The plan shall show the comparison of the design grades versus the as-constructed grades.
   3. Top of subgrade elevations shall be verified using laser-operation survey instruments. Grades at each point shall be within plus or minus 1/2-inch (0.04 feet) from the elevations shown on the Drawings. In addition, no two adjacent points within the grid shall cumulatively deviate more than 3/4-inch (0.06 feet) from the respective points' design grades.

D. Completed Stone Base:
   1. Prior to acceptance of the stone base, a Conformance Survey will be prepared by the Contractor's Surveyor and submitted by the Contractor to the Owner's Representative as specified.
   2. The survey shall be based on a 25-foot grid showing the field crown, perimeter of the field and adjacent curb edge.
   3. The survey plan shall show the comparison of the design grades versus the as-constructed grades.
   4. A portion of the survey that does not conform to the requirements identified above shall be corrected by the Contractor.
      a. Areas out of conformance shall be resurveyed following the identical procedure stated above by the Surveyor, and these revised points shall be added to the original digital file for review and acceptance by the Owner's Representative.
      b. Delays and costs incurred due to grades out of conformance are the sole responsibility of the Contractor.
   5. It is the Contractor's responsibility to protect the grading and compaction tolerances of the base after conformance survey is complete and prior to installation of the synthetic turf.

E. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using the string line method.
   1. A mason's line held taught between two workers separated by a distance of approximately 40 feet shall be placed directly on the finished surface parallel to the direction of greatest slope.
   2. A third worker shall check for separations between the mason's line and the finished surface that are equal to or greater than the specified tolerances.
   3. Entire finished surface shall be "walked" with mason's line in increments of approximately 3 feet.
   4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.

3.03 ASPHALT PLAY COURT CONFORMANCE SURVEYING REQUIREMENTS

A. Prior to the pouring of the asphalt play court perimeter curbing, Contractor shall be responsible for verifying the proper horizontal and vertical controls of all concrete formwork. This quality control process does not need to be completed by a licensed surveyor. However, the Contractor shall employ a Licensed Surveyor to determine finish surface grades of all edgebands and curbing upon completion of initial concrete curing process.

B. A digital file of the curb elevations shall be provided on a minimum 20-foot spacing, including all corner points.

C. Required Tolerance: No point along the curbing shall be greater than 1/4 inch (0.02 feet) outside the design grades and no spot shall deviate more than 1/2 inch (0.04 feet) from any other adjacent point within the 20-foot spaced curb survey.

D. After curbing is confirmed to be within the specified tolerances, the Contractor shall pave the asphalt play court area with specified paving.

E. The completed asphalt courts shall undergo a flood test to assure there are no birdbaths and low points that may not be identified by the Conformance Survey. A bird bath is a puddle of water that has not evaporated after one hour in 70 degrees F or warmer temperature. If the bird bath has a water depth greater than 1/16 inch, which shall be verified by using a nickel with the nickel being fully submerged in the birdbath, then corrective measures shall be taken by the Contractor prior to installation of the final court surface.

END OF SECTION

SECTION 31 20 00

EARTH MOVING (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Site excavation and backfilling as shown on the Drawings including, but is not necessarily limited to, the following:
   1. Topsoil stripping, stockpiling, and replacement into planting areas.
   2. Rough grading.
   3. Filling and backfilling to attain required grades.
   4. Excavating for paving, footings, and foundations.
   5. Chemical treatment of subgrade under proposed synthetic turf areas.

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures
   2. Section 01 71 23 - Field Engineering
   3. Section 01 78 39 - Project Record Drawings
   4. Section 02 41 13 - Site Clearing and Demolition
   5. Section 31 23 00 - Excavation and Fill
   6. Section 32 01 90 - Existing Tree Protection and Maintenance
   7. Section 32 11 00 - Base Courses
   8. Section 32 90 00 - Planting

1.02 REFERENCES

A. California Building Code (CBC).

B. American Society for Testing and Materials (ASTM):
   1. D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. California Occupational Safety and Health Standards (OSHA):
   1. Article 6 - Excavations and Shoring.

D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Drawings:
   1. Conform to requirements specified in Section 01 78 39 - Project Record Documents.
   2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts, and slope gradients.

1.05 ACTION SUBMITTALS

A. Import Topsoil:
   1. It is the Contractor's responsibility to determine if import topsoil is required on the Project.
   2. If required, Contractor shall submit four 1/2-pound samples in nominal 1 quart-sized "zip-lock" plastic bags for each proposed import topsoil. Each sample shall include current accompanying fertility and structure analyses prepared by a recognized soil and plant laboratory.

1.06 QUALITY ASSURANCE

A. Adhere to requirements, recommendations, and Best Management Practices (BMPs) for storm water management as may be outlined in the Project Storm Water Pollution Prevention Plan (SWPPP) prepared for this project, or as required by governing agencies.

B. Geotechnical Investigation:
   1. A Geotechnical Report has been prepared and is available for use on this Project. The recommendations contained therein have been incorporated into the Contract Documents.
   2. Accuracy, sufficiency, and competency of Geotechnical Report are not ratified by the Owner or its design consultants and remain the sole responsibility of Geotechnical Engineer.
   3. The Geotechnical Report is available from the Owner.
   4. Unless otherwise specified or indicated on the Drawings, it is intended that all work shall be done in accordance with applicable provisions of the Geotechnical Report. Shall any discrepancies arise between the Drawings, Specifications, or Geotechnical Report, Contractor shall bring to the attention of the Owner's representative prior to proceeding with work.

C. The Owner may retain the services of the Geotechnical Engineer to make recommendations based on the soil conditions encountered the results of field and laboratory tests, and observations of the activities performed under this Section.
   1. If, in opinion of the Geotechnical Engineer, work performed does not meet technical or design requirements stipulated, the Contractor shall make necessary readjustments to the approval of the Geotechnical Engineer.
   2. No deviations from the Contract Documents shall be made without specific and written acceptance of the Owner's Representative.
   3. In event of conflict between the Specifications and recommendations contained in Geotechnical Report, the Owner's Representative and Geotechnical Engineer shall be notified.
      a. Contractor shall follow clarification and interpretation issued through the Owner's Representative at no extra cost to the Owner.
      b. If clarification or interpretation should change scope of work, there will be mutually agreed-to adjustment in the Contract price by written Change Order.
   4. The Geotechnical Engineer will not inspect the Contractor's safety measures.

D. Compaction densities specified for structural fills under footings, slabs, or pavements shall be determined in accordance the Geotechnical Engineer's written recommendations.

E. Certification:
   1. The Contractor shall certify source and type of backfill and topsoil proposed to be incorporated into the work, at the request of the Owner's Representative.
   2. The Contractor shall certify elevations of excavations, footings, subgrades, and finish grades with the use of a Licensed Surveyor, at Contractor's expense, at the request of the Owner's Representative.

F. Control of Work: Conform to Section 5 of the Standard Specifications.

G. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.07 PROTECTION

A. Protect all existing structures, fences, roads, sidewalks, paving, curbs, and other items as necessary from earthwork activity.

B. Protect above or below grade utilities which are to remain.

C. Protect trees to remain in accordance with Section 32 01 90 - Existing Tree Protection and Maintenance as applicable.

D. Repair damage to any existing site features which are to remain. Repair and restoration shall be equal to quality and appearance of prior condition and to the satisfaction of the Owner's Representative.

1.08 FIELD CONDITIONS

A. Underground Utilities: Unknown buried utility lines may exist. If encountered, notify Owner's Representative immediately for direction and re-direct work to avoid delay.
   1. Cooperate and coordinate with Owner's Representative and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   2. Do not interrupt existing utilities serving occupied facilities without proper notification to, and written direction from, Owner's Representative.

B. Wet Conditions: No grading operations shall be conducted when excessively wet conditions exist as determined by the Owner's Representative.

C. Contractor shall provide de-watering equipment as required to continue scheduled operations and provide optimum working conditions at no additional cost to Owner.

D. Dry Conditions: Contractor shall apply sufficient water to materials during construction to properly compact materials and control dust. Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to subgrades as necessary to achieve compaction goals.

1.09 GRADE STAKES AND LINES

A. Grading and subgrading shall be controlled by Contractor-installed intermediate grade stakes and lines necessary to obtain the finished grade elevations shown or implied in the Drawings. Subgrade and finish grade surfaces shall conform to the control planes established by these grade stakes and lines.

B. Protect and maintain all existing benchmarks, monuments, and other reference points. If disturbed or destroyed, they shall be replaced at the Contractor's expense.

C. Contractor shall set temporary benchmarks as necessary to properly complete construction operations.

1.10 SURVEYING

A. Contractor shall be responsible for hiring a licensed professional surveyor to perform all surveying, layout and staking in accordance with requirements specified in Section 01 71 23 - Field Engineering. Contractor shall be responsible for informing Owner's Representative a minimum **[**2**]** **[**____**]** working days' notice when staking and layout is scheduled so that a review of completed chalk lines and staking can take place.

1.11 TOLERANCES

A. Refer to related specification sections for grading tolerances of specified improvements.

PART 2 - PRODUCTS

2.01 PERFORMANCE CRITERIA

A. Excavations shall not exceed plus or minus 1/10-foot variation from dimensions and elevations shown or noted, unless otherwise accepted by Owner's Representative.

B. Grading Tolerance: Refer to related specification sections for grading tolerances of specified improvements.

2.02 MATERIALS

A. Fill Material: Soil excavated from the site or imported conforming to requirements for fill material contained in applicable portions of Division III Grading, Section 19 - Earthwork of the Standard Specifications, unless modified by recommendations for fill material contained in the Geotechnical Report. Imported fill shall be approved by the Geotechnical Engineer before importation to the site. The Geotechnical Engineer shall receive samples of and approve all proposed import fill materials prior to use on site. Engineered Fill shall meet the requirements established in Table 3 of the Geotechnical Report and placement of materials shall meet the requirements established in Geotechnical Report section 5.3.3.

B. Topsoil: Excavated material from top 6 inches maximum of existing grade at unpaved areas and/or import material graded free of roots and rocks larger than two inches, subsoil, debris, weeds, large mats of grass, and other deleterious material. Topsoil shall be approved by the Owner's Representative and comply with the additional requirements specified in Section 32 90 00 - Planting.

C. Subsoil: Excavated material below top 6 inches of existing grade, graded free of clay clods larger than 6 inches, rocks larger than 3 inches, and debris.

D. Permeable Fills: As specified in Section 32 11 00 - Base Courses and conforming to recommendations for granular fill in the Geotechnical Report.

E. Water: Clean and free from deleterious amounts of acids, alkalis, salts, and organic matter.

F. Additional Materials: As noted in the Geotechnical Report.

G. Chemical Treatment: Final quantities to be determined by Geotechnical Engineer. The below quantities shall be used by Contractor for establishing the cost of chemical treatment additives and operations in the Contract sum:
   1. Treatment shall be 5 percent high calcium quicklime by dry weight to a depth of at least 12 inches below finish subgrade elevation. The water content of the lime treated soil should be maintained at a minimum of 3 percent above the optimum water content during the treatment operation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify all required lines, levels, contours, datum, control points and property lines required to properly establish limits of work.

B. Verify elevations of critical existing grades as noted on Drawings and as directed by Owner's Representative. Notify Owner's Representative of discrepancies prior to start of work and re-direct work to avoid delay.

C. Identify all known below grade utilities. Stake and flag locations.

D. Identify and flag surface grades and utilities.

E. Contact Underground Service Alert (USA), 800-642-2444, and local utility companies to verify locations of existing utilities a minimum of 5 working days prior to excavation.

F. A pre-construction conference specifically covering earthwork operations shall be held at the jobsite with representatives from the owner, GC, grading contractor, and the Geotechnical Engineer prior to starting the clearing and demolition operations at the site, at which time geotechnical considerations affecting grading should be discussed.

3.02 PROTECTION

A. Maintain and protect existing utilities remaining which pass through work area.

B. Perform excavation work near utilities by hand. Provide necessary protection as the work progresses.

C. Provide and maintain protection for walks, curbs, drains, trees, corners of structures, and other improvement, as necessary to prevent damage.

D. Barricade and/or cover open excavations occurring as part of this work and post with warning lights to the satisfaction of the Owner's Representative. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

E. Keep adjacent properties, streets and drives clean of any dirt, dust, or stains caused by earthwork operations.

F. Upon discovery of unknown utility or concealed conditions, notify the Owner's Representative immediately and re-direct work to avoid delay.

G. Control dust on and near the work, and on and near off-site borrow areas.
   1. Thoroughly moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of any other activities that may occur on the site.
   2. Non-compliance with proper dust control measures will be cause for issuance of a "stop work" order by the Owner until such time as satisfactory measures can be implemented.

3.03 TOPSOIL EXCAVATION

A. Excavate topsoil from areas scheduled for paving or rough grading and stockpile material in neat wind-row(s) and in location(s) previously established and accepted in coordination with the Owner's Representative and which will cause least interference to construction operations.

B. Do not excavate topsoil that has become wetted to, or beyond, the saturation point that would be required for optimum compaction.

C. Stockpile topsoil in wind-row(s) of a height not to exceed 8 feet, protect from erosion, and cover as necessary to prevent formation of dust.

D. Topsoil excavation shall occur for the entire area or each field. No topsoil excavation shall occur for partial field areas without approval.

E. Topsoil staging areas shall be clearly defined and protected from other grading and utility operations.

3.04 ROUGH GRADING

A. Grade site subsoil to establish proper subgrade elevations and site contouring as described or implied in the Drawings:

B. Contouring:
1. Construct landforms depicted in the Drawings to the satisfaction of the Owner's Representative.
2. "Round-off" tops of slopes.
3. "Feather" toes of slopes.

C. Following contouring:
1. Following excavation to the required grades, subgrades in areas to receive engineered fill, as well as for slabs-on-grade or flatwork, should be scarified to a depth of at least 8 inches; moisture conditioned, and compacted to the requirements in part 3.04-E of this specification section.
2. Engineered fill shall be moisture-conditioned and thoroughly mixed during placement to provide uniformity in each layer.
3. To adjust the water content at the time of construction. This may require that water be added to soils that are too dry, or that scarification and aeration be performed for any soils too wet.
4. The fill material should be evenly spread and compacted in relatively uniformlifts not exceeding 8inches in pre-compacted (i.e., loose lift) thickness. Smaller lifts may be necessary to achieve the minimum required compaction using lighter weight compaction equipment.

D. Compaction:
1. Compact subgrade and engineered fill in accordance with the procedures and to relative compaction percent indicated in the Geotechnical Report.
2. Compact by power tamping, rolling, or combinations thereof as accepted by Geotechnical Engineer.
   a. Where impractical to use rollers in close proximity to adjacent construction, compact by mechanical tamping.
   b. Scarify, moisture condition, and recompact any layer not attaining compaction until required density is obtained.
3. Repeat compaction procedure until proper grade is attained.

E. Compaction: Compact subgrade for the specific areas as follows unless otherwise noted:
1. Areas to be Planted: Maximum 8-inch loose lifts to be between 85 percent and 88 percent relative compaction.
2. Areas to be Paved:
   a. Scarify to a depth of at least 8 inches, moisture conditions, and compact.
   b. Maximum 8-inch loose lifts to at least 90 percent relative density.
   c. Additional lifts should not be placed if the previous lift did not meet the required density, relative compaction, moisture content or if the soil conditions are not stable. The top 12 inches shall be compacted to at least 90 percent relative compaction.
   d. Fill soils shall be compacted to no less than 90 percent relative compaction at moisture content of 2 to 4 percent for pavement area.
   e. Compacted subgrade should be non-yielding under construction traffic, including a loaded ten-wheel truck such as a water or dump truck, in all pavement areas. Removal and subsequent replacement of some material (i.e. areas of excessively wet materials, unstable subgrade, or pumping soils) may be required to obtain the minimum 90 percent compaction to the recommended depth of 12 inches.
   f. Subgrade preparation for pavement areas shall extend laterally for at least two feet beyond the edge of pavement when adjacent to softscape areas.
   g. Underground utility trench backfill shall be compacted to minimum 90 percent relative compaction at the upper 3 feet below pavement section.
3. Areas to Receive synthetic Turf: Shall be as follows:

a. Chemically treated with the addition of 5 percent high calcium quicklime by dry weight to a depth of 12 inches below subgrade elevation.
b. Work shall be performed by a specialty Contractor using appropriately sized spreading and mixing equipment which will results in a uniform six percent lime-cement soil mixture throughout the upper 12" of the subgrade.
c. After satisfactory soil mixing has been achieved and the moisture content has been brought ot optimum moisture for compaction, the soil shall be recompacted to at least 95% relative compaction. Compaction shall be performed using heavy compaction equipment and field density tests shall be performed.
d. Additional lifts shall not be placed if the previous lift did not meet the required density, relative compaction, moisture content of if the soil conditions are not stable.
e. The surface of the chemically treated subgrade shall be kept moist for a minimum of four days after treatment and compaction is performed. Heavy vehicular loading shall not be allowed on the subgrade surface during the four day curing period.

F. Remove all excess subsoil material from site and dispose of in a legal manner. Refer to "Material Storage" below.

G. Entire project or individual field area shall be rough graded at one time. No earthwork operation shall occur for partial field areas without receiving direction from the Owner or prior written approval from the Owner.

3.05 EXCAVATION

A. Remove and dispose of all miscellaneous materials encountered when establishing required grade elevations:
1. Miscellaneous materials can include but are not limited to: pavements and other obstructions, underground structures, utilities, abandoned irrigation materials, and other materials encountered per the discretion of the Owner's Representative.

B. Stability of Excavations:
1. Comply with any applicable recommendations contained within the Project Geotechnical Report and requirements of agencies having jurisdiction.
2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

C. De-watering: Provide and maintain, at all times during construction, ample means and devices with which to promptly remove and properly dispose of water from any source entering structural excavation, pipe trenches, or other excavations. All costs incurred from de-watering activities shall be paid for by the Contractor.

D. Excavation for Structures: Conform to elevations and dimensions shown in the drawings within a tolerance of plus-or-minus 1/10 (0.10) of a foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form-work, installation of services, and quality review.

E. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown in the Drawings.

F. Material Storage:
1. Stockpile satisfactory excavated materials where appropriate, until required for use.
2. Stockpile topsoil and subgrade soil in separate piles.
3. Place, grade, and shape stockpiles for proper drainage.
4. Locate and retain stockpiles away from edge of excavations.
5. Dispose of excess soil material in a legal fashion after it has become evident that the material is no longer needed on the project and is of no value to the Owner.

3.06 TOPSOIL PLACEMENT

A. Thoroughly cross-rip all subgrade soil to a depth of 12 inches prior to placing the specified thickness of topsoil back into all applicable planting areas. Secure review and acceptance of ripping depth prior to placement of topsoil. Refer to Section 32 90 00 - Planting for this process.

B. Topsoil placement requirements for planting areas shall be as follows:
   1. Planting Areas: A minimum of 6 inches of clean, acceptable topsoil.
   2. Topsoil shall not be placed until all earthwork and utility operations are complete.
   3. Topsoil shall be installed at one time for entire project or entire field area. No partial placements shall occur.

C. Compact topsoil to 84 percent to 89 percent relative density.

D. Maintain slopes and gradients established during subgrade operations and shape landforms to satisfaction of the Owner's Representative.

E. Refer to Section 32 90 00 - Planting for finish grading information and finish grades at edge of planting areas and hardscape.

3.07 FIELD QUALITY CONTROL

A. Tolerances: Conform to Conform to Section 19 of the Standard Specifications, unless more stringent requirements in these Contract Documents are provided, in which place the more stringent tolerances shall govern. Refer to Section 01 71 23 - Field Engineering for additional project requirements.

B. The Owner Representative shall review and accept work at the following stages:
   1. Topsoil removal and stockpile.
   2. Grading plan for project. Plan shall provide strategy for grading sequence for entire site at one time or by field. Limits and sequence shall be reviewed and coordinated.
   3. Cross ripping of subgrade shall be reviewed and observed.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVEMENT (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Asphalt paving is shown on the Drawings including, but is not necessarily limited to, the following:

1. Plant-mixed asphalt and other asphalt items.
2. Asphalt overlays
3. Header boards

B. Related Requirements:

1. Section 01 33 00 - Submittal Procedures
2. Section 31 20 00 - Earth Moving
3. Section 32 11 00 - Base Courses
4. Section 32 13 13 - Concrete Paving
5. Section 32 33 00 - Site Furnishings
6. Section 33 40 00 - Storm Drainage Utilities

1.02 REFERENCES

A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

B. Sequencing and Scheduling:

1. Time delay between placement and compaction of base material and installation of asphaltic shall not be more than 5 calendar days. Base material left unpaved longer than this time period shall be subject to testing and re-compaction at the expense of the contractor.

1.04 action SUBMITTALS

A. Product Data: Descriptive literature for primer and other materials proposed for use if requested by the Owner's Representative.

B. Certificates, signed by asphaltic producer and Contractor, stating that materials comply with specification requirements. Minimum information submitted shall include a manufacturer's certification for asphalt products and an asphalt mix design by an independent, qualified laboratory.

C. The Contractor shall furnish vendor's certified test reports for each carload, or equivalent of bituminous material shipped to the project, signed by asphaltic producer and Contractor stating that materials comply with specification requirements.

1. Minimum information submitted shall include a manufacturer's certification for asphalt products and an asphalt mix design by an independent, qualified laboratory.

2. The report shall be submitted and approved before material is used on the Project. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as basis for final acceptance.

3. Test reports shall be subject to verification by testing samples of materials received for use on the project.

1.05 Closeout submittals

A. Warranty as specified.

1.06 QUALITY ASSURANCE

A. Work shall conform to the appropriate portion of the referenced "Standard Specifications" except references to "measurement" and "payment" are not applicable.

B. Control of Work: Conform to Section 5 of Standard Specifications.

C. Control of Materials: Conform to Section 6 of Standard Specifications.

D. Asphalt paving surfaces shall have positive drainage as indicated on the Drawings.

1.07 PROTECTION OF WORK

A. Curbs and other work shall be covered with suitable material and protected from staining or injury by equipment and contact with oil, emulsion, and asphalt.

B. Manholes, catch basins, and other gratings 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.

C. Damage to adjacent improvements shall be repaired or replaced at the Contractor's expense and to satisfaction of the Owner's Representative.

1.08 FIELD CONDITIONS

A. Grade Control:

1. Establish and maintain required lines and grades, including crown and cross slope.

2. The final grades and elevations of the ground paving shall be a consistent depth below adjacent concrete work.

B. Ambient Conditions:

1. Apply bituminous prime and tack coats only when ambient temperature in shade is at least 50 degrees F and when temperature has not been below 35 degrees F for 12 hours immediately prior to application.

2. Do not apply when substrate surface is wet or contains an excess of moisture.

3. Construct asphaltic surface course only when atmospheric temperature is above 40 degrees F and underlying base is thoroughly dry.

1.09 WARRANTY

A. Contractor: Provide an extended 2-year warranty for asphalt paving.

1. Warranty shall be limited to ordinary wear and tear by weather or defects due to faulty materials and workmanship.

2. Make repairs at no expense to Owner.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE REQUIREMENTS

A. At no point shall paved surface fail to drain. Provide drainage as indicated on the Drawings.

B. Asphalt paving shall be free from excessive segregation defined as gaps between aggregate visible at 3/16 inch or larger, cracking, potholes, raveling, slippage, depressions, corrugations, or other defects at the date of completion and acceptance of the project.

C. Unless otherwise noted, aggregates in asphalt mix may be a blend of virgin material and reclaimed asphalt paving (RAP), with the RAP constituting no more than 15% of the aggregate blend per Section 39 of the Standard Specifications.

D. Areas identified on plans as 'Asphalt crack repair and seal coat':

Contractor shall base their bid on an allowance of 20% of the identified area to require 'digouts'. Digouts are small areas of deteriorated pavement (areas to be identified on site) that are to be removed and replaced with new pedestrian asphalt concrete. Pavement removal shall be accomplished by cold planning or saw cutting and excavation.

ll visible asphalt cracks shall be crack filled/ sealed. The procedure for crack sealing shall include routing small cracks, cleaning and sealing using hot rubberized crack sealing material.

After digouts are completed and cracks repaired, entire area shall be prepared for surface seal. See specification section 32 12 36.

E. At joints between existing and new asphalt, contractor shall apply tack coat or sealant material along the face of the longitudinal joint to enhance bond between surfaces. Provide flush condition at joints.

F. Entire play court surfacing area shall receive a seal coat application once the asphalt overlay and new asphalt pavement areas have cured (30 days minimum).

2.02 ASPHALT PAVING

A. Paving Asphalt Binder: Shall be PG 64-10, conforming to Section 92 of the Standard Specifications.

B. Tack Coat: Asphaltic emulsion to be penetration type conforming to the RS-1 requirements of Section 94 of the Standard Specifications.

C. Aggregates:

1. 3/8 inch maximum or No. 4 maximum aggregate in accordance with the gradation requirements of Section 39 of the Standard Specifications, unless otherwise specified or noted.

2.03 ASPHALT OVERLAY

A. Contractor shall base their bid on an allowance of 10% of the identified area to require 'digouts' as a part of the surface preparation activities necessary prior to overlay. Digouts are small areas of deteriorated pavement (areas to be identified on site) that are to be removed and replaced with new pedestrian asphalt concrete. Pavement removal shall be accomplished by cold planning or saw cutting and excavation.

B. All visible asphalt cracks shall be crack filled/ sealed. The procedure for crack sealing shall include routing small cracks, cleaning and sealing using hot rubberized crack sealing material.

C. After digouts are completed and cracks repaired, entire area shall be prepared for overlay. See below for required surface preparation procedures:
   1. Surface to receive overlay shall be prepared in accordance with the requirements specified for preparing surfaces to receive asphaltic emulsion as specified in Section 37- 2.06, "Placing," of the Caltrans Specifications.
   2. Power sweepers shall be required to sweep from face of curb to face of curb or, for those streets without curbs, between the edges of street pavement. This shall involve a minimum of three passes with a power broom street sweeper (Mobile or equivalent).
   3. Pavement missed by or inaccessible to broom sweepers shall be swept clean by other approved methods. Contractor shall provide whatever compressed air or other approved cleaning methods necessary to remove all dirt and loose material from the pavement.
   4. All existing raised pavement markers and thermoplastic markings shall be removed and disposed of by the Contractor.
   5. Place tack coat as described in section 3.03 below.

D. Overall thickness of overlay section (or combined leveling course and overlay) shall be as required to obtain proposed design finish grade elevations, and shall be a minimum of 3" thick.
   1. Asphalt overlay section shall be a minimum of 2" thick when leveling course is used below.
   2. Leveling course shall not exceed 3" per layer. Areas requiring multiple layers shall not exceed three inches (3") per layer and each layer will extend past the previous layer until the desired cross section is obtained. Compact each layer prior to placement of additional layer.

2.04 HEADERS

A. Refer to details on the Drawings.

2.05 AGGREGATE BASE

A. Aggregate base shall conform to Section 32 11 00 - Base Courses.

2.06 EQUIPMENT

A. Spreading and rolling equipment shall be in accordance with Section 39-5 of the Standard Specifications and additional requirements specified.

B. Spreading and compaction shall be in accordance with Section 39-6 of the Standard Specifications and additional requirements specified.

C. Pavers that leave ridges, indentations or other marks in the surface that cannot be eliminated by rolling or prevented by adjustment in operation shall not be used.

PART 3 - EXECUTION

3.01 EDGEBAND and WOOD HEADER INSTALLATION

A. Install to conform to shapes, lines, dimensions, and grades shown on the Drawings.

B. Radii shall be smooth and constant with properly aligned tangent points.

3.02 Paving Installation - General

A. Conform to requirements of Sections 37 and 39 of the Standard Specifications.

B. Place plastic materials under asphaltic paving equipment while not in use, to catch and/or contain drips and leaks.

C. Areas shall be paved in sequence and direction to avoid driving loaded trucks on the new asphalt surface.

3.03 PREPARATION – TACK COAT

A. General: Apply tack coat to contact surfaces of adjacent pavement and concrete curbs.

B. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or air blast to remove all loose dirt and other objectionable material.

1. Vegetation shall be removed and an approved herbicide applied to those areas before cleaning.

2. Emulsified asphalt shall be diluted by the addition of water when directed by the Owner's Representative and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before the overlying mixture is placed on the tacked surface.

3. The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.05 to 0.07 gallons per square yard. The type of bituminous material and application rate shall be approved by the Owner's Representative prior to application.

C. Following the application, the surface shall be allowed to cure without being disturbed. The curing period shall be not less than 24 hours, unless otherwise approved by the Owner's Representative, and shall be sufficient to permit drying out and setting of the tack coat.

D. After tack coat has cured, suitable precautions shall be taken by the Contractor to protect the surface against damage prior to placement of next course.

3.04 PLACING ASPHALT PAVEMENT

A. General:

1. Place asphalt within 48 hours of applying primer or tack coat and after required curing time for emulsions.

2. Each course of asphalt concrete shall be installed or constructed in accordance with the Standard Specifications Section 39.

3. All layers, except as otherwise provided in these Specifications, shall be spread with mechanical spreading and finishing equipment as provided for in the Standard Specifications Section 39-5.01.

B. Tack and Levelling Course:

1. After completion of the base course a tack coat shall be applied and a leveling course of minimum 1-inch thickness shall be placed and compacted over entire area.

2. After compacting, the surface of the leveling course shall be check for compliance with the specified tolerances.

3. Where required, depressions shall be filled with asphalt concrete fines prior to proceeding with subsequent pavement construction.

C. Paver Equipment Requirements:

1. Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane.

   a. Screed action shall include cutting, crowding, and other practical action which is effective on the mixture without tearing, shoving, or gouging, and which produces a surface texture of uniform appearance.

   b. The screed shall be adjustable to the required section and thickness. The paver shall be provided with a full width roller or tamper or other suitable compacting devices.

2. Asphalt pavers shall be operated to insure continuous and uniform movement of the paver.

3. The asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded in a satisfactory manner and, if necessary, the load of the haul vehicle shall be limited to that which will insure satisfactory spreading.

4. While being unloaded, the haul vehicle shall be in contact with the machine at all times, and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.

D. Placing Hot-Mix Asphalt:

1. The completed mixture shall be deposited at a uniform quantity per linear foot to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.

   a. Segregation shall be avoided, and the surfacing shall be free from pockets of coarse or fine material.

   b. Asphalt containing hardened lumps shall not be used.

2. Unless lower temperatures are directed by the Owner's Representative, mixtures shall be spread, and the first coverage of initial or breakdown compaction shall be performed, when the temperature of the mixture is not less than 275 degrees F. Breakdown compaction shall be completed before the temperature of the mixture drops below 250 degrees F.

   a. A layer shall not be placed over another layer that exceeds 2 inches in compacted thickness until the temperature of the layer that exceeds 2 inches in compacted thickness is less than 150 degrees F at mid depth.

b. Layer thickness shall not be less than 1.25 inches or exceed 2 inches unless approved in advance and in writing by Owner's Representative.

3. At completion of new asphalt paving and asphalt overlay, pavement shall receive seal coat per specification 32 12 16 Part 2.

E. Construction Joints: Before placing the top layer adjacent to cold transverse construction joints, the cold transverse construction joints shall be trimmed to a vertical face and to neat line.

1. Transverse joints shall be tested with a 16-foot straightedge and shall be cut back to conform to meet the specified tolerances.

2. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness.

3. Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Owner's Representative, in such condition that the quality of the completed joint will be affected.

F. Rollers and Roller Equipment: The Contractor shall furnish a sufficient number of rollers to achieve the compaction and surface finish required by these Specifications.

1. Each roller shall have a separate operator.

2. Rolling equipment shall be self-propelled and reversible.

3. Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic- or steel-tired wheels.

4. A parting agent that will not damage the asphalt mixture, as determined by the Owner's Representative, may be used to aid in preventing the sticking of the mixture to the wheels.

G. Compaction:

1. Compact pavement by rolling to a specified relative compaction that is 93-96% of bulk unit weight, tested in accordance with the nuclear gauge or CTM 309 core method.

a. Do not displace or extrude pavement from position.

b. Hand compact in areas inaccessible to rolling equipment.

c. A "pass" shall be one movement of a roller in either direction.

d. A "coverage" shall be as many passes as are necessary to cover the entire width being paved.

e. Overlap between passes during a coverage, made to ensure compaction without displacement of material in accordance with good rolling practice, shall be considered to be part of the coverage being made and not part of a subsequent coverage.

f. Each coverage shall be completed before subsequent coverages are started.

g. Rolling shall commence at the lower edge and shall progress toward the highest portion.

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

i. In-place density of asphalt concrete will be determined prior to opening the pavement to public use.

j. Relative compaction will be determined by California Test 375.

k. Laboratory specimens will be prepared in conformance with California Test 304.

H. The completed surfacing shall be thoroughly compacted, smooth, and free from routes, humps, depressions, or irregularities. Ridges, indentations, or other objectionable marks left in the surface of the asphalt paving by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt paving shall be discontinued, and other acceptable equipment shall be furnished by the Contractor.

3.05 TOLERANCES

A. Surface Tolerance:

1. The Contractor shall have on site a 12-foot straightedge for testing the asphalt paving surface when said straightedge is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge.

2. The transverse slope of the finished surface shall be uniform to a degree that no depressions greater than 0.02-foot are present when tested with a straightedge 12 feet long.

3. Skin patching will not be allowed to correct depressions.

B. Thickness Tolerance:

1. The pavement thickness shall be determined by measuring the average thickness of core samples taken from the pavement for density determination.

2. Thickness will be determined from the cores and shall be based upon the average of the cores.

3. The asphalt thickness indicated on the cross sections shall be maintained.

4. Thickness deficiencies in excess of 3/8-inch shall be corrected by removal and replacement of overlay at the discretion of the Owner's Representative.

5. Skin patches and overlays less than 1-1/2 inches will not be allowed.

C. Adjustments to Contract Sum:

1. The Contract will be reduced for thickness deficiencies equal to or less than 3/8-inch in proportion to 2 times the percent of thickness deficiencies to the specified pavement thickness (i.e., a 1/4-inch thickness deficiency in a pavement with a 2-inch specified thickness would result in a reduction of the unit price of (2 x 0.25)/2.0 = 25 percent) for the lot containing a thickness deficiency.

2. No Contract Sum adjustment will be made for thickness in excess of those specified or shown.

3.06 FIELD QUALITY CONTROL

A. Take samples and perform tests in accordance with Caltrans Test Methods.

B. Upon completion of the work, Contractor shall provide a water drainage test for paved areas.

1. Areas that fail to drain properly, as determined by the Owner's Representative, shall be corrected and repaired at no additional cost.

2. If repaired, the entire surface shall have a seal coat applied at Contractor's cost.

    a. Type of seal coat will be determined by the Owner's Representative.

    b. Repairs shall be made within 15 calendar days of notification at the expense of the Contractor.

3.07 Protection

A. After final rolling, do not permit vehicular traffic on pavement until it has cooled to not less than temperature noted in the "Standard Specifications" and hardened and in no case sooner than 6 hours.

B. Contractor shall be responsible for erecting barricades to protect paving from traffic until mixture has cooled and attained its maximum degree of hardness.

C. Ample time shall be allowed for drying before traffic, vehicular and pedestrian, is allowed on the pavement.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all striping and related work shown on the Drawings and/or specified herein.

B. Scope of Work: The general extent of the striping work is shown on the Drawings and can include, but is not necessarily limited to the following:
   1. Court striping on asphalt
   2. Accessible parking striping, lettering, and symbols
   3. Parking lot striping

C. Related sections can include, but may not be limited to the following:
   1. Section 32 12 16 - Asphalt Paving
   2. Section 32 13 13 – Concrete Paving

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, current edition.

1.03 SUBMITTALS

A. Conform to requirements of Section 01 33 00 Submittals and/or applicable Division One and Division Two specifications, General Conditions and Special Provisions.

1.04 PROJECT/SITE CONDITIONS

A. Work shall not be performed during wet, or other adverse conditions as determined by the Owner's Representative and/or paint manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All striping shall be StreetBond® SB150 or approved equal (of the colors indicated in the Drawings) in conformance with Section 84 of the Standard Specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall make provisions and take all necessary precautions to protect existing improvements and surrounding property from overspray or damage due to pavement marking work.

B. Contractor shall layout all striping (with chalk-lines or other acceptable method) prior to start of work for review and acceptance by the Owner's Representative. Adjust layout as directed by the Owner's Representative.

3.02 APPLICATION

A. No striping shall be installed until the pavement surface has fully cured and/or has been properly stripped, cleaned and prepped per the paint manufacturers' instructions.

B. Paint shall be applied at rates approximately as follows: Per manufacturer's recommendations.
   1. Northern Half of AC Courts: Follow pedestrian pavement guidelines
   2. Southern Half of AC Courts and Parking Lot: Follow vehicular traffic guidelines (500 – 1000 vehicles per day)

3.03 PROTECTION

A. The contractor shall provide appropriate barriers, warning signs, and/or other acceptable arrangements to protect all painted surfaces until project Final Acceptance.

END OF SECTION

SECTION 32 18 13

SYNTHETIC TURF PLAYING FIELD (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Included: Synthetic grass playing field system consisting of, but not necessarily be limited to, the following:
   1. Synthetic grass system consisting of two inch tall blend of monofilament and slit-film polyethylene fiber.
   2. A resilient infill system consisting of one of the specified topping natural infill products and graded silica sand.

B. Related Requirements:
   1. Section 32 18 14 - Synthetic Turf Base

1.02 REFERENCES

A. ASTM Standard Test Methods:
   1. D1335: "Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings."
   2. D5848: "Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering."
   3. F355: "Standard Test Method for Shock-Absorbing Properties of Playing Surfaces."
   4. F1936: "Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.04 ACTION SUBMITTALS

A. Submit Drawings: Prepare and submit the following.
   1. Seaming plan.
   2. Installation details; edge detail, utility box detail, and other conditions of the installation.
   3. Field layout and striping plan including field colors, including field line layouts and colors.
   4. Final electronic versions of artwork.

B. Samples:
   1. Turf, 4" x 4" in size, illustrating details of finished product.
   2. Loose samples, 1-foot square, of the turf backing and tufted fibers.
   3. Color samples of color and artwork including final electronic versions of artwork.
   4. One-quart samples of the following:
      a. Specified primary natural infill.
      b. Specified secondary silica sand infill.

1.05 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

B. Certifications:

1. Project specific letter from turf manufacturer on the company letterhead certifying that the products to be provided meet or exceed all specified requirements, and state that the installer meets the specified qualifications above and is certified by the manufacturer to install the synthetic turf specified and to be provided.

C. Certified copies from an independent third-party laboratory reports for results of the following tests:
   1. Pile Height, face width & total fabric weight, ASTM D5823 and D5848.
   2. Primary and secondary backing weights, ASTM D5848.
   3. Tuft bind, ASTM D1335.
   4. Grab tear strength, ASTM D5034.
   5. Water permeability, ASTM F1551.
   6. Flame resistance, ASTM D2859.
   7. Tuft yarn tensile strength and elongation, ASTM D2256.

D. Copy of the manufacturers' minimum 8-year, prepaid, non-prorated, third-party insured warranty and insurance policy information.

E. Qualifications: A list providing project name, date the field installation was approved, contact names and telephone numbers for each project that meets the experience and qualification requirements specified.

1.06 CLOSEOUT SUBMITTALS

A. The Contractor shall provide the following prior to Final Acceptance and the Owner filing the Project Notice of Completion:
   1. Written warranty as specified with forms completed in Owner's name and registered with manufacturer and insurance carrier.
   2. Information confirming that the third-party insurance policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by a Best "A" Rated Insurance Carrier. Insurance carrier shall confirm that the policy is in force and premiums paid.
   3. Three copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
   4. Project Record Documents, in accordance with Section 01 78 39 – Project Record Documents with plans showing actual locations of seams and other pertinent information.

B. Field groomer and/or sweeper as specified.

1.07 QUALITY ASSURANCE

A. The manufacturer shall have a representative on site to certify the installation and warranty compliance.

B. Designs, markings, layouts, and materials shall conform to all current standards as specified that may apply to this type of synthetic turf installation.

C. Quality Assurance Testing: Prior to shipment of the synthetic turf and components to the job site, the synthetic turf rolls should be randomly sampled and tested by the manufacturer who will certify that they meet the specification.
   1. Testing shall be conducted and may include pile composition, pile weight, total weight, pile height, tuft bind, and grab/tear strength.
   2. Test results of the relevant characteristics and certification turf meets or exceeds the specified requirements shall be submitted as specified.

1.08 TURF COMPANY QUALIFICATIONS

A. The Turf company shall be experienced in both the manufacturing and installation of the specified type of synthetic infilled turf system.
   1. Use of outside, independent contractors for the installation is to be reviewed by the Owner's Representative prior to the Bid of Contract.
   2. The Turf Company shall identify and provide the name of a single point of contact for their company for this project beginning with the bid process through construction administration and project close-out.
   3. The Turf Company shall coordinate all bid documents, submittals, shop drawings, schedules, warranty and close-out efforts internally and shall not rely on Owner's Representative to coordinate with multiple parties. Failure to do so could result in a time and materials charge from the Owner or Owner's Representative for additional coordination.
   4. For the purpose of meeting these qualifications, the type of fiber and infill are not determining factors in meeting these installation qualifications.

B. Installer:
   1. Capable of providing competent workers skilled in this specific type of in-filled synthetic grass installation.
   2. Designated supervisory personnel on the project shall be certified as competent in the installation of this material including sewing seams and proper installation of the infill mixture.
   3. The foreman for the installation shall have installed at least 20 fields in the last 3 years of the specified material.
   4. Possess an active California D-12 Synthetic Products license in good standing and have never had a license revoked.
   5. Shall not have had a Surety or Bonding Company finish work on any contract within the last 5 years.
   6. Shall not have been disqualified or barred from performing work for any public owner or other contracting entity in the U.S.
   7. For the purpose of meeting these qualifications, the type of infill are not determining factors in meeting these installation qualifications.

1.09 FIELD CONDITIONS

A. Contractor shall be responsible for reviewing the base and ensuring it conforms to the project requirements prior to placement of the synthetic turf.

B. Playing field subgrade preparation shall be completed and accepted by the Owner Representative prior to commencement of Work under this Section.

C. Ambient Conditions: Care should be taken during installation to account for rapid fluctuations in temperature to avoid expansion and contraction which can affect the final installation. Temperature extremes shall be carefully monitored. The carpet should never be rolled or unrolled when frozen, which can cause cracking and irreparable damage to the secondary backing.

1.10 WARRANTY

A. Manufacturer: Provide Owner with turf manufacturer's warranty which guarantees the usability and playability of the synthetic turf system for its intended uses for a minimum eight year period. The warranty coverage shall not be prorated nor limited to the amount of the usage. The warranty submitted must have the following characteristics:
   1. A non-prorated, non-cancellable up-front pre-paid, third-party insured warranty. Warranty shall be covered by a third party insurance policy, non-cancelable and pre-paid, and is in effect covering this installation, and underwritten by a Best "A" Rated (or better) Insurance Carrier listed in the A.M. Best Key Rating Guide.

2. Insurance carrier shall confirm that the policy is in force and premiums prepaid for entire warranty duration in full.
3. The policy shall include a minimum annual aggregate of $5,000,000 per year and be based on claims arising from fields installed and completed only during the policy year.
4. The policy shall provide full coverage for a minimum of eight years from the date of Notice of Completion.
5. The policy shall cover all costs associated with full field replacement with new equal or better turf material, including labor, materials and any other costs to repair or replace the field.
6. Owner shall not be responsible for any deductible.
7. Warranty shall have no restrictions on amount of use provided type of use is in accordance with the approved warranty language.
8. Shall warrant materials and workmanship, and that the materials installed meet or exceed the product specifications, including general wear and damage caused from UV degradation.
9. Shall have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
10. Shall be a warranty from a single source covering workmanship and all self-manufactured or procured materials.
11. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.
12. The name on the warranty shall be made out to South San Francisco Unified School District.
13. Turf contractor shall include in the warranty the cost to replace high use areas such as but not limited to goal mouth of soccer pitch's, corner kick areas, goal kick areas, base paths, etc. Replacement shall be one time for each area during the warranty period at a time of the warranty holder's discretion. The replacement area shall include the required square footage needed to replace the damaged areas up to the closest field line or change in turf color.
14. Turf system of 2" hybrid/monofilament turf with sand/natural infill over a manufactured drainage / shock pad shall not exceed a field average Gmax of 130, as tested according to the ASTM 1936 Standard Specifications, for the duration of the turf warranty period.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. General:
1. Synthetic turf construction and components shall be non-toxic and not cause commonly known allergic reactions. Each synthetic turf system should be constructed to provide dimensional stability and resist damage from wear and tear during athletic and recreational usage.
2. System shall be permeable by design with adequate perforations through all of the backing coatings.
3. The bonding or fastening of system material components shall provide a permanent, tight, secure, and hazard-free athletic playing surface.
4. Seams shall be sewn with high strength sewing thread. Gluing of rolls is permitted if warrantied by the turf company and shall be glued with the specified glue.

B. Product Specifications:
1. Monofilament/Slit-Film Fiber: 9,000 denier, low friction, eight-strand monofilament fiber, measuring not less than two inches high and not less than 125 microns in thickness.
   a. The low friction fiber shall be custom blended polyethylene, treated with UV inhibitors.
   b. Fibers shall have been extruded individually through a spinerette, stretched and twisted.
   c. Low friction fiber shall be specifically designed to virtually eliminate abrasion.
2. The tufted fiber weight shall not be less than 36 ounces per square yard. The low friction fiber shall be custom blended polyethylene, treated with UV inhibitors.
3. The maximum gauge of the tufted fiber rows shall be 3/4 inch.
4. The turf product shall have an infiltration rate not less than 40" per hour as tested by ASTM D1551.

5. Backing: Not less than 2 components consisting of a primary and secondary backing system of woven polypropylene or urethane.
   a. Backing system shall be treated with UV inhibitors.
   b. The backing shall receive polyurethane and acrylic applications during the manufacturing process.
   c. The backing weight of all backing material shall be a minimum of 23 ounces per square yard.
6. The minimum tuft binding tensile strength shall be 8 pounds without infill, as determined by ASTM D1335.

C. The synthetic turf shall be delivered in 15-foot wide rolls and of sufficient length to extend from sideline to sideline. Head seams, between the sidelines, will not be acceptable.

D. Markings:
1. The perimeter white and yellow lines can be tufted into the individual sideline rolls.
2. Field of play lines for soccer, including soccer penalty kick circle, shall be inlaid or tufted. The lines for soccer including soccer penalty kick circle shall be yellow or blue, depending on thie field size and layout.
3. Field of play flag football markings shall be red.
4. Field of play lines and markings for baseball / softball shall be inlaid or tufted, and shall be white.

2.02 INFILL SYNTHETIC TURF

A. All bidders must meet all of the qualifications, product specifications and warranty requirements. The turf product shall be one of the following (provided they meet the specification requirements) or approved equal:
   1. AstroTurf Rhino Blend. Contact is Dominic Berarducci, Ph: 559-612-9065.
   2. FieldTurf Vertex Prime. Contact is Andrew Rowley, Ph: 707-586-2066.
   3. Shaw Legion 2.0. Contact is Matt Cohen, Ph: 916-216-9883.
   4. Greenfield's AllSport Blend – 2". Contact is Jarrod Lawson Ph:408-515-1706
   5. FieldTurf Vertex Prestige. Contact is Andrew Rowley, Ph: 707-586-2066.
   6. Tencate MaxSport Ultra. Contact is Nic Paschini, Ph: 209-483-4642

2.03 MATERIALS

A. Synthetic Turf Infill system shall consist of two components, a Primary and Secondary Infill:
1. Primary Infill: Shall be one of the following: Olive Pits, Corn Cob, or BrockFill (a proprietary infill made by BrockUSA). The infills shall comply with the product specifications outlined in this specification section. All primary infill shall be tested to show it is free of heavy metals and PFAS chemicals as defined by established testing criteria.
2. Secondary Infill: Sand shall be rounded silica sand and dust free. Coarse jagged sand will not be accepted. Sand shall consist of 50-60 percent of the total infill material as defined by weight. The sand shall have the following gradation:

Sieves (US Mesh Size)	% Retained
16	0
25	10-30
30	30-50
35	15-35
40	5-15
50	<5

Sieves (US Mesh Size)	% Retained
70	<1

3. At the end of installation, and prior to acceptance, the top of the infill shall be not less than a uniform 3/4 inch depth below the top of fibers. If additional infill is required to meet with requirement, it shall be furnished and installed by the Turf Company at no additional charge.

B. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.

C. Synthetic Turf Glue
1. Glue for inlaying lines and markings shall Nordot 34G, Mapei 2K, Turf Claw, hot melt technology or equivalent, as recommended by the synthetic turf manufacturer.
2. Any adhesive products required for the installation of the proposed turf system shall be purpose-suited to the system. The material and application methods shall be as recommended by the adhesive manufacturer.
3. Disposal of adhesive containers and unused adhesives as well as any fees resulting from such disposal shall be the responsibility of the Contractor.

2.04 SYNTHETIC TURF MAINTENANCE EQUIPMENT (GROOMER AND SWEEPER)

A. Contractor shall supply one field groomer and one sweeper. Sweeper shall have a debris collection attachment that shall pick up 1/4-inch diameter and larger material, but leave sand and rubber infill material. The groomer shall have plastic brushes and metal tines that are adjustable.

B. Grooming Product: "Synthetic Turf Sports Turf Groomer – model 920SDE" groomer with STR- Rear-Mounted Spring Tine Rake and 924SD- Extension Wings by GreensGroomer, including base unit with 164 linear inches of brushes, electric lift for raising and lowering, with powder coated frame, super duty synthetic bristle brushes, integrated pneumatic wheels, adjustable spring steel de-thatching tines, and detachable/foldable brush extension wings, as manufactured by GreensGroomer, 888-298-8852, or acceptable equivalent product.

C. Field Sweeper: "LitterKat - model 760 SFM" sweeper with magnet by GreensGroomer. 888-298-8852. This is a sweeper with basket attachment and tow-behind magnet.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify the base, as specified in Section 32 18 14 - Synthetic Turf Base, has been installed and approved by Owner's Representative and turf manufacturer.

B. Use a 2-5-ton static roller or other acceptable compactor to repair and properly compact any disturbed areas of the prepared base.

C. Do not proceed with installation of turf until unacceptable base conditions have been corrected.

3.02 INSTALLING THE SYNTHETIC TURF

A. The installation shall be performed in full compliance with the reviewed and accepted product submittal.

B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer's supervisor, shall undertake cutting, sewing, gluing, shearing, topdressing or brushing operations.

C. Strictly adhere to the installation procedures specified. Variance from these requirements shall be submitted to and accepted in writing, by the manufacturer's onsite representative, and submitted to the Owner, verifying that the changes do not, in any way, affect the warranty.

D. The turf manufacturer and installation subcontractor shall inspect and accept the field base, and provide documentation to that effect, prior to the installation of the synthetic grass system. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

E. The turf rolls are to be installed directly over the properly installed manufactured drainage / shock pad material.
   1. No equipment with loads greater than 35 pounds per square inch shall be allowed on the field. Contractor is responsible for altering operations in order to adhere to this requirement.
   2. Contractor and synthetic turf installer shall strictly adhere to the written instructions provided by the manufactured base manufacturer for installing turf on top of their product.
   3. Contractor is responsible to assure vehicles being used on the manufactured base are equipped with pneumatic (air-filled) tires, preferably turf tires, designed to spread loads and minimize damage to surface. Foam filled or solid tires and tires with aggressive lug patterns shall not be used on the manufactured base without synthetic turf installed.
   4. Use of an A-frame for unrolling of the synthetic turf as recommended by the base manufacturer.

F. Cutouts in the synthetic turf shall be in accordance with the Drawings and approved submittals. Coordinate cutouts in turf with Owner's Representative before cutting turf for utility boxes and other structures.

G. The turf rolls shall be installed directly over the properly prepared base. Extreme care shall be taken to avoid disturbing the base, both in regard to compaction and planarity.

H. The full width rolls shall be laid out across the width of the field.

I. Utilizing standard state of the art sewing procedures each roll shall be attached to the next. After all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.

J. The synthetic turf field shall utilize sewn seams. Minimum gluing will only be permitted to repair problem areas, corner completions, and to cut in any logos or inlaid lines as required by the Specifications.
   1. Seams between turf panels shall be sewn. Seams shall be sewn using double bagger stitches and polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying.
   2. Inlaid markings that cannot be tufted into the fabric shall be installed by means of shearing out the existing green fiber and laying in a new piece of colored fabric into a bed of suitable "hot melt" adhesive placed directly on the original turf backing material.
      a. Inlaid markings shall not be installed by means of cutting through the fabric and adhering the colored turf to a separate reinforcing tape or cloth.

K. Connections of the perimeter synthetic turf edges shall be completed by one of the following two methods and as shown on the Drawings:
   1. Connection to perimeter concrete edges with the specified adhesive.
   2. Connection to the recycled plastic header boards shall be done with industrial staples. Minimum embedment depth of fasteners shall be 1 inch with spacing a maximum 2 inches on center.

L. The infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.

1. Apply in thin lifts to depth specified. The turf shall be brushed as the mixture is applied.
2. The mix shall be uniform and even in thickness to assure proper playing characteristics.
3. The infill shall be placed with a void of 3/4 inch to the top of the fibers.

3.03 FIELD QUALITY CONTROL

A. After completion of the synthetic turf installation, and prior to Substantial Completion of the project, the Contractor shall have installation tested for shock absorbency.
   1. Site testing shall be at ambient shaded air temperature of 40–100 degrees F.
   2. Field test measurements shall be made at a minimum of 6 locations and shall avoid areas where 2 seams cross.
   3. Testing shall be made, at the Contractor's expense, by an independent testing laboratory accredited for such tests and pre-approved by the Owner.
   4. Testing and analysis by the testing laboratory shall provide the necessary data to the Owner that verifies the finished field does not exceed shock attenuation of 130 as determined by the ASTM F355A and F1936 test procedures.

B. Test results that do not meet the specified shock attenuation, or if any one test value is 10 percent greater in variance than the specified values, then the Contractor's field installer shall address the failed test area, be required to retest the entire field as stated above, and conform to these requirements prior to acceptance by the Owner.

C. The Contractor shall provide the following prior to Final Acceptance and the Owner filing the Project Notice of Completion:
   1. Written warranty as specified with forms completed in Owner's name and registered with manufacturer and insurance carrier.
   2. Information confirming that the third-party insurance policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by a Best "A" Rated Insurance Carrier. Insurance carrier shall confirm that the policy is in force and premiums paid.
   3. Three copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
   4. Project Record Documents, in accordance with Section 01 78 39 with plans showing actual locations of seams and other pertinent information.

3.04 DEMONSTRATION AND TRAINING:

A. Upon completion of the field installation, Contractor shall have a supervisory person provide a minimum 3-hour field training seminar with the Owner's personnel on how to care for the field.

B. At a minimum, seminar shall include a demonstration of how use of the sweeper and groomer, how to care for the field with the groomer and sweeper, review the entire provided maintenance manual including the proper procedure for removal of gum and other debris, and answer any questions.

3.05 MAINTENANCE

A. Manufacturer shall be responsible for the testing of the G-max levels of the installed synthetic turf at the completion of years 2, 4, 6, and 6 months prior to the completion of year eight of the warranty period.

B. Testing shall be completed by an independent testing laboratory accredited for such tests and shall be pre-approved by the Owner. Testing and analysis of findings shall be completed by testing laboratory's qualified persons utilizing the required techniques outlined in the ASTM F355 test standard.

C. If tests results indicated turf playing field does not fall within the G-max range specified, the manufacturer will be required under terms of its warranty to modify the field composition to the sole

satisfaction of the Owner so that it falls within the target G-max range. A failed test shall be retested to verify that the field meets the specifications.

D. Costs associated with testing and corrective work shall be at no cost to the Owner.

END OF SECTION

SECTION 32 18 14

SYNTHETIC TURF BASE (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Base for the synthetic turf consisting of, but is necessarily limited to, the following:
   1. Vertical draining, porous stone aggregate base consisting of a uniform single stone base.
   2. Stone aggregate base for stability and leveling purposes, and substrate for porous drainage composite.
   3. Manufactured drainage/ shock pad.

B. Related Requirements:
   1. Section 01 78 29 – Conformance Survey
   2. Section 31 20 00 – Earth Moving
   3. Section 31 23 00 – Excavation and Fill
   4. Section 32 18 13 – Synthetic Turf Playing Field

1.02 REFERENCES

A. California Building Code (CBC):
   1. Chapter 33 – Site Work, Demolition, and Construction.

B. American Society for Testing and Materials (ASTM):
   1. ASTM D1557-12: “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.”
   2. ASTM F2898-11: “Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method”
   3. ASTM D2434-22: “Standard Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils.”
   4. ASTM C88-13: “Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.”
   5. ASTM C136-06: “Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.”
   6. ASTM D75-03: “Standard Practice for Sampling Aggregates.”
   7. ASTM F1936-19: “Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field.”

C. California Occupational Safety and Health Standards (OSHA):
   1. Article 6 - Excavations and Shoring.

D. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:
   1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.
   2. Closeout Submittals shall be submitted in accordance with Section 01 78 39 - Project Record Documents.

1.04 ACTION SUBMITTALS

A. Product Data: Manufacturer's descriptive literature for filter fabric and shock/drain pad as applicable. Descriptive literature and product cut sheets for each rock material from quarries, including initial sieve analyses per Part 2 Materials Section, shall be provided with the initial action submittals and shall be certified as current data (within 60 days from date of submission) from the quarries. Once initial submittals and samples are authorized from the Owner's representative, the Contractor may proceed with the additional testing as outlined in Part 1 Section "Material Testing".

B. Samples: Two 1-quart samples of each rock material and additional samples of each rock material to the Owner's testing agent as specified under Article "Material Testing," and Two 1-quart samples of Subdrain Trench Leveling Rock, as required.

C. Refer to Section 01 78 29 – Conformance Survey for Action Submittals relative to Synthetic Turf Base.

1.05 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

B. Certification: Certification signed by Contractor and drainage system (piping, structures, and fittings) Installer that installed materials conform to specified requirements and system was successfully checked and tested prior to covering with engineered permeable rock base, trench drain rock, and/or subdrain trench leveling rock.

1.06 CLOSEOUT SUBMITTALS

A. Project Record Drawings.

1.07 QUALITY ASSURANCE

A. Control of Work: Conform to Section 5 of the Standard Specifications.

B. Control of Materials: Conform to Section 6 of the Standard Specifications.

C. Single-Source Responsibility: Crushed stone shall come from only one supplier.

D. Material delivered to the site not meeting the Specifications will be rejected by the Owner. Material rejected by the Owner shall be removed from the site at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Prior to trucking of material to project sites, crushed rock shall be washed so it is clean of impurities and fines created during rock crushing operations.

B. Store products to be installed as part of the field base neatly and orderly, stacked and blocked to prevent damage and contamination.

1.09 FIELD CONDITIONS

A. Protection of Project Site: Make provisions, and take the necessary precautions, for protect existing and completed work from damage during turf installation.

B. Contractor shall be responsible for stabilizing top of subgrade elevations for the synthetic turf areas prior to receiving the stone aggregate base and for executing fine grading as may be necessary or incidental to placement of the synthetic turf.

C. Contractor shall prevent surface water and subsurface or groundwater from flowing into excavations and flooding area to receive turf base. Contractor shall not allow water to accumulate in excavations. Contractor shall remove water to prevent softening of sub grades.

1.10 MATERIAL TESTING

A. General:
   1. The summary of Synthetic Turf Base Material Testing includes the following:
      a. Initial Action Submittal and samples for Owner Representative authorization to proceed.
      b. Pre-construction testing procedures described in Section 1.10.B.
      c. Testing procedures during construction described in Section 1.10.C and Section 3.03.
      d. In-situ permeability of Engineered Permeable Base Rock as described in Section 1.10.D.
   2. The Owner will employ and pay for the services of an Independent Testing Agency as specified in Section 01 45 00 – Quality Control.
   3. Payment for initial material testing is the responsibility of the Owner.
   4. Employment by the Owner of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
   5. The Owner reserves the right to change its testing laboratory if the need arises.
   6. Cost of testing which are repeated on materials that have failed to meet specifications or are as a result of shortages shall be borne by the Contractor.
   7. The Contractor shall include the following with its sample submittals:
      a. Identification of proposed source and supplier.
      b. Current lab mechanical analysis (within the last 60 calendar days) of the proposed stone using ASTM standards for sieve analysis.
      c. Sample sizes as specified.
      d. Certification that the supplier can deliver the total quantity of material needed to complete the project in a timely manner.

B. Pre-Construction Testing Procedures: The following tests will be performed by the Owner's Testing Agent prior to acceptance of rock provided under this Section, after authorization/review from the Owner's Representative of the initial Action Submittal and samples provided. Testing will be performed in the following steps:
   1. Engineered Permeable Base Rock and Subgrade Trench Drain Rock:
      a. Contractor shall submit a 5-gallon separate composite to the Owner's Testing Agency, unless the Owner's Testing Agent elects to pull the sample directly at the quarry and/or requests test samples of varying quantities based on the testing labs' needs, for each porous base rock material. The Owner's testing agent will evaluate these materials as specified using ASTM C136-06 and ASTM D75-03 testing protocol as a guideline.
      b. The submitted samples will be used for comparison with all subsequent samples submitted for acceptance during construction.
      c. Material shall not be delivered to the project site until tests show it complies with the accepted material.
      d. Engineered Permeable Rock Base and Subdrain Trench Drain Rock shall be tested to show that both materials meet the following stability requirements:

Test Method	Criteria
LA Abrasion (California Test 211)	Not to exceed 35
Durability Index (California Test 229)	Not less than 40
Aggregate Soundness (ASTM C88-13)	Not to exceed 12% loss for coarse aggregate, 10% for fine aggregate (based on a sulfate solution)

      e. If Contractor provides current certification (within last four months) that a Permeable Rock Base and Subdrain Trench Drain rock are from the same quarry and vein of rock, only one set of stability testing requirements are required.
   2. Engineered Permeable Base Rock Testing ONLY:
      a. To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < \frac{D^2_{30}}{D_{10} * D_{60}} < 3$
      Fragmentation shall be 100%.

$D_{"x"}$ is the size of the sieve (in millimeters) that lets pass "x" percent of the stone. For example, D_{60} is the size of the sieve that lets 60 percent of the stone pass. For calculation purposes, these sizes may be obtained by interpolation on a semi-log graph of the sieve analysis.

b. To ensure proper drainage: Porosity of Engineered Permeable Rock Base > 25% (when stone is saturated and compacted to 92% Modified Proctor)

Permeability of stone base > 30 in/hr (Tested through ASTM D2434-22 with rock saturated and compacted to 92% Modified Proctor)

Depending on the type of rock present in the crushed stone mix, other mechanical characteristics might be necessary for approval.

C. Testing During Construction:
   1. During construction, samples will be taken and analyzed periodically by the Owner's representative/Testing Agent to assure strict compliance with the Specifications. The Owner may sample and test the rock material either at the source or at the project site upon delivery from incoming transfer trucks. Frequency of sampling for gradation testing would be to sample every 500 tons of Engineered Permeable Base Rock delivered to the site. Rock not meeting Specifications will be rejected by the Owner's representative. Materials rejected by the Owner's representative shall be removed from the site at the Contractor's expense.
   2. It is the Contractor's responsibility to ensure that all permeable stone for the synthetic turf base meet the above requirements throughout the installation process, including transfer and delivery to the site, placement, spreading, compaction, and installation of synthetic turf material. Proper investigation into rock sources may be required by the Contractor to ensure that the rock that was bid will meet the project specifications.
   3. Refer to Section 3.03 Placing the Engineered Permeable Rock Base for additional testing required during construction.
   4. Subdrain Trench Leveling Rock: The leveling rock shall comply with section 2.04 A and be submitted to the Owner's Testing Agent for gradation testing. No additional tests are required for the leveling stone.

D. Permeability of placed engineered permeable rock base shall not be less than 10 in/hr (Tested per ASTM F2898-11)

1.11 PROJECT RECORD DOCUMENTS

A. Accurately record location of pipe runs, connections, cleanouts and invert elevations. Include locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities as applicable by horizontal dimensions, elevations, inverts, and slope gradients.

1.12 MANUFACTURED SHOCK/DRAIN PAD GUARANTY

A. The manufacturer of the shock/drain pad shall provide a guaranty, in writing, that for a period of twenty five (25) years, the shock/drain pad shall be a part of a turf system that will not exceed a field average G-max of 120 g's as tested according to the ASTM F1936-19 Standard Specification.

PART 2 - MATERIALS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. The finished crushed stone or aggregate base supplied shall be stable, unyielding, and permeable.

2.02 ENGINEERED PERMEABLE ROCK BASE

A. Engineered Permeable Rock Base: Virgin, un-recycled, crushed stone meeting the gradation criteria for the California Department of Transportation 3/4-inch Permeable Class II (Section 68) and the following gradation.

Mesh size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

B. The above rock gradation range is a general recipe for the Contractor to use in order to meet the product performance requirements of the built stone base. The Contractor is responsible for ensuring that the type of rock and blend they submit and install will meet all the specified requirements, including those outlined in item 1.10 of this specification section.

C. Soft rock materials, including sandstone, limestone, and shale, are not suitable. Rock supplier shall certify that all supplied rock will be void of this type of rock.

2.03 SUBDRAIN TRENCH DRAIN ROCK

A. Shall be 3/4-inch x 1/2-inch crushed virgin, un-recycled, washed rock, meeting the following general gradation requirements:

Sieve Size	Percent Passing
1”	100
3/4”	90-100
1/2”	10-40
3/8”	0-15
#4	0-5

B. The rock profile will extend from the bottom of the trench to the top of both sides of the subdrain trench, and to the top of rock elevation. The Engineered Permeable Base Rock shall not be installed over the subdrain trench drain rock.

C. Soft rock materials, including sandstone, limestone, and shale, are not suitable. Rock supplier shall certify that all supplied rock will be void of this type of rock.

D. The Contractor is responsible for ensuring the type of rock and blend they submit and install will meet all the specified requirements, including those outlined in item 1.10 of this specification section.

2.04 SUBDRAIN TRENCH LEVELING ROCK

A. For planarity purposes, a clean, washed, uniform 3/8-inch crushed stone material, of the same source as the subdrain trench drain rock or Engineered Permeable Rock Base may be installed over the subdrain trench profile upon approval of Owner's representative. Maximum thickness for this stone layer is 1/2 inch.

2.05 ROCK BASE AND SUBDRAIN TRENCH DRAIN ROCK SUPPLIERS

A. The following suppliers are recommended. Recommendations do not preclude suppliers from meeting all rock requirements specified herein:

Region	**Supplier**	**Address**	**Phone Number**
South Bay	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 94588	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
	Graniterock – Wilson Quarry	1900 Quarry Rd, Aromas, CA 95004	1 (831) 768-2330
East Bay	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 945881 (925) 846-5125	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
	Teichert - Woodland	35030 County Rd. 20 Woodland, CA 95695	1 (530) 661-4290
North Bay	Syar	885 Lake Herman Rd, Vallejo, CA 94591	1 (707) 252-8711
	Vulcan Pleasanton	50 El Charro Rd, Pleasanton, CA 94588	1 (925) 846-5125
	DeSilva Gates Sunol	6527 Calaveras Rd, Sunol, CA 94586	1 (925) 862-1909
Peninsula/SF	Dutra	2350 Kerner Blvd, San Rafael, CA 94901	1 (415) 258-6876
Central Coast	Graniterock – Wilson Quarry	1900 Quarry Rd, Aromas, CA 95004	1 (831) 768-2330

2.06 MANUFACTURED SHOCK/DRAIN PAD

A. Manufactured Porous Close-Cell Composite Base: Resilient, interlocking, polypropylene panels specifically engineered for sports fields; pre-approved products:
   1. "PowerBase YSR" by Brock International, 303-544-5800, or equal.
   2. FieldTurf ShockBase Pro

2.07 IMPERMEABLE LINER

A. Provide an impermeable liner at the subgrade elevation below the synthetic turf section as shown on the Drawings. The impermeable fabric liner shall conform to the following minimum specifications:

Property	Test Method	Typical Values
Thickness	ASTM D 5199	20 mil
Density	ASTM D 1505	0.939 g/ml
Max Strength MD	ASTM D 7004	114 lb/in.
Max Strength TD	ASTM D 7004	114 lb/in.
Max Strength MD	ASTM D 7003	74 lb/in.
Max Strength TD	ASTM D 7003	74 lb/in.
Elongation at Max Strength	ASTM D 7003	20%
Elongation at Film Break	ASTM D 7003	550%
Tear Strength	ASTM D 5884	53 lbs
CBR Puncture Resistance	ASTM D 6241	360 lbs

B. Impermeable Fabric Liner shall be SuperScrim HX Scrim-Reinforced LLDPE Smooth, Mirafi 600X or approved equal.

2.08 PERMEABLE GEOTEXTILE FILTER FABRIC

A. Geotextile Filter Fabric: Mirafi 140 N, or accepted equal, conforming to the following minimum specifications, unless otherwise recommended by the Geotechnical Engineer:

Property	Test Method	Typical Values
Grab Strength	ASTM D4632	80 lb.
Puncture Strength	ASTM D4833	25 lb.
Burst Strength	ASTM D3786	130 lb.
Trapezoid Tear	ASTM D4533	25 lb.
Permeability	ASTM D4491	0.1 cm/sec
Apparent Opening Size	ASTM D4751	#50 Sieve size
Permittivity	ASTM D4491	

2.09 DRAINAGE ELEMENTS

A. Refer to Storm Drainage Specification Section for in-field drainage elements.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. Contractor shall verify that subgrade has been prepared according to specification Section 31 20 00 – Earth Moving with regard to compaction, grade tolerances in accordance with Section 01 71 23 – Field Engineering and is free of debris, non-compactable material, topsoil, or organics prior to beginning work.

B. Top of subgrade elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.

C. Once the subgrade conformance has been accepted and compaction has been properly achieved, the geotextile filter fabric shall be installed over the compacted and prepared subgrade, as shown on the plans, without disturbing grades.

D. Geotextile fabric shall be laid in shingle fashion overlapping 12 inches minimum following direction of slope with upslope fabric laying atop the down slope fabric and stapled 6' on-center along seams. Staples to be 6" staples.

3.02 INSTALLATION OF THE SUBDRAIN TRENCH

A. Contractor to install piping in strict compliance with the manufacturer's written instructions and as indicated in the Drawings. Contractor to exercise caution and the appropriate sequencing of work, so as not to damage any drainage piping during the base rock installation.

B. Contractor to protect drain trenches to ensure that pipe is not damaged in any way by construction operations and that the rock is not contaminated with native soils, unintended construction material, or deleterious materials during subsequent construction operations.

C. NO VIBRATORY COMPACTION OF THE SUBDRAIN TRENCHES SHALL BE PERMITTED.

D. Contractor shall protect the installed subdrain trenches with fabric until ready for installation of turf. If rain is imminent, add straw waddles and silt fencing to prevent contamination of the subdrain trench rock.

3.03 PLACING THE ENGINEERED PERMEABLE ROCK BASE

A. The stone shall be laid without damaging the soil subgrade and the in-field drainage system. Do not create depressions in subgrade with heavy equipment. If damage to subgrade occurs, correct as specified for subgrade preparation.

B. The crushed stone shall be carefully and evenly spread over the subgrade and up both sides of the subdrain trenches to the depth shown on the Drawings.

C. Excess water shall not be applied during installation of rock base and rough grading due to the potential of softening the subgrade and altering the grading.

D. Crushed stone shall be smoothed and compacted uniformly to design grades by alternating raking, water settling, and rolling operations. Minimal rolling is advisable to achieve design grades and compaction. Only static rolling is allowed, and max 3-5-ton rollers should be used on the permeable stone base. Vibratory rolling of the permeable stone is not permitted. Contractor shall roll field ridges so as to provide a rounded ridge and not a harsh break.

E. If the required compacted depth of the base course exceeds 6 inches, the base stone course shall be constructed in 2 or more layers or lifts of approximate equal thickness. Each layer shall achieve a uniform 90 percent relative compaction.

F. Top of porous rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.

G. The final grade shall be ideally compacted to a uniform 90 – 92 percent relative compaction.

H. Contractor shall not overwork the stone material and consequently modify its gradation characteristics. Minimal moving of the stone upon placement of the material on the subgrade and rolling is advisable to achieve design grades and compaction. Do not compact greater than 93 percent relative compaction.

I. Contractor shall prepare an initial 50' X 50' area of compacted, placed permeable base during the start of base import for initial permeability testing per ASTM 2898-11. Notify the Owner's Representative three (3) days prior to completion of the test area being ready for testing. Testing Shall be completed by The Owner's Representative.

J. Contractor shall manually screed the top stone surface to ensure tolerances are met.

K. Top of rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements.

L. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using string line method.
   1. Entire finished surface shall be "walked" with mason's line in increments of approximately 3 feet.
   2. A mason's line shall be held taught between two workers separated by a distance of approximately 40 feet then placed directly on the finished surface parallel to the direction of greatest slope.
   3. A third worker shall check for separations between the mason's line and the finished surface that are equal to or greater than the specified tolerances.
   4. Areas of separation shall be outlined with marking paint and the depth of separation indicated.
   5. Areas outlined with marking paint shall be filled with top rock to the depth indicated and raked by hand. Filled areas shall be compacted to provide a non-yielding, smooth, flat surface.
   6. Final finished surface planarity shall be approved by the Owner and the synthetic turf installer.

M. Once the top of the Engineered Permeable Rock Base is fully installed and compacted, the Contractor shall notify the Owner Testing Agent that it is ready for the field permeability test.
   1. The Agent shall be given 4 working days' notice and have 2 days to complete the in-field test which will consist of a minimum of 3 controlled field permeability tests per synthetic turf field.
   2. Tests shall be by the following test method: ASTM F2898-11: "Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method"
   3. Permeability of placed Engineered Permeable Rock Base shall comply with specified requirements.
   4. If the test does not comply with section 1.10, the Contractor shall provide within 48 hours a written repair procedure to correct the permeability deficiency.
   5. Repair work, including associated delays, shall be the Contractor's sole responsibility. Fine tuning of the field base due to the testing operations is the responsibility of the Contractor.

3.04 INSTALLATION OF MANUFACTURED DRAINAGE MATERIAL

A. Upon successful completion of installing the base, the porous drainage composite shall be installed in accordance with the Drawings and in strict compliance with the manufacturer installation instructions. Contractor to exercise extreme care in order to avoid disturbing the crushed stone base.

B. Contractor to take measures to ensure that the product is not exposed to the outdoor elements longer than the manufacturer's recommendations. Product that exceeds this exposure time duration shall be removed from the project site immediately and not used on the project.

C. Sections of the material shall be interlocked and/or connected to adjacent pieces of the drainage material in strict conformance with the manufacturer's written installation instructions.

D. Provide geotextile filter fabric in the areas designated on the Drawings. Fabric shall be laid in shingle fashion overlapping 12 inches minimum following direction of slope with upslope fabric laying atop the down slope fabric.

END OF SECTION

SECTION 32 33 00

SITE FURNISHINGS (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Site furnishings and installation accessories as shown on the Drawings including, but not necessarily limited to, the following:
      a. Soccer goals.
      b. Soccer goal net.
      c. Truncated domes.
      d. Drinking fountain.
      e. Volleyball posts
      f. Volleyball sleeve
      g. Volleyball net
      h. Basketball post, backboard, and net
      i. Backstop
      j. Paper towel dispenser
      k. Feminine hygiene dispenser
      l. Conex Container
      m. Synthetic turf
      n. Synthetic turf irrigation system
      o. Connex Container
      p. Restroom grab bar
      q. Pickleball net system
   2. Site Furnishings Product Matrix

B. Related Requirements:
   1. Section 32 12 16 - Asphalt Paving
   2. Section 32 13 13 – Concrete Paving
   3. Section 32 18 13 – Synthetic Turf Playing Field

1.02 REFERENCES

A. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

B. Scheduling and Sequencing:
   1. Do not install site furnishings prior to acceptance by Owner's Representative of area to receive items.
   2. Coordinate construction timing of installation of site furnishings in conformance with other work interfacing with installation of the site furnishing items.

1.04 ACTION SUBMITTALS

A. Shop Drawings: Submit complete shop drawings for all materials or furnishings requiring field or shop fabrication.

B. Product Data: Manufacturer's catalog cut sheets of materials and equipment to be provided.
   1. Include the manufacturer and distributor name, and subcontractor as applicable.
   2. Cut sheets clearly describe the specific product by catalog number and that additional non-specified products that may appear on the same cut sheet are crossed out where applicable.

C. Samples: Colors and finishes for products and furnishings requiring selection by the Owner's Representative.

1.05 INFORMATIONAL SUBMITTALS

A. Statement of qualifications for manufacturers and installer if requested by the Owner's Representative.

1.06 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance data for items with operable, movable, or replaceable parts, for items with mechanical connections, and for other items as applicable.

B. Extended warranties as specified.

1.07 QUALITY ASSURANCE

A. Furnishings shall be reviewed for conformance with the intent of the Contract Documents and accepted by the Contractor prior to installation.

B. Site furnishings shall be in a new, "first-class" condition as determined by the Owner's Representative at the time of Final Acceptance.

C. Field Samples and Mockups: As requested by the Owner's Representative.

1.08 DELIVERY, STORAGE AND HANDLING

A. General:
   1. The Contractor is responsible for coordination of the delivery, acceptance, handling, and storage of site furnishings.
   2. Store and handle site furnishings as acceptable to the Owner's Representative and so that work or access of others is not impeded.
   3. Protect site furnishings from theft or damage until such items have been accepted by the Owner.

B. Packaging and Labeling: Furnish materials in manufacturer's unopened, original packaging, bearing original labels showing quantity, description, and name of manufacturer. Verify that materials and components are adequately padded and securely bound in such a manner that no damage occurs to the product during delivery and unloading at the site.

C. Storage: Damaged materials will be rejected. Remove damaged materials from job site immediately and pay cost of replacement. Determination of damage shall be the sole authority of the Owner's Representative.

D. Painted Finishes: Provide non-scratching, non-staining, firmly bound covering for shop-painted finishes until installed and accepted.

E. Protect wood materials from stains.

1.09 WARRANTY

A. Manufacturers: Provide Owner with manufacturer's written extended product warranties as available for the specified products.

PART 2 - PRODUCTS

2.01 SITE FURNISHINGS - GENERAL

A. In addition to those described in the following Articles, refer to the Site Furnishing Matrix included at the end of this Section for complete list of items to be provided. Insert product information on bleachers, if used, in the following Article

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to commencement of work described in this Section, carefully inspect installed work, and verify all such work is correct and complete. Immediately notify the Owner's Representative of any discrepancy before proceeding with work.

3.02 INSTALLATION - GENERAL

A. Conform to layout shown on Drawings. Final placement shall be field verified with the Owner's Representative.

B. Installation of products shall be as shown in the Drawings, or according to manufacturer's instructions. If discrepancies are found, or if information is lacking, consult with the Owner's Representative prior to beginning the work.

C. Concrete footings shall conform to requirements of Section 32 32 15 – Landscape Concrete unless noted otherwise.

D. Furnish anchorage and fastening required for installation to ensure proper fit and accurate placements. Bolts, where exposed, shall be cut back to within three threads of the nut.

3.03 CLEANING AND ADJUSTMENT

A. Protect furnishings from damage until acceptance of work. Do not remove protective wrappings from furnishings until so instructed by the Owner's Representative.

B. Clean soiled site furnishings prior to acceptance by Owner.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the Owner's Representative.

D. Replace damaged items to the satisfaction of the Owner's Representative. Replace missing accessories at no cost to Owner.

3.04 SITE FURNISHINGS MATRIX

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
A.	Round Faced Soccer Goal	Sportsfield Specialties	SG618RS	1 sets	White Frame with Black Netting and 1 Extra Net Provided for Each Goal	Sportsfield Specialties Alex Fletcher (408) 728-0483
B.	Round Faced Soccer Goal	Sportsfield Specialties	SG46	4 sets	White Frame with Black Netting and 1 Extra Net Provided for Each Goal	Sportsfield Specialties Alex Fletcher (408) 728-0483
C.	Truncated Domes	Engineered Plastics – Armor Tile	ADA-C-Series Cast-in-place tiles	Per plan	Federal Yellow	Gerard Angeles, Engineered Plastics (916) 844-4132
D.	Drinking Fountain	Most Dependable Fountains	485 EZWM	1 ea.	TBD	Most Dependable Fountain (800) 552-6331
E.	Volleyball Post and system	Douglas Sports	SKU: 65350	8 sets	Black Powder Coat	Douglas Sports (800) 553-8907
F.	Volleyball Sleeve	Douglas Sports	GS-24SQ	8 ea.		Douglas Sports (800) 553-8907
G.	Volleyball Net	Douglas Sports	VB-1200 (part of SKU65350 system)	8 ea.		Douglas Sports (800) 553-8907
H.	Basketball Post (back-to-back)	PW Athletics	Model #1536 5-9/16" O.D. With 6' Offset)	4 ea	Galvanized	PW Athletics (866) 833-4680
I.	Basketball Post (8')	PW Athletics	Model #1535 5-9/16" O.D. With 6' Offset)	4 ea	Galvanized	PW Athletics (866) 833-4680
J.	Basketball Post (10')	PW Athletics	Model #1535 5-9/16" O.D. With 6' Offset)	4 ea	Galvanized	PW Athletics (866) 833-4680
K.	Basketball Backboard	PW Athletics	Model #20 Fiberglass w/ Orange Target & Perimeter.	16 ea	Standard	PW Athletics (866) 833-4680
L.	Basketball Rim	PW Athletics	Model # 45 Heavy-duty double rim	16 ea	Standard	PW Athletics (866) 833-4680
M.	Basketball Net	PW Athletics	Model #34 Nylon	16 ea	Standard	PW Athletics (866) 833-4680
N.	Baseball/softball Backstop	BSN Sports	SKU: BSCL20H	1 ea	Standard	BSN Sports (800) 856-3488
O.	Paper Towel Dispenser	Bobrick	B-3944	2 ea	Standard	Bobrick (818) 764-1000
P.	Feminine Hygiene Dispenser	Bobrick	B-4706C	1 ea	Standard	Bobrick (818) 764-1000
Q.	Conex Container	Aztec Container	Custom 20' Container	2 ea.	Custom	Azteccontainer.com 1800-399-2126
R.	Synthetic Turf Irrigation System	Hunter	ST System	1 ea.		Hunter Christine Hawkins (760) 744-5240
S.	Restroom grab bar	Bobrick	Model# 5806x36 & 5806x48	ea	Standard	Bobrick (818) 764-1000

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	QTY.	FINISH/COLOR	DISTRIBUTOR/CONTACT
T.	Pickleball Net System	Jaypro	Heavy Duty Portable Net system RPP-3PORT	10	-	https://jayprosports.com

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES (REVISED PER BID ADDENDUM 1)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Storm drainage system improvements and related work as shown on the Drawings and specified including, but is necessarily limited to, the following:
   1. Pipe and fittings.
   2. Nonpressure transition couplings.
   3. Expansion joints and deflection fittings.
   4. Cleanouts.
   5. Drains.
   6. Catch basins.
   7. Stormwater inlets.
   8. Pipe outlets.

B. Related Requirements:
   1. Section 31 20 00 - Earth Moving
   2. Section 31 23 00 - Excavation and Fill
   3. Section 32 11 00 - Base Courses
   4. Section 32 32 15 - Landscape Concrete
   5. Section 32 33 00 - Site Furnishings
   6. Section 22 11 00 – Domestic Water Utilities

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. C478: Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
   2. C923: Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
   3. D2321-20: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   4. D2412-21: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   5. D2729-21: Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   6. D3034-21: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   7. D3350-21: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
   8. D4101-11: Standard Specification for Polypropylene Injection and Extrusion Materials.

B. California Building Code, Current Edition.

C. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.03 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 33 00 - Submittal Procedures.

B. Coordinate work of this section with all other work contained in the Contract Documents.

1.04 ACTION SUBMITTALS

A. Shop Drawings:
   1. Catch basins stormwater inlets and dry wells. Include plans, elevations, sections, details, frames, covers, and grates.

B. Product Data: Manufacturer's cut-sheets of products to be used.

1.05 CLOSEOUT SUBMITTALS

A. Record Drawings:
   1. Accurately record location of new piping, drain structures, and connections to existing systems using horizontal dimensions, elevations, inverts, and slope gradients as applicable.
   2. Comply with the additional requirements of Section 01 78 39 – Project Record Documents.

1.06 QUALITY ASSURANCE

A. Control of Work: Conform to Section 5 of the Standard Specifications.

B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store pipe neatly and orderly, stacked and blocked to prevent damage. Cracked, checked, spalled, or otherwise damaged pipe and precast concrete units shall be removed from site.

B. Use of chain slings shall not be permitted.

C. Piping, fittings, and related materials shall be carefully handled. Comply with manufacturer's rigging instructions for precast items. Use of chain slings is not be permitted.

D. All pipelines, fittings and drainage structures shall be kept clean and closed during construction.

1.08 FIELD CONDITIONS

A. Make provisions for, and take the necessary precautions to, protect existing and new work from damage during entire life of project.

B. Work of this Section shall not be executed when site conditions are detrimental to quality of work as determined by the Owner's Representative.

C. Do not interrupt service to facilities occupied or used by Owner without the Owner's written permission.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. General:
   1. Pipe and fittings shall be clearly and permanently marked to identify manufacturer, type, class, or schedule and NSF approval as applicable.
   2. Unless otherwise noted, Contractor has option of using either CHDPE or PVC pipe as specified.

B. Corrugated High Density Polyethylene (CHDPE) Pipe: Dual wall, perforated and solid with an integrally formed smooth waterway; "N-12 "drainage pipe by Advanced Drainage Systems, Inc., 510-913-2211, or equal.
   1. Nominal sizes shall have a full circular cross-section, with an outer corrugated pipe wall and an essentially smooth inner wall (waterway).
   2. Corrugations may be either annular or spiral.
   3. Sizes shall conform to the AASHTO classification "Type S."
   4. Pipe manufacturer for this specification shall comply with the requirements for test methods, dimensions, and markings found in AASHTO Designations M252 and M294.
   5. The minimum parallel plate stiffness values when tested in accordance with ASTM D2412 shall be as follows:

Diameter	Pipe Stiffness
4 inch (100 mm)	50 psi (340 kPa)
6 inch (150 mm)	50 psi (340 kPa)
8 inch (200 mm)	50 psi (340 kPa)
10 inch (250 mm)	50 psi (340 kPa)
12 inch (300 mm)	50 psi (340 kPa)
15 inch (375 mm)	42 psi (290 kPa)

   6. Fittings: Virgin PE compounds conforming with the requirements of ASTM D3350, cell class 324420C, and supplied or recommended by the pipe manufacturer.
      a. The fittings shall not reduce or impair the overall integrity or function of the pipeline.
      b. Common Corrugated Fittings:
         1) Couplers, reducers, and other in-line joint fittings.
         2) "Tees", "wyes", end caps, and other branch or complimentary assembly fittings.
      c. Acceptable Installation Methods: Snap-on, screw-on, bell and spigot, and wrap around.
      d. Couplings shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints.
      e. Where designated on the Drawings and as required by the manufacturer, a neoprene or rubber gasket shall be supplied.

C. Smooth Polyvinyl Chloride Pipe (PVC) and Fittings: SDR 26, spigot end, Type I PVC 1120, NSF approved, and complying with ASTM D3034.

D. Smooth Polyvinyl Chloride (PVC) Perforated Drain Pipe and Fittings: Bell and non-pressure rated PVC SDR 35 pipe with two rows of perforations 120 degrees apart on bottom of pipe 5 inches on center, conforming with ASTM D2729 or ASTM D3034 and Section 68 of the Standard Specifications.

2.02 DRAINAGE STRUCTURES

A. Precast Catch Basins/Drain Inlets:
   1. General:
      a. Grates in paved areas shall conform to ADA Standards for Accessible Design.
      b. All catch basins to have locking mechanism or screw down grate to frame.
      c. Provide two grade rings at each catch basin.
   2. Square Basin Product Matrix:

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	GRATE INFORMATION
A.	12" Concrete Basin	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	1212CB	Galvanized Steel cross bars, ADA compliant (pedestrian applications), meeting AASHTO H-20 loading (vehicular applications), locking bolts included

ITEM	DESCRIPTION	MANUFACTURER	MODEL NO.	GRATE INFORMATION
B.	18" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-1818	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
C.	24" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-2424	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
D.	36" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-3636	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.
E.	48" Concrete Drain Inlet	Oldcastle Precast, or equal. (Contact Number: 888-965-3220)	DI-4848	Hot-dipped galvanized, ADA compliant (pedestrian applications), ADA compliant meeting AASHTO H-20 loading (vehicular applications), bicycle-proof grates for all applications, locking bolts included.

B. Extensions: Provide box extensions, junction boxes and grade rings compatible with structures as necessary to finish at the proper elevation and to facilitate future elevation adjustments as noted below.

C. Clean Outs: As shown or noted in the Drawings.

D. French Drain: As shown or noted in the Drawings.

E. Drop Inlet: 12 inches, Model #1240 by NDS, Inc., 888-825-4716, or equal.

F. Area Drain: 8" Cast Iron Grate by NDS, Inc, Model NDSD8, or equal.

G. Drinking Fountain Drain: Square with cast iron body and bronze grate; Z415 Series floor drain Model Z415SH by Zurn, or equal.
   1. Size: 8 inches by 8 inches.

2.03 ADDITIONAL MATERIALS

A. Permeable Rock Beneath Synthetic Turf Area: As specified in Section 32 18 14 – Synthetic Turf Base.

B. Drain Rock:

   1. Drain Rock shall conform to requirements of Subdrain Trench Drain Rock beneath Synthetic Turf Area: As specified in Section 32 18 14 – Synthetic Turf Base

C. Pea Gravel:
   1. Pea gravel shall conform to the following gradation requirements:

U.S. Standard Sieve Mesh	Allowable Range Percent Retained on Sieve
1/2 inch (12.5 mm)	95% passing
1/4 inch (6.3 mm)	45% passing
10 mesh (2.0 mm)	No more than 10% passing

U.S. Standard Sieve Mesh	Allowable Range Percent Retained on Sieve
18 mesh (1.0 mm)	No more than 5% passing

2. Supplier: Harbor Sand & Gravel, Redwood City, TMT Enterprises, Inc., San Jose; or equal.

D. Sand Bedding for Storm Drain Piping: Sand conforming to Section 19-3.02F(2) of the Standard Specifications.

E. French drains have a backfill with one of the following general characteristics:
1. USGA Root Zone Sand,
   a. 65 percent USGA Root Zone sand conforming to the following sieve range:

Sieve Size	USGA Spec
	Individual % Retained
#4 (4.75mm)	0
#10 (2mm)	0-10% Combined
#18 (1mm)	
#35 (0.5mm)	Minimum 60% Combined
#60 (.25mm)	
#100 (.15mm)	20% Maximum
#140 (.1mm)	5% Maximum Combined
#270 (.05mm)	
Silt (.05-.002mm)	5% Maximum
Clay (<.002mm)	3% Maximum

   b. 15 percent Coconut Coir Fiber.
   c. 15 percent AXIS Calcined Diatomaceous Earth.
   d. 5 percent Worm Castings.
2. Supplier: 'Terra Vida French Drain Backfill Mix' by TMT Enterprises. Contact: Matt Moore 408-432-9040

F. Top Dress Sand
1. Sand conforming to the following sieve range:

Sieve Size	USGA Spec
	Individual % Retained
#4 (4.75mm)	0
#10 (2mm)	0
#18 (1mm)	<5
#35 (0.5mm)	Minimum 60% Combined
#60 (.25mm)	
#100 (.15mm)	20% Maximum
#140 (.1mm)	5% Maximum Combined

Sieve Size	USGA Spec
	Individual % Retained
#270 (.05mm)	
Silt (.05-.002mm)	3% Maximum Combined
Clay (<.002mm)	

2. Supplier: 'G-8 Top Dress Sand' by TMT Enterprises. Contact: Matt Moore (408) 432-9040

G. Permeable Filter Fabric : Mirafi 140N, or equal.

H. Filter Fabric Fasteners: Metal clip type staple.

I. Mortar: A 1:2 Portland cement to sand mixture with a minimum of water conform to the applicable sections of the Standard Specifications.

J. Structural Adhesives for Manholes, Catch Basins, and Junction Boxes: "Ram-Nek" by Henry Company, 800-523-0268, or equal as available.

K. Reinforcing Bars: As specified in Section 32 32 15 – Landscape Concrete.

L. Minor Concrete: Comply with requirements of Section 32 13 13 – Concrete Paving.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 31 20 00 - Earth Moving.

3.02 PIPING INSTALLATION

A. General:
1. Pipe shall be installed per manufacturers' instructions and in conformance with the Contracts Documents.
2. Installation of thermoplastic pipe shall be in accordance with ASTM D2321.

B. CHDPE Pipe:
1. Pipe shall be installed with a minimum cover under the H-20 live load equal to 12 inches to the top of subgrade elevation.
2. Minimum compaction for pipe subject to H-20 live load is 90 percent in accordance with Section 19, Standard Specifications.
3. CHDPE pipe shall be laid and jointed in accordance with generally accepted practice and the following provisions to provide the required work.

3.03 INSTALLATION OF DRAINAGE STRUCTURES

A. General: Set rim or cover elevations to specified grades utilizing a minimum of two grade rings (or extensions) at top of drainage structure to facilitate potential elevation adjustments in the future.

B. Catch Basins: Install as shown in the Drawings and as follows:
1. Excavate as required.

2. Set on firm, unyielding base. Set on compacted select backfill material if directed by Owner's Representative.
3. Prefabricated units not having a bottom shall be set on a poured-in-place concrete slab with smooth trowel finish. Mortar and properly seal unit to slab, making a watertight connection.
4. Install pipe inlets and outlets to specified elevations. Grout and/or seal all joints to a watertight condition with material per manufacturer's recommendation.

C. Cleanouts: Install as shown in the Drawings.

D. French Drains: Install per drawings. Contractor shall use a roller to compact the sand to 85-88% compaction and leave the sand in the trench areas ¼-1/2" high to allow for anticipated settling.

E. Drywells, Drinking Fountain Drains, Atrium Drains and Drop Inlets: Install as shown in the Drawings and in accordance with the manufacturer's written recommendations.

3.04 IDENTIFICATION

A. Materials and their installation are specified in Section 31 20 00 - Earth Moving. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

B. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.05 FIELD QUALITY CONTROL

A. The Owner's Representative shall review and accept work at the following stages:
1. Excavated trench with bedding in place prior to any pipe being laid.
2. Pipe laid prior to backfilling. Pipe covered prior to review and acceptance shall be uncovered and re-backfilled at Contractor's expense.
3. Drainage device location and pipe connection.
4. New drainage system shall be flood tested and clean of debris.

END OF SECTION