SAN BERNARDINO COUNTY

SECTION F

TECHNICAL SPECIFICATIONS

KESSLER PARK
DREAM FIELD PROJECT

FOR

BLOOMINGTON RECREATION & PARK DISTRICT
BLOOMINGTON, CALIFORNIA

PROJECT NO.: 30.30.0154

TECHNICAL SPECIFICATIONS

APRIL 29, 2024

KESSLER PARK - DREAM FIELD RENOVATIONS FOR:

SAN BERNARDINO COUNTY
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KESSLER PARK – DREAM FIELD
SAN BERNARDINO COUNTY

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SCHEDULE, CLAUSES AND ATTACHMENTS, & SOLICITAITON REQUIREMENTS
Issued separately by the District

REFERENCE DOCUMENTS

1. Standard Specifications for Public Works Construction (SSPWC), Latest Edition.
2. Standard Plans for Public Works Construction (SSPWC), Latest Edition.

GEOTECHNICAL INVESTIGATIONS

Limited Geotechnical Investigation Report – Kessler Park Dream Field 18401 Jurupa Avenue, Unincorporated Bloomington, San Bernardino County, California. By Geocon West, Inc.

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SECTION 01 10 00 SUMMARY OF WORK

PART 1 – GENERAL

1.1 NAME, LOCATION, AND ACCESS TO PROJECT

A. Project Location:

1. 18401 Jurupa Avenue, Bloomington, CA 92316

1.2 DESCRIPTION OF WORK

A. General Requirements

1. Contractor shall provide licensed construction professionals, qualified supervision, lead-people and workers, and shall supply labor, materials, equipment, services, transportation, insurance, licenses, demolition, utility, and other items or work required to properly execute the intentions of the contract.

B. Scope of Work includes, but is not limited to:

1. Renovation of existing natural grass infield to synthetic turf.
2. Installation of new scoreboard, fencing, netting, dugouts, benches, bleachers, scorekeeper booth, shade structures, “blue monster”, and associated infrastructure.
3. Irrigation syringe system for cooling.
4. LID Swale along outside perimeter of baseball outfield.
5. Work shall be constructed in accordance with contract documents including addendums issued prior to bid submittal.

C. Intent of Contract Document

1. Contract documents were prepared with the intent to include everything necessary for the proper completion of the project. Work necessary for completion or inferred by the contract documents, even though not specifically shown, or specified, shall be provided by contractor at no additional cost to Owner.
2. Where removal of existing facilities is required for performance of work under this contract, removal, and replacement of utilities and/or facilities shall be included in the work at no additional cost to the Owner.

D. Schedule

1. The Notice to Proceed shall be issued no sooner than TBD. Substantial completion shall be completed no later than TBD. Liquidated damages are $500 per calendar day.

1.3 INTERPRETATION OF TERMS

A. The term "Owner" and “County” used in these specifications, is synonymous with the County of San Bernardino. The terms "as directed," "as required," "as permitted," "approved," "acceptable," "satisfactory," means by or to the Owner/County.

1.4 DEFINITIONS

A. Owner: San Bernardino County

B. Project Manager: To be designated by the Owner prior to commencement of construction.

C. Project Inspector: To be designated by the Owner prior to commencement of construction.

D. Contractor: To be designated by the Owner prior to commencement of construction.

TERM	MEANING
Adequate, Careful, Proper, Sufficient, Suitable, Satisfactory	These terms refer to interpretation by the Owner and are subject to approval upon request
Applicable Codes	Current California Building Codes
Approved	As approved by Owner
As Directed	As directed by Owner
As Required	As required by applicable code requirements; by good building practice; by the conditions prevailing; by the contract documents; by Owner
As Selected	As selected by Owner
By Others	Work on this project that is outside the scope of work to be performed by contractor under this contract, but that will be performed by Owner, other contractors, or other means
Equal	Of same quality, appearance, and utility to that specified, as determined by Owner. Contractor bears the burden of proof of equality
Furnish	Supply only, not install, (unless required to be provided or installed elsewhere in the contract documents) and store on site where directed by the Owner
Include/Including	Include/including, without limitation
Install	Install or apply only, not furnish (unless required to be provided or furnished elsewhere in the contract documents)
Manufacturer's Directions, Instructions, Recommendations, Specifications	Manufacturer's written directions, instruction, recommendations, specifications
Must, Shall, To, Will	When used as a directive to contractor, these terms indicate a mandatory action
Necessary	Essential to completion of work
Owner-Furnished, Contractor Installed	To be furnished by Owner at its' cost and installed by contractor as part of the work

Project Site, Job Site	Geographical location of the project
Provide	Furnish and install
Shown	As indicated in the contract documents
Specified	As written in the contract documents
Submit	Submit to Owner
Supply	Furnish

1.5 INCONSISTENCIES IN CONTRACT DOCUMENTS

A. In addition to the requirements of the General Conditions, if there is an inconsistency in the contract documents, the stricter, more stringent standards and requirements shall be followed at no additional cost to the Owner.

1.6 NOTIFICATION

A. Notify the Owner not less than two (2) working days in advance of any inspection, meeting, or consultation requiring the representative's presence.

B. The Contractor shall be required to schedule all inspections with the jurisdictions having authority. This includes scheduling inspections with the soils engineer and other third-party inspectors.

1.7 SITE DECORUM

A. Contractor shall control the conduct of its direct employees and subcontractors so as to prevent unwanted interaction initiated by the Contractor's employees with the Owner members, guests, staff, students, or other individuals (except those associated with the project), and adjacent to the project site. Without limitation, unwanted interaction by contractor employees would be whistling at or initiating conversation with passerby. If any contractor employee initiates such unwanted interaction, the Contractor shall, either upon request of the Owner or on its own initiative, replace said employee with another of equivalent technical skill, at no additional cost to the Owner.

1.8 CLEAN-UP DURING CONSTRUCTION

A. Maintain job site in a clean, orderly fashion. Pick up and remove debris DAILY. If work under this contract creates dusty, dirty, or unsightly conditions in adjacent areas, the Contractor will immediately clean up the affected areas. Daily clean up shall remove all dangerous materials and equipment that may be considered an "attractive nuisance" to children.

B. Electrical and mechanical equipment and tools shall be equipped with dampers, mufflers, isolators, or other appropriate means for reducing noise emissions.

1.9 NOISE AND DUST CONTROL

A. Contractor shall note that adjacent facilities will remain in use during the entire construction period, and shall take all reasonable precautions to reduce dust and minimize noise in compliance with local jurisdictional requirements.

1.10 ACCESS AND EXIT-WAYS

A. Do not interfere with use of, or access to, occupied buildings or adjacent property.

1.11 WELDING AND BURNING

A. Welding and burning of steel shall be eliminated as much as possible. Where unavoidable, welding and burning shall be done with all possible precaution to avoid fire hazards. Contractor shall contact the Owner's Representative who will submit a service request to disconnect the smoke detectors. Point of Contact phone number shall be provided at the preconstruction meeting. Contractor shall provide a fire watch for one-half (1/2) hour after burning stops. Contractor shall provide protection for all adjacent purposes.

B. No welding power is available; trailer mounted welding machines complying with campus noise mitigation standards are required. No diesel generators are allowed.

1.12 POWDER DRIVEN FASTENERS

A. Powder driven fasteners are not permitted, unless approved by the Owner.

1.13 SURROUNDING SITE CONDITION SURVEY

A. Prior to commencing the construction portion of the work, both the Contractor and Owner shall tour the project site together to examine and record the damage to existing adjacent buildings and improvements. This record shall serve as a basis for determination of subsequent damage due to Contractor's operations and shall be signed by all parties making the tour. Any cracks, sags, or damage to the adjacent buildings and improvements not noted in the original survey, but subsequently discovered, shall be reported to the Owner.

1.14 EXCAVATION AND TRENCHING

A. Pursuant to Labor Code 6707, the Contractor shall include adequate sheeting, shoring, bracing, or equivalent method for the protection of life and limb, which conforms to applicable Federal and State safety orders.

B. Before beginning any excavation five (5) feet or more in depth, submit to the Owner a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavations. If the detailed plan varies from such shoring system standards, it shall be prepared by a registered Civil or Structural Engineer whose name and registration number shall be indicated on the drawing. If a dispute arises as to whether the plan must be prepared by a registered Civil or Structural Engineer, the Owner's determination of the matter shall be final and conclusive. The cost of required engineering services shall be borne by the Contractor and shall be deemed to have been included in the stipulated sum for the work, as stated in the Agreement.

C. Neither the review nor approval of any plan showing design of shoring, bracing, sloping, or other provisions for worker protection shall relieve the Contractor from his obligations to comply with Construction Safety Standards for design and construction of such protective work, and Contractor shall indemnify the Owner from any and all claims, liability, costs, actions, and a cause of action arising out of or related to the failure of such protective system. The Contractor shall defend the Owner, its officers, employees,

and agents and the Owner in any litigation or proceeding brought with respect to the failure of such protective systems.

1.15 MATERIAL AND EQUIPMENT

A. General:

1. All material and equipment furnished shall be:

a. New;

b. In condition acceptable to the Owner;

c. And Suitable for intended use.

2. Keep materials clean, dry, and undamaged.

B. UL Label: Materials and equipment, for which UL standards have been established and their label service is available, shall bear the appropriate UL Label.

C. Manufacturer's Trademarks and Names: The Owner reserves the right to review and request the removal or redesign of manufacturers' trademarks and names on items of materials and equipment which will be exposed to view in the completed Work. Such removal or redesign shall be at no increase in contract Sum.

D. Delivery of Materials: Deliver all materials in the original packages, containers or bundles bearing the name, brand, type, and grade of material of the manufacturer or the supplier for whom the product is manufactured.

1.16 LAYING OUT OF THE WORK

A. Contractor shall bear the expense of corrective work necessitated by its failure to so report. Contractor shall employ an California registered Land Surveyor to lay out the Work and set grades, lines, levels, and positions throughout the Project Site. Before beginning the Work, locate general reference points, establish monuments, and take action as is necessary to prevent their destruction; then lay out all lines, elevations, and measurements for buildings, grading, paving, utilities, and other parts of the Work. Verify figures and dimensions shown on the Drawings and accept responsibility for any error resulting from failure to so verify, including the cost of any additional re-surveying. Establish permanent monuments on curbs, manholes, or pavements, or with concrete embedded steel pipe with lead plug and brass nail, as approved. Actual field conditions deviating from the information provided to bidders shall be reported to the Owner before proceeding.

1.17 APPARATUS AND EQUIPMENT LOCATIONS

A. Locations of apparatus and equipment indicated on the Drawings (if any) are approximate only and are subject to change to suit operational service as approved by the Owner.

B. Furnish and install apparatus and equipment in a manner and in locations, which keep openings and passageways clear. Make changes in locations of equipment and materials, which may be necessary to accomplish these purposes as approved by Owner.

1.18 EXAMINATION OF EXISTING CONDITIONS

A. Verify measurements in field, as required, for work fabricated to fit job conditions. Before starting work, examine adjoining work on which installment is in any way dependent for perfect workmanship and fit. Give written description of any existing deficiencies detrimental to proper and timely installation of work.

1.19 CARE OF EXISTING FACILITIES

A. Contractor shall be responsible for repair or replacement of existing facilities including any landscaping, paving, roads and sidewalks damaged as a result of the performance of this work. Any facilities or finishes damaged shall be repaired or replaced with materials and workmanship equivalent to that employed in executing the original work and to the satisfaction of the Owner.

B. Contractor shall take care not to overload any existing structures by storing material, erecting shoring, placing equipment, or other materials upon or against them.

C. Do not park trucks, store materials, or cross over landscaped areas intended to remain. Any plant materials damaged as a result of the performance of this work will either be replaced with new plant materials equal in size to those damaged, or by payment of an amount representing the value of the damaged material as determined by the Owner.

1.20 REPAIR OF EXISTING WORK

A. Whenever any cutting, removal, or alterations of existing work is required to form connections with new work or otherwise meet the requirements of the contract documents, perform such work so as not to damage the work that will remain in place. Perform patching and repairs occasioned thereby using materials, construction details, and finishes matching those of the existing work as closely as possible and to the approval of the Owner.

1.21 TEMPORARY CONSTRUCTION UTILITIES

A. The Contractor shall provide and pay for necessary power and water required during construction. Contractor shall be responsible for providing temporary facilities required to deliver such utility services from their existing location on the site to the point of intended use.

B. Contractor shall verify characteristics of power available on site. Where power of higher voltage or different phase of current is required, Contractor shall be fully responsible for providing such service and shall pay all costs required thereof. Work to be done in accordance with applicable California Administrative Codes.

C. Use backflow preventers on water lines at point of connection to Owner or Municipal water supply. Backflow preventers are to comply with requirements of the Uniform Plumbing Code.

1.22 UTILITY SHUTDOWNS AND INTERRUPTIONS

A. Contractor shall give the Owner ten (10) days' notice, in writing, of need to shut off existing utility services or equipment interruptions. The Owner shall set exact time for and execute shutdown. All work required re-establishing service such as connections, line taps, and cable splicing shall be performed by the Contractor.

B. Obtain Owner approval at least ten (10) days in advance of deliveries of material, equipment, or other activities, which may conflict with the Owner's use of facilities.

C. Excessive scheduling of utility shutdowns or repeated requests to schedule, and subsequent cancellation or rescheduling of shutdowns, may be subject to back-charges to the Contractor in accordance with this section of the specifications.

1.23 TEMPORARY JOB OFFICE

A. Contractor is not required to provide a temporary job office for their use.

B. The Contractor shall maintain on-site, a complete set of Construction Documents, all reviewed shop drawings, submittals, samples, and all executed Change Orders.

1.24 PROJECT RECORD DOCUMENTS, "AS BUILT" DRAWINGS

A. The Contractor shall maintain on-site, a complete record set of up-to-date Contract Documents and Construction Documents. The prints shall show actual installation by dimension, elevation, or other reference, where changed from the Construction Documents approved by the Owner.

B. Contractor shall cross-reference all changes approved by the Owner on the record set of Construction Documents, noting the type and number of the document authorizing the change.

C. Electrical and Irrigation design work is shown diagrammatically on the Construction Drawings. Contractor shall make "as-built" drawings showing the exact measured location of concealed piping, ductwork, and major electrical conduits.

1.25 CONTRACTOR'S SUBMITTALS

A. Project Schedule: Submit detailed project schedule to the Owner for approval.

B. Schedule of Values (Cost Breakdown): Submit detailed project Schedule of Values to the Owner for approval.

C. Submittal Schedule: Submit detailed Submittal Schedule to the Owner for approval.

D. Staffing Plan: Submit detailed Staffing Plan (amendment to the Contractor's Qualification Statement if additional staff are necessary) to the Owner for approval.

E. Product Literature: Submit detailed technical literature fully describing every product or item proposed for use including manufacturer's literature and items specified.

F. Samples: Submit samples of materials specified to permit full evaluation of work or items proposed.

G. Shop Drawings: For detailed requirements refer to individual sections.

H. Design Materials: Submit Design Materials as required by individual sections of the Performance Specifications.

I. Certificates: Where certificates of compliance with the performance criteria are required, the Contractor shall submit the manufacturer's standard certification for the product, material, assembly, application, installation, craftsman competency, or equipment. It is not the intention of the contract to require the Contractor to conduct or pay for independent laboratory tests or certifications. This limitation does not apply to

certifications that may be required by applicable codes or code required special inspections. This limitation does not apply to retesting that may be required for rejected work.

1.26 CORRESPONDENCE

A. Contractor's correspondence (any written document other than a full-size drawing) directed to the Owner should be distributed as follows:

1. Original to the Owner.

2. Three copies (minimum) to the Owner.

B. Owner's correspondence (any written document other than a full-size drawing) directed to the Contractor shall be distributed as follows:

1. Original to the Contractor.

2. Three copies (minimum) to the Owner.

1.27 COST BREAKDOWN

A. Within ten (10) days from the date of commencement shown in the Notice to Proceed, the Contractor shall submit to the Owner a breakdown of cost of the contract price itemizing the estimated costs of each class of work together with his total allowance for profit, insurance and overhead expense. This breakdown, approved by the Owner, shall become the basis for determining the value of Work performed for the purpose of making payments

B. Contractor shall include a separate allowance (or line item) identified as "project close out" with a corresponding value attributed to this item.

C. Contractor shall not submit a Payment Application to the Owner, prior to the Owner's approval of the Cost Breakdown submittal.

1.28 FINAL CLEAN UP

A. Clean up the entire construction site and adjacent areas affected by the performance of work under this contract. Remove all temporary construction, tools, equipment, excess materials, and debris.

1.29 PREPARATION FOR ACCEPTANCE (PRIOR TO FINAL INSPECTION)

A. Temporary facilities and utilities shall be properly disconnected, removed, and disposed of off-site.

B. All systems, equipment, and devices shall be in full and proper adjustment and operation and properly labeled and identified.

C. All materials and finishes shall be neat, clean, and unmarred.

D. All broken work, including glass, curbs, slabs, paving, landscape sprinklers, etc., shall be replaced or properly repaired.

E. Clean up of the site shall be complete.

F. All guarantees, service manuals, record documents, and other submittals as specified in the body of the Specifications, shall be assembled in an orderly manner and delivered to the Owner.

1.30 SYSTEM(S) COMMISSIONING (PRIOR TO FINAL ACCEPTANCE)

A. Prior to final inspection, the Contractor will schedule, through the Owner, training sessions, programs, manuals, and documentation as required to educate and familiarize maintenance and operations staff with equipment and system's operations. At minimum, one session per system or major piece of equipment is required. Final inspection will not be scheduled until training sessions for all building systems and major pieces of equipment have been conducted.

1.31 FINAL INSPECTION

A. Upon receipt of written notice from the Contractor that the work is ready for final inspection and acceptance, the Owner and Contractor shall promptly make a joint inspection of the work and note deficiencies, if any. When noted deficiencies have been removed and the Owner finds the work to be complete in every respect of the contract documents, the Owner will file a Notice of Completion.

B. The Notice of Completion shall be prepared and recorded in the County Recorder's Office. The date of final acceptance in the Notice of Completion will start the Guarantee period.

C. Contractor shall not submit a Payment Application representing the work of the project to be one hundred percent (100%) complete prior to the recordation of the Notice of Completion.

1.32 STORM WATER POLLUTION PREVENTION/DUST CONTROL PERMIT

A. The General Contractor will be responsible for securing all SWPPP and dust control documents and permits required for control of storm water during the construction process. The General Contractor will file the Notice of Intent (NOI) and Notice of Termination (NOT) all other applications required for this portion of the project. Additionally, the Contractor shall provide a SWPPP manual and erosion control plans as required by County.

PART 2 – PRODUCTS (NOT USED)

PART 3 – INSTALLATION (NOT USED)

END OF SECTION

SECTION 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES SUBMITTALS

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDED

A. Shop Drawings, Product Data, and Samples, other than in connection with proposed substitutions, shall be submitted to Owner only when specifically required; and Owner will not review any other such submittals. Product Data and Samples for proposed substitutions shall be submitted to Owner. Contractor shall be responsible for obtaining such copies of Shop Drawings, Product Data, and Samples as it may require for its own use.

1.2 RELATED REQUIREMENTS

A. Definitions:

1. The terms "Shop Drawings" and "Product Data" as used herein also include, but are not limited to, fabrication, erection, layout and setting drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams, all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment, or systems and the positions thereof conform to the Contract Documents.

2. As used herein, the term "manufactured" applies to standard units usually mass-produced. The term "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements. Shop Drawings shall establish the actual detail of all manufactured or fabricated items, indicate correct relation to adjoining Work, and amplify design details of mechanical and electrical equipment in accurate relation to physical spaces in the structure.

B. Manufacturers' Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed in accordance with a specified product manufacturer's instructions, Contractor shall procure and distribute the necessary copies of such instructions to Owner and all other concerned parties; and Contractor shall furnish, install, or perform the Work in strict accordance therewith.

C. Submittal Schedule:

1. Contractor shall provide a Submittal Schedule to the Owner for approval no later than ten (10) days after the date of commencement specified in the Notice To Proceed.

2. The schedule for submission of Shop Drawings, Product Data, and Samples by Contractor (the "Submittal Schedule"), and their processing and return by Owner, shall be agreed upon by both parties in order that the items covered by these submittals will be available when needed by the construction process and so that each party can plan its workload in an orderly manner.

1.3 SHOP DRAWINGS

A. Present information required on Shop Drawings in a clear and thorough manner. Identify details by reference to drawing and detail, schedule, or room numbers shown and specified.

1.4 PRODUCT DATA

A. Preparation:

1. Clearly mark each copy to identify pertinent products or models.
2. Show performance characteristics and capacities.
3. Show dimensions and clearances required.
4. Show wiring or piping diagrams and controls.

B. Manufacturers' standard schematic drawings and diagrams:

1. Modify the Drawings and other diagrams to delete information which is not applicable to the work.
2. Supplement standard information to provide information specifically applicable to the work.

1.5 SAMPLES

A. Office Samples shall be of sufficient size and quality to clearly illustrate the following:

1. Functional characteristics of the products, with integrally related parts and attachment devices.
2. Full ranges of color, texture, and pattern.

1.6 CONTRACTOR'S REVIEW OF SUBMITTALS

A. Review, mark up as appropriate, and stamp Shop Drawings, Product Data, and Samples prior to submission. Submittals shall clearly show that Contractor has reviewed them for conformance with the requirements of the Contract Documents and for coordination of the Work.

B. Determine and Verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Contract Documents.

C. Coordinate each submittal with requirements of the work and of the Contract Documents.

D. Notify Owner in writing, at time of submission, of any changes in the submittals from requirements of the Contract Documents.

E. Begin no fabrication or work which requires submittals until the return of Owner's final reviewed submittals.

1.7 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with the Submittal Schedule and in such sequence as to cause no delay in the work or in the work of any separate contractor.

B. Number of Submittals Required:

1. Shop Drawings & Product Data: Submit one (1) electronic copy (PDF).
2. (if requested) Non-Reproducible Submittals: Submit the number of copies which contractor will need, plus four (4) copies (minimum) which will be retained by Owner.
3. Samples: Submit the number specified in the Section that requires them.
4. Do not submit product data for multiple specifications sections in the same submittal.

C. Submittals shall contain:

1. Cover Sheet with the following
   a. Date of submission and dates of any previous submissions.
   b. Project name and number.
   c. Contract identification.
   d. Names of
      - Contractor.
      - Subcontractor.
      - Supplier.
      - Manufacturer.
2. Specification Section requiring submitted products and materials.
3. 8-inch x 3-inch blank space for review stamps.
4. Contractor's stamp, initialed or signed, certifying to the review of submittal; verification of materials and field measurements and conditions; and compliance of the information within the submittal with requirements of the Work and of the Contract Documents.

D. Product Data and Shop Drawings

1. Product and material data
2. Required product certifications, engineering stamps and testing certifications
3. Field dimensions clearly identified as such.
4. Relation to adjacent or critical features of the Work or materials.
5. Reference standards, such as ASTM or Federal Specification numbers.
6. Identification of changes from requirements of the Contract Documents.
7. Identification of revisions on re-submittals.

E. Resubmission Requirements:

1. Shop Drawings and Product Data:
   a. Revise Shop Drawings or Product Data and resubmit as specified for the initial submittal.

b. Identify any changes that have been made other than those requested.

c. Note any departures from the Contract Documents or changes in previously reviewed submittals that were not commented upon by Owner.

2. Samples: Submit new samples as required for initial submittal.

F. Distribution:

1. Owner will electronically (as applicable) distribute approved Shop Drawings, Product Data and Samples, (all of which carry Owner's review stamp).

G. Owner's Review: Owner will review Contractor's submittals, such as Shop Drawings, Product Data, and Samples, for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor as required by the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 62 00 PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 – GENERAL

1.1 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. Catalog numbers and specific brands of trade names followed by the designation "or equal" are used in conjunction with the material and equipment required by the specification to establish the standards of quality, utility and appearance required. Substitutions, which are equal in quality, utility and appearance to those specified, may be accepted subject to the following provisions:

1. Substitutions must be approved by Owner in writing.
2. Contractor shall submit to the Owner, within 10 calendar days after the date of commencement specified in the Notice to Proceed, a typewritten list containing a description of each proposed substitute item or material.
3. Contractor shall provide supporting data required by paragraph C.
4. The Owner will accept, in writing, such proposed substitutions as are, in Owner opinion, equal in quality, utility and appearance to the items or materials specified.
5. Such approval shall not relieve Contractor from complying with the requirements of the drawings and specifications.
6. Contractor shall be responsible at their own expense for any changes resulting from Contractor's proposed substitution that affect other parts of Contractor's own work or the work of others.
7. The decision of the Owner shall be final.

B. If a request for substitution occurs after the ten (10) calendar-day period, substitution may be reviewed at the discretion of Owner; and costs of such review, as approved by Owner, shall be borne by Contractor and will be deducted from contract sum.

C. Requests for substitutions will only be considered if Contractor submits the following supporting data:

1. Complete technical data including drawings, performance specifications, samples and test reports of the article proposed for substitution; and any additional information required by the Owner or Owner representative.
2. Statement by Contractor that the proposed substitution is in full compliance with the requirements of the contract documents and applicable code requirements.
3. List of subcontractors, if any, which may be affected by the substitution.
4. If the proposed substitution requires that portions of the work be redesigned or removed to accommodate the substituted item, submit design and engineering calculations prepared by a properly licensed design professional.

D. Owner may reject any substitutions not proposed in the manner and within the time prescribed above.

E. 10-day submittal period does not excuse Contractor from completing the project within the performance time stipulated in the agreement or excuse Contractor from the payment of liquidated damages if final completion is delayed.

F. Samples may be required. Tests required by Owner for determination of quality and utility shall be made by Owner Testing Laboratory, and at the expense of Contractor they shall be made by a testing laboratory, with acceptance of the test procedure first given by the Owner.

G. In review of data submitted in support of substitutions Owner would use, for purposes of comparison, all characteristics of specified items as they appear in manufacturer's published data shall be submitted for review, even though all characteristics of specified items may not have been particularly mentioned in technical specifications. If more than two submissions of data are required, the cost of reviewing these additional submissions shall be charged directly against Contractor; and Owner will withhold funds necessary to cover these costs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

KESSLER PARK – DREAM FIELD
SAN BERNARDINO COUNTY

SECTION 01 77 00 CONTRACT CLOSE-OUT

PART 1 – GENERAL

1.1 SUMMARY

A. Scope of Work:

1. This section specifies administrative and procedural requirements for project closeout that may include but are not necessarily limited to:

a. Inspection and/or observation procedures

b. Project record document submittal

c. Operating and maintenance manual submittal

d. Warranty submittal

e. Final cleaning

1.2 SUBSTANTIAL COMPLETION

A. Refer to General Provisions as applicable. Final regular Certificate for Payment (final progress payment) shall be issued when all pertinent requirements of Substantial Completion are met. Final retention payment shall be made after project Final Acceptance and conclusion of any specified Landscape Maintenance Periods subject to the discretion of the owner's representative.

B. Inspection Procedures: Upon receipt of a request for inspection or observation, the Owner shall either proceed or advise contractor of unfilled requirements. Owner shall prepare the Certificate of Substantial Completion following review, and advise the contractor for what must be completed or corrected by "punch-list" before the certificate is issued. Upon receipt of "punch-list," contractor shall complete all work described in a timely manner subject to the discretion of the owner's representative.

C. Owner shall repeat inspection and/or observation when requested provided contractor has made the request within specified lead time and given written assurance that "punch-list" work has been completed.

D. Results of the completed inspection and/or observation shall help from the basis of requirements for final acceptance and if acceptable, may signal the beginning of the specified landscape maintenance period.

1.3 UNCORRECTABLE WORK

A. Should the Owner determine it is not practical or possible for the contractor to correct work that is damaged or improperly executed, an equitable deduction from the contract sum may be made at the sole discretion of the owner's representative.

1.4 1.4 CLOSE-OUT SUBMITTALS

A. Submit two (2) copies of the following, where applicable, in accordance with applicable contract documents:

1. Project record documents (as contracted)

2. Operation and maintenance manuals

3. Warranties, guaranties, and bonds
4. Keys and keying schedule
5. Spare parts and extra materials
6. Other items required by specifications

B. Specified number of copies of above closeout submittals shall be received and accepted by the Owner before final acceptance shall be given.

C. In addition to those items previously mentioned in this section, the contractor shall submit to the Owner the following items before a Notice of Completion will be filed: Up-to-date sub-contractor list with names, addresses and telephone numbers.

D. Final Adjustment of Accounting: Submit a final statement of accounting to the Owner showing all adjustments to the contract sum.

1.5 MAINTENANCE MANUALS

A. Submit two (2) copies of proposed manual(s) to the Owner for review and acceptance. Maintenance manuals shall be received and accepted by the Owner before final acceptance shall be given.

B. Organized operating and maintenance data into properly indexed heavy-duty 2-inch, 3-ring vinyl covered binders. Mark appropriate identification on front and spine of each binder. Manuals can include but are not limited to the following types of information:

1. Emergency instructions
2. Spare parts list
3. Copies of warranties or actual warranty cards
4. Wiring diagrams
5. Recommended “turn around” cycles
6. Inspection procedures
7. Shop drawings and product data
8. Fixture lamping schedule

1.6 DEMONSTRATION

A. Prior to final acceptance, contractor shall fully instruct owner’s representative’s designated operating and maintenance personnel in the operation, adjustment and maintenance of products, equipment, and systems installed. Provide services of factory trained instructors from the manufacturers of each major item of equipment or system, if necessary or requested by the owner’s representative.

B. Operating and maintenance manual(s) shall be fully described at this instruction meeting.

1. Review contents of manual(s) with personnel in full detail to explain all aspects of operations and maintenance such as:

a. Maintenance manuals

b. Record documents

c. Spare parts and materials

d. Tools

e. Fuels

f. Identification systems

g. Control sequences

h. Hazards

i. Cleaning

j. Warranties and bonds

k. Maintenance agreements and similar continuing commitments.

2. As part of instruction for operating equipment, demonstrate the following procedures:

a. Start-up

b. Shutdown

c. Emergency operations

d. Noise and vibration adjustment

e. Safety procedures

f. Economy and efficiency adjustments

g. Effective energy utilization

1.7 PROJECT RECORD DRAWINGS AND SPECIFICATIONS (AS CONSTRUCTED)

A. Project Record Drawings shall conform to Section 01 78 39 – Project Record Drawings.

1.8 WARRANTY/GUARANTY FORMAT

A. Provide written warranties, guaranties (except manufactures' standard printed warranties and/or guaranties), addressed to the owner's representative, in the format shown at the end of this section. Manufactures' standard printed warranties and/or guaranties shall be submitted as-is.

B. Warranties and guaranties shall be submitted in duplicate, in the attached format, signed by all pertinent parties and by the contractor in every case, with modifications as accepted by the Owner to suit the conditions pertaining to the warranty or guaranty. Collect and assemble written warranties and guaranties into bound booklet form and deliver bound books to the Owner for review.

1.9 REMOVAL OF TEMPORARY FACILITIES

A. Prior to final inspection, the contractor shall remove tools, materials, sheds, temporary power poles, temporary tree protection, and other articles from the project site. Should the contractor fail to take prompt action, the Owner may, given 30 days written notice, treat them as abandoned property.

1.10 FINAL SITE CLEANING

A. Broom clean exterior paved surfaces and adjacent public streets. Utilize appropriate cleaning methods to remove spills, stains, tire tracks, etc. from all paved surfaces. Rake clean other surfaces of the site.

B. Hose down and scrub walls and paving surfaces dirtied or stained as a result of the construction work, as directed by the owner's representative.

C. Remove from the site construction waste, unused materials, excess earth, and debris resulting from the work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

ATTACHMENT: Warranty/Guaranty Form

WARRANTY/GUARANTY FORM

TO: (client)

We, the undersigned, do hereby warranty and guaranty that the parts of the Work described above which we have furnished and/or installed for:

County of San Bernardino

San Bernardino County, CA

are in accordance with the contract documents and that all said work as installed will fulfill or exceed warranty and guaranty requirements. We agree to repair or replace work installed by us, together with any adjacent work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or operation within a period of one (1) year from the date of final acceptance by Owner or from the date of certificate of substantial completion, whichever is the earlier, at no cost to the owner.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time period determined by the owner's representative, after notification in writing, we, the undersigned all collectively and separately, hereby authorized the Owner to have said defective work repaired and/or replaced and made good, and agree to pay to the owner upon demand all moneys that the Owner may expend in making good said defective work, including all collection costs and reasonable attorney fees.

Date: _____

_____

(Sub-contractor, sub-subcontractor, manufacturer or supplier)

By: _____

Title: _____

State License No.: _____

Local representative: For maintenance, repair, or replacement service, contact:

Name: _____

Address: _____

Phone Number: _____

Email: _____

SECTION 01 78 36 PRODUCT WARRANTIES

PART 1 – GENERAL

1.1 General Conditions require items to be guaranteed for a period of one (1) year.

1.2 Guarantees for more than one (1) year required by individual specification sections require a written guarantee by contractor.

PART 2 – PRODUCTS

2.1 FORM OF GUARANTEE: Use form approved by the County.

PART 3 – EXECUTION

3.1 SUBMITTAL REQUIREMENTS

A. Submit prior to date of final completion and prior to final application for payment.

B. Provide two (2) original copes.

C. Provide on letterhead of contractor, sub-contractor or supplier doing the work or supplying the item guaranteed.

END OF SECTION

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store project record documents and samples in contractor's field office separate from documents used for construction.

B. Maintain record documents in order and in a clean, dry, legible condition.

C. Do not use record documents for construction.

1.2 RECORD DOCUMENTS

A. Record Drawings: must include comprehensive information for all installed and found utilities, structures, and other improvements including but not limited to:

1. All utility locations including inverts, rims and crossings.
2. Location of work buried under or outside the building, such as plumbing and electrical lines and conduits. Provide horizontal and vertical dimensions from fixed points.
3. Actual numbering of each electrical circuit.
4. Locations of plumbing and electrical work, and other work that was changed by contractor from that shown on drawings.
5. Locations of items, not necessarily concealed, which vary from locations shown on drawings.

B. The following requirements for record drawings are in addition to those specified elsewhere:

1. Prepare carefully and neatly by a competent drafter, familiar with work involved, and using methods acceptable to owner.
2. Keep up to date during entire progress of the work and made available to owner at any time.
3. Additional drawings shall be provided as required to accurately describe changes.
4. Record changes in size, location, and other features of installation shown on drawings.
5. Record locations of underground work, points of connection, valves, manholes, catch basins, capped stub outs, invert elevations, etc.
6. Record sufficient information such that work concealed may be located with ease and accuracy. This may be accomplished by dimensioning or by stating the relationship to the spaces near which the work was installed. Owner's decision on what constitutes sufficient information shall be final.

C. Shop Drawings: Provide final shop drawings that have been updated to show actual conditions, for work specified in the individual sections.

D. Specifications and Addenda:

1. Record manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.
2. Record changes made by addenda, change order, or field order, and clarifications and interpretations made by letter of instruction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02 41 13 DEMOLITION

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The scope of this section includes but not limited labor, materials, equipment, transportation, and services necessary to complete demolition and clearing and grubbing work shown explicitly on construction drawings, or additional demolition as necessary to complete the project.

1.2 RELATED SECTIONS

A. 01 33 23 Shop Drawings, Product Data and Sample Submittals

B. 31 22 00 Grading

C. 31 23 33 Trenching & Backfill

D. 32 16 00 Concrete

E. 32 18 13 Synthetic Turf

F. 32 84 00 Irrigation

G. 33 40 00 Storm Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

B. Demolition and construction operations shall adhere to the requirements of the California State Water Resources Board General Permit:2009-0009-DWQ OR 2022-0057-DWQ (effective 9/1/23) CONSTRUCTION GENERAL PERMIT.

1.4 PROJECT CONDITIONS

A. The Contractor shall verify existing site conditions before starting work.

B. Contractor shall, prior to commencement of work, submit a letter to Owner stating locations of disposal sites for demolished materials, and certifying that they have obtained permission from the disposal site to accept the material.

C. The Contractor shall coordinate work to maintain utilities to and applicable on-site facilities.

D. The Contractor is responsible for the cost of material export and disposal.

E. Equipment and materials designated as salvage are to be removed by Contractor and turned over to Owner. The Contractor shall coordinate storage and transportation of salvaged materials with the Owner prior to construction.

F. The Contractor is responsible for obtaining any necessary permits for demolition work.

G. The Contractor is responsible for all temporary security fencing, gates, and locks. The Contractor is to coordinate access to site with the Owner prior to construction.

H. The Contractor is responsible for all temporary security access roads or ramps. The Contractor is responsible for removing temporary roads or ramps prior to project completion. The Contractor is responsible for temporary planking or other surface coverings required to protect existing site conditions to remain.

I. The Contractor shall protect existing structures and facilities to remain.

J. The Contractor shall not interfere with use of adjacent buildings or block access to facilities to remain open during grading operations.

K. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas outside the project limits.

L. The Contractor shall prevent movement or settlement of walls and structures to remain, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

M. The Contractor shall cease operations and notify Owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.

N. The Contractor shall provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

O. The Contractor shall provide all necessary shoring and safety means and methods required for stabilizing trenches and excavations to the depths indicated on the plans per OSHA requirements.

P. The Contractor shall provide and install necessary erosion control items such as silt fencing, hay bales, sediment roles, stabilized construction entrances, inlet sediment traps, etc. as required.

Q. The Contractor shall provide dust control in conformance with all environmental regulations.

R. The Contractor shall provide necessary clean and potable water for construction activities, moisture conditioning and compaction. The Contractor shall prevent movement or settlement of walls and structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

S. The Contractor shall provide and maintain, at all times during construction, the means and devises to promptly remove and properly dispose for water from any source entering low points, trenches, or other excavations at no additional cost to the Owner.

1.5 SUBMITTALS

A. The following information shall be submitted prior to proceeding with demolition or as require per this section and Section 01 33 23:

1. Demolition procedures, items to salvage and operational sequence shall be submitted for review and acceptance by Owner.

2. Material export plans, routes and disposal sites are to be submitted as required by Local, County or State requirements.

1.6 CONTRACTOR QUALIFICATIONS

A. Contractor shall have experience with demolition and construction of facilities and of similar size and scope.

B. Contractor shall be licensed and certified as required for all protections, demolition, disposal and remediation identified in the plans or as required to complete the work.

PART 2 – PRODUCTS

2.1 NONE

PART 3 – EXECUTION

3.1 PROTECTION

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

B. The Contractor shall protect existing structures.

1. The Contractor shall not interfere with use of adjacent buildings.

2. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas.

3. The Contractor shall prevent movement or settlement of structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

4. The Contractor shall cease operations and notify Owner immediately if safety of structures appears to be endangered, take precautions to properly support structures and resume operations only after safety is restored.

5. The Contractor shall provide and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

C. Protect trees, shrubs, other vegetative growth and fencing which are not designated for removal.

D. The Contractor shall protect existing services and utilities.

1. The Contractor shall follow procedures outlined by Local, County, State and Federal regulations for utility disconnects and interruptions.

2. The Contractor shall follow procedures outlined by general conditions specification and drawings for utility disconnects and interruptions if provided.

3. The Contractor shall place markers to indicate location of disconnected services and identify service lines and capping locations on project record documents.

4. Removal or capping of existing utilities shall be coordinated with the Owner.

E. The Contractor shall use a utility location service. Any utilities shown on plans are for reference only and dimensional accuracy is not guaranteed.

3.2 CLEARING & GRUBBING

A. Prior to site clearing & grubbing salvage irrigation heads, valves and controllers and provide to the Owner.

B. Remove trees as shown on the drawings.

C. Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth. Remove all evidence of their presence from the surface including sticks and branches greater than 1-inch in diameter or thickness. Remove and dispose of trash piles and rubbish.

D. Remove and dispose of wood or root matter including stumps, trunks, roots, or root systems greater than 1-inch in diameter or thickness to a depth of 12 inches below the ground surface.

E. Remove and dispose of all organic sod, topsoil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped.

F. Stockpile existing topsoil needed for landscaping with proper dust and erosion control measures. Refer to Grading Specifications.

3.3 DEMOLITION

A. Contractor shall be responsible for determining the method or methods used to accomplish the removals and excavations indicated on the plans. Blasting is not an accepted method of demolition.

B. Contractor shall assume responsibilities to protect existing structures and facilities during the work and shall repair or replace structures or facilities damaged by them or their subcontractors at Contractor's expense.

C. Contractor shall demolish in an orderly and careful manner items required to accommodate new work, including work required for connection to existing structures. Protect existing foundations and structural members.

D. When directed to remove existing walks, curbs, gutters, and paving, the Contractor shall saw cut concrete and/or asphaltic pavement to provide a straight line at edges of existing pavement that will remain.

E. Debris handling

F. Repair demolition not identified in the plans and specifications, at no cost to Owner.

G. The burning of materials onsite is not permitted.

H. Owner may identify specific items in addition to plans for the Contractor to salvage and delivered to Owner for future use.

I. Contractor shall provide sufficient watering to abate dust.

3.4 DISPOSAL & HANDLING

A. Remove excess debris as it accumulates, except as otherwise specified. Do not store or permit debris to accumulate on site.

B. Materials requiring removal and demolition are to be removed completely from site, unless approved otherwise.

C. If Contractor encounters unforeseen items during clearing and demolition work, they shall notify the Owner prior to removal or demolition.

D. Excess or unsuitable material, broken asphaltic concrete, broken Portland concrete, pipes, etc., shall be removed and disposed of by Contractor.

E. All demolished and salvaged materials shall be removed and handled in accordance with local and national requirements and guidelines.

F. All materials to be disposed of shall be hauled and delivered an approved disposal site.

3.5 MAINTENANCE

A. Contractor shall maintain a clean and organized site properly storing and securing all tools, equipment, and materials.

B. Contractor shall protect spoils from erosion by wind and rain.

C. All required stormwater pollution prevention and temporary construction BMPs shall be inspected daily maintained and in working order throughout the duration of demolition and construction.

D. Contractor shall inspect and maintain all measures of protection of existing facilities to remain.

E. Fencing and padding, staking, guying, and shoring shall be inspected daily and adjusted as needed to protect trees, buildings, equipment, structures and surfacing to remain.

F. Contractor shall maintain water services to irrigation to landscape areas to remain.

G. Maintain all required safety equipment and facilities in working order and access per Local, State and Federal regulations.

3.6 CLEANING

A. Remove all tools, equipment and appliances used for demolition from the site upon completion of the work.

B. Clean the project site adjacent streets and pavements to a broom-clean, stain-free condition each day during demolition and construction.

END OF SECTION

SECTION 11 68 33 SPORTS EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

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

B. Unless specifically stated otherwise, the Contractor is responsible for the purchase and installation of all sports equipment.

1.2 RELATED SECTIONS

A. 02 41 13 Demolition

B. 31 22 00 Grading

C. 31 23 33 Trenching & Backfill

D. 32 16 00 Concrete

E. 32 18 13 Synthetic Turf

F. 32 84 00 Irrigation

G. 33 40 00 Stormwater Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards unless otherwise documented by the construction documents:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

1.4 PROJECT CONDITIONS

A. All materials shall be installed per manufacturer recommendations. Contact Landscape Architect/Engineer where recommendations conflict with plans or specifications.

B. The contractor shall provide sealed Landscape Architect/Engineered drawings for structures, footings, and other applicable components as required by state law.

1.5 SUBMITTALS

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

1. Manufacturer published product cut sheets indicating the product number, dimensions, materials and finish.
2. Manufacturer warranty

3. Shop drawings for all products, as necessary.
4. Manufacture installation requirements and/or recommendations.

1.6 CONTRACTOR QUALIFICATIONS

A. Contractor shall have experience with installation of specified products and/or trained by the manufacturer prior to installation.

1.7 QUALITY ASSURANCE

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

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

1.8 MAINTENANCE

A. The Contractor shall service and maintain all site furnishings as necessary until the end of the contracted maintenance period and final acceptance by the owner.

1.9 WARRANTY

A. All sports equipment and site furnishings shall come with a manufacturer standard warranty.

PART 2 – PRODUCTS

2.1 SPORTS EQUIPMENT

A. The Contractor is required to provide and install all permanent and loose equipment as specified by this section, per manufacturer recommendations and as shown on drawings.

B. Baseball equipment shall be the following, or approved equal products:

Item **Listed in Plan**	**Manufacturer**	**Model**	**Details/Finish**
20’ Baseball Foul Pole	Sportsfield Specialties	FPW420	20’ Foul pole w/o mesh wing, ground sleeve inserted. Color: (yellow). Sleeves shall be powder coated.
Pitcher’s Rubber	Beacon Athletics	Youth	In-ground dual stanchion system with base plugs. (white) Sleeve Anchor System
Home Plates	On Deck Sports		Sleeve Anchor System (white)
Home Plate w/ Anchor for Synthetic Turf	On Deck Sports	BA2025	Removable - Rawlings Major League Home Plate, with mounted steel stanchion and ground anchor. Color: white.

Impact Bases	Sportsfield Specialties	SHIBL	Set of (3) bases with anchor sleeves
Bat Racks	Sportsfield Specialties	SUABRPL8	(1) qty each dugout. 8 storage tubes. Color: "Dodger Blue" or approved equal.

C. Sports Safety Padding shall be the following, or approved equal product:

Item Listed in Plan	**Manufacturer**	**Model**	**Details/Finish**
Sports Safety Wall Padding (at backstop)	Sportsfield Specialties	PFWP	Sports safety padding. Color: "Dodger Blue".
Outfield Fence Cap	Sportsfield Specialties	BCLTRPSG	BaseZone Chain Link Top Rail Padding, Sewn Grommet, 3" Thick, 9" L. Color: Yellow

D. Windscreen shall be the following, or approved equal products:

Item Listed in Plan	**Manufacturer**	**Model**	**Details/Finish**
Windscreen – 90%	Fence Screen	350 Series	Color: Blue. TBD – Owner Provided.

E. Site Furnishings shall be the following, or approved equal products:

Item Listed in Plan	**Manufacturer**	**Model**	**Details/Finish**
Trash & Recycle Receptacles	Match Existing.	Match Existing.	Owner Provided. Match Existing.
Dugout Benches with Backrest	Sportsfield Specialties	12' Length, Single Tier	(2) qty per dugout. Powder coated "Dodger Blue" or approved equal.
Spectator Bleacher	Belson Outdoors	7'x4'Wx24'L, BD-0424V – 4 Row x 24'	Non-Elevated, Aluminum galvanized, with access/rail, guard rail.
Scorekeeper Stand	National Recreation Systems	36A-ADAPLAT1010	Elevated, Aluminum galvanized, with stairs/handrail.
Cantilever Dugouts	Icon Shelter Systems	Custom	Powder coated steel framing with corrugated metal roofing. Color: Roof – "Dodger Blue", framing – black.

2.2 MANUFACTURER PHONE NUMBERS:

A. Sportsfield Specialties, https://www.sportsfield.com (888) 975-3343

B. Liberty FlagPole, https://www.libertyflagpoles.com (800) 314-2392

C. Sportsedge, https://www.sportsedge.com (800) 334-6057

D. Beacon Athletics, https://beaconathletics.com (800) 747-5985

E. Fence Screen, https://www.fencescreen.com (888) 313-6313

F. Douglas Sports, https://douglas-sports.com (800) 553-8907

G. Rally Master Backboards, https://www.rallymasterbackboards.com (240) 660-2881

H. Belson Outdoors, https://www.belson.com (800) 323-5664

I. BearSaver, https://bearsaver.com (800) 851-3887

J. Sun Trends Inc. https://www.sun-trends.com (800) 915-9862

K. On Deck Sports, http://www.ondecksports.com , (800) 365-6171

L. Icon Shelter Systems, Inc, https://www.iconshelters.com/products , (800) 748-0985

M. National Recreation Systems, https://bleachers.net/, (888) 568-9064

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Ship and transport all materials in a safe manner protecting from damage, corrosion, and wear.

B. Offload all products with appropriate equipment and care preventing any damage.

C. Store in a neat and orderly manner protected from elements to prevent damage, corrosion, or wear. Provide additional covering or conditioning as needed per manufacturer requirements.

3.2 INSTALLATION

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

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

3.3 MAINTENANCE

A. Provide all necessary maintenance per manufacturer recommendations during the maintenance period.

B. Provide all training to owner for maintenance per manufacturer recommendations.

C. Furnish all extra materials, keys, caps, tools, fittings, and components included with the product to the Owner.

3.4 WARRANTY

A. The Contractor shall verify that all documents are proper order, contain full information and are certified or notarized where required.

END OF SECTION

SECTION 26 00 10 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 1.

C. Definitions, guarantees, submittals, clean-up, "As-Builts" and all other applicable requirements of and Division 1 apply to the work of this section.

1.2 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.
2. Refer to other sections of the Specifications for other qualification requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
2. Verify final locations for rough-ins with field measurements and with the requirements of the equipment to be connected.
3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.
4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.
6. Coordinate electrical equipment and materials installation with building components and the Work of other trades.
7. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

C. Terminology:

1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.
2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations:

1. Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. Where conduits pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, conform to ACI 3.8-11 Section 6.3 for conduits and pipes embedded in concrete and Section 2308.9.10 for notches and bored holes in wood; for steel, as detailed on the structural steel Shop Drawings.

F. Protection of Materials:

1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.

G. Cleaning:

1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped, and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

1.3 WARRANTIES

A. Provide one year warranty on all work performed, unless noted otherwise in specific sections.

1.4 DISCREPANCIES

A. Where a conflict in requirements occurs between the specifications and drawings, or in the specifications or on the drawings, and a resolution is not obtained from the Engineer before the bidding date, the more expensive alternate will become the contractual requirement.

B. Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work but they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

C. The Contractor shall check all drawings furnished him immediately upon their receipt and shall promptly notify the Engineer of any discrepancies. Figures marked on drawings shall in general be followed in preference to scale measurements. Large scale drawings shall in general govern small scale drawings. The Contractor shall compare all drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.

1.5 SUBMITTALS

A. Submit shop drawings, manufacturer's data certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and obtain approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable technical society publication references, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval. Contractor shall be responsible for reviewing and certifying submittals as conforming to the drawings and specifications prior to submittal and shall verify conformance of equipment as delivered with final shop submittals, specifications and plans. Contractor shall report to Engineer any deviations prior to initiation of construction. Contractor is responsible for promptly reporting to Architect any news of late equipment delivery which is likely or certain to delay installation.

1. Submit shop drawings and product data grouped and referenced by the technical Section numbers. Products must be highlighted on the product data sheets.
2. Submittal/shop drawing shall consist of cover sheet with specification number and the submitted products within the submittal shall be highlighted. Submittals shall be grouped per the related specification number.
3. Proposed Products List: Include Products as required by the individual section in this Division.
4. The Contractor shall be responsible for all equipment ordered and/or installed prior to receipt of shop drawings returned from the Engineer bearing the electrical engineer's stamp of "reviewed". All corrections or modifications to the equipment as noted on the

shop drawings shall be performed and equipment removed from the job site when required by the Engineer, without additional compensation.

5. Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size with a minimum scale of 1/8-inch per foot, except as specified otherwise. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, duct work, and other items that must be shown to assure a coordinated installation. In wiring diagrams, identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If equipment is disapproved, revise drawings to show acceptable equipment and resubmit.
6. Manufacturer's Data: For each manufactured item, provide current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves if applicable, and catalog cuts.
7. Standard Compliance: When materials or equipment provided by the Contractor must conform to the standards of organizations such as American National Standards Institute (ANSI) or Underwriters' Laboratories (UL), submit proof of such conformance to the Engineer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified. In lieu of the label or listing, submit a certificate from an independent testing organization, which is competent to perform acceptance testing and is approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard.
8. Certified Test Reports: Before delivery of materials and equipment, certified copies of all test reports specified in individual sections shall be submitted for approval.
9. Certificates of Compliance or Conformance: Submit manufacturer's certifications as required on products, materials, finish, and equipment indicated in the technical sections. Certifications shall be documents prepared specifically for this contract. Pre-printed certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; or "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Manufacturer shall use Form 260010-A for equipment installation certification. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance or conformance.

1.6 GUARANTEE

A. Except as may be specified under other sections in the Specifications, guarantee all equipment furnished under the Specifications for a period of one year from date of project acceptance

against defective workmanship and material and improper installation. Upon notification of failure, correct deficiency immediately and without cost to the Owner.

B. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner for their service agency as directed. Furnish manufacturer's warranties for all equipment furnished under this project.

1.7 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Advise the IOR before starting the Work of this Division.

B. Exposed conduits shall be painted to match the surfaces adjacent to installation.

C. Salvaged materials removed from buildings shall be removed from the Project site as required by the OAR.

D. Where existing structural walls are cored for new conduit runs, separation between cored holes shall be 3 inches edge to edge from new or existing holes, unless otherwise required by the Architect. All coring to be laid out and reviewed by Architect prior to drilling. Contractor to verify location of structural steel, rebar, stress cabling or similar prior to lay out.

E. Electrical equipment shall be braced and anchored per 2013 CBC CH 16A, Section 1616A.1.23 through 1616A.1.26 seismic requirements, or as otherwise indicated on the Drawings.

3.2 WORK RESPONSIBILITIES

A. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, equipment, etc., and are to be followed as closely as possible. Proper judgement must be exercised in executing the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference with structural conditions. The contractor is responsible for the correct placing of his work and the proper location and connection of his work in relation to the work of other trades. Advise appropriate trade as to locations of access panels.

B. In the event changes in the indicated locations or arrangements are necessary, due to developed conditions in the building construction or rearrangement of furnishings or equipment, such changes shall be made without extra cost, providing the change is ordered before the conduit runs, etc. and work directly connected to same is installed and no extra materials are required.

C. Where equipment is furnished by others, verify dimensions and the correct locations of this equipment before proceeding with the roughing-in of connections.

D. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with any work, carefully check and verify all dimensions, sizes, etc. with the shop drawings to see that the equipment will fit into the spaces provided without violation of applicable codes.

E. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Engineer immediately and cease work on all parts of the contract which are affected until approval for any required modifications to the construction has been obtained from the Engineer.

F. Be responsible for any cooperative work which must be altered due to lack of proper supervision or failure to make proper provisions in time. Such changes shall be under direction of the Engineer and shall be made to his satisfaction.

G. Perform all work with competent and skilled personnel.

H. All work, including aesthetic as well as electrical and mechanical aspects of the work, shall be of the highest quality consistent with the best practices of the trade.

I. Replace or repair, without additional compensation, and any work which, in the opinion of the Engineer, does not comply with these requirements.

3.3 OPERATION AND MAINTENANCE MANUAL

A. Provide operation and maintenance manual of all equipment and lighting fixtures furnished on this project

3.4 POSTED OPERATING INSTRUCTIONS:

A. Furnish approved operating instructions for systems and equipment indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or

equipment. Provide weather-resistant materials or weatherproof enclosures for operating instructions exposed to the weather. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.5 MANUFACTURER'S RECOMMENDATIONS:

A. Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material.

3.6 DELIVERY STORAGE AND HANDLING

A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.7 CUTTING AND PATCHING

A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.

B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

C. Repair or restore other work, or surfaces damaged as a result of the work performed under this contract.

3.8 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the Owner Authorized Representative.

3.9 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 26 00 60 - ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 311000 - Site Clearing.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to Engineer before disturbing existing installation.

C. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in fixtures and devices scheduled for removal.

B. Coordinate electrical outages with the owner. Contractor shall notify the Owner of any power outages a minimum of two weeks in advance, and shall only occur if approved by the Owner in writing.

C. Provide temporary wiring and connections to maintain existing systems in-service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK.

A. Demolish and extend existing electrical work under provisions of this Section and as indicated on the drawings.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply unless otherwise indicated.

D. Remove exposed abandoned conduit. Cut conduit flush with grade, walls and floors, and patch surfaces.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Extend existing installations using materials and methods as specified in Section 260533, "Raceways and Boxes for Electrical Systems."

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260533 " Raceways and Boxes for Electrical Systems"
2. Section 260553 "Identification for Electrical Systems."

1.3 DEFINITIONS

A. ASTM: American Society of Testing Materials.

B. ICEA: Insulated Cable Engineers Association.

C. IEEE: Institute of Electrical & Electronics Engineers.

D. NEMA: National Electrical Manufacturers Association.

E. NETA ATS: InterNational Electrical Testing Association - Acceptance Testing Specification.

F. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of product, indicating conductor/cable construction, insulation material, thickness of insulation, jacket, cable stranding, and voltage rating of each type of conductor/cable specified, splices and terminations. Indicate date and place of manufacture for each conductor/cable, cable, splice and termination.

B. Manufacturer's ISO certification.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Independent Testing Agency.

B. Field quality-control reports. Perform field testing of cables per para 3.8. Submit six (6) copies of field test reports to owner's representative within two (2) weeks of completion of test.

1.6 QUALITY ASSURANCE

A. General Requirements: The low voltage power conductors and cable shall be copper, minimum 600V rated unless otherwise indicated. Aluminum conductors and cables shall not be accepted unless otherwise indicated.

B. Materials and installation shall meet or exceed requirements in the following referenced standards and shall be listed and labelled by UL.

1. ICEA S-93-639/ NEMA WC 74.
2. AEIC CS8.
3. UL 1072.
4. IEEE.
5. ASTM.
6. NEMA.

C. Conductors and cables shall be of the same manufacturer, and shipped to the job site in original unbroken reels.

D. Conductors and cables shall be manufactured with in twelve (12) months of installation. Date of manufacture shall be clearly marked on conductors or conductor reels.

E. Manufacturer shall have minimum ten (10) years' experience in the manufacturer of conductors and cables similar to those specified on this project.

F. Manufacturer shall have ISO 9001 and ISO 9002 certification.

G. All conductors and cables shall be new and supplied by a local distributor.

H. American made conductors and cables have been acceptable. If non-domestic product is submitted, notice is hereby given that extensive testing shall be required to insure quality and conformance to the Specifications. All of the testing procedures and results shall be satisfactory to the Owner's representative. The Contractor shall bear all costs for testing and shall be responsible for all costs associated with travel, lodging, etc. for the Owner's Representative to witness the test at the manufacturer's testing facility. The Contractor shall reimburse the Owner at $1,200 per man day or part thereof for the time required to witness the testing.

I. Testing: Provide the services of an independent qualified testing laboratory to perform the specified field tests. Notify the Owner's Representative fourteen (14) days in advance of performance of work requiring testing.

J. Conductors, cables, splices and terminations shall be manufactured within twelve (12) months of installation. Each item shall have a permanent marking on the product or the original manufacturers' package indicating the date of manufacture unless otherwise noted.

K. Testing Agency Qualifications:

1. Testing agency shall be an independent company; shall have been a member of NETA for a minimum of last ten (10) years and has permanent in-house testing engineers and technicians involved with testing of low voltage electrical power conductors and cables similar to those specified on this project.
2. Testing company shall be located with 50 miles radius of the project.
3. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
4. Field Testing technician and supervisor shall have minimum ten (10) years' experience in field testing of low voltage power conductors and cables of the type and rating similar to the conductors and cables to be tested on this project.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Basis-of-Design Product:

1. General Cable Technologies Corporation.
2. Southwire Incorporated
3. Alpha Wire.
4. Belden Inc.
5. Encore Wire Corporation.

B. Conductor Material: Electrical grade, soft drawn annealed copper, 98 percent conductivity, and fabricated in accordance with ASTM and IPCEA standards. Minimum size is number 12 for branch circuits, number 14 stranded for control wiring. Aluminum conductors are not permitted. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

D. Provide separate neutral with each branch circuit serving outlets. When dedicated neutrals are provided, use color spiral to match associated phase.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Ideal Industries, Inc.
2. Ilsco; a branch of Bardes Corporation.
3. NSi Industries LLC.
4. O-Z/Gedney; a brand of the EGS Electrical Group.
5. 3M; Electrical Markets Division.

6. Tyco Electronics.

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

C. Copper conductors shall be terminated in copper or bronze mechanical connectors or lugs or tool applied compression connections made of copper for all connections except those on wiring devices.

D. Splices in wires No. 10 and smaller shall be made with twist-on splicing connector in accordance with UL486-C. Connections in wires No. 8 and larger shall be made with compression type connectors in accordance with UL486-A and wrapped with insulated tape in accordance with UL501. Insulating tape shall be applied in a minimum of two layers of half wrap or built to match the overall insulation of the wire.

E. Splices in underground pull boxes shall be made submersible type and made using “3M” Scotch-cast epoxy kits.

F. Pressure type connectors are not permitted.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: UL Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. All conductors and cables shall be installed in a raceway.

B. Before installing conductors and cables in existing conduits, verify the continuity of each conduit; each surface conduit is properly supported per code and clear of any debris.

C. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

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

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

F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.3 CONNECTIONS

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

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

3.4 IDENTIFICATION

A. Each conductor shall be factory color coded by conductor manufacturer. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage an independent qualified testing agency to perform tests and inspections.

B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

B. Section includes grounding systems and equipment, plus the following special applications:

1. Overhead-line grounding.
2. Underground distribution grounding.
3. Ground bonding common with lightning protection system.

1.3 DEFINITIONS:

A. NETA ATS: InterNational Electrical Testing Association - Acceptance Testing Specification.

B. NETA MTS: InterNational Electrical Testing Association - Maintenance Testing Specification.

C. NFPA : National Fire Protection Association.

1.4 ACTION SUBMITTALS

A. Product Data: Submit manufacturer’s technical catalog cuts for each type of product indicated.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Testing agency shall be an independent company; shall have been a member of NETA for a minimum of last ten (10) years and has permanent in-house testing engineers and technicians involved with testing of grounding systems similar to those specified on this project.
2. Testing company shall be located with 50 miles radius of the project.
3. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

4. Field Testing technician and supervisor shall have minimum ten (10) years' experience in field testing of rounding systems of the type and rating similar to the systems to be tested on this project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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

PART 2 - PRODUCTS

2.1 GROUNDING ELECTRODES, CONDUCTORS, CONNECTOR, BUS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal:

1. Grounding Connectors, Bars and Rods:

a. Erico Inc.; Electrical Product Group
b. Framatome Connectors/Burndy Electrical.
c. Ideal Industries, Inc.
d. O-Z/Gedney Co.; a business of the EGS Electrical Group.
e. Thomas & Betts, Electrical.

2. Grounding Conductors and cables:

a. Southwire
b. American Insulated Wire
c. Okonite

2.2 CONDUCTORS

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

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Sizes and types of conductors in four subparagraphs below are typical examples. 28-kcmil bonding cable in first subparagraph is slightly larger than No. 6 AWG.
5. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
6. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
7. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
8. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTORS

A. Listed and labeled by UL for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

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

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

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

PART 3 - EXECUTION

3.1 APPLICATIONS

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

B. Conductor Terminations and Connections:

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

3.2 GROUNDING OVERHEAD LINES

A. Comply with IEEE C2 grounding requirements.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits in the same conduit containing phase and neutral conductors. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70. :

1. Feeders and branch circuits.
2. Lighting circuits.
3. Single-phase motor and appliance branch circuits.

C. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding conductor with branch-circuit conductors.

3.5 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

3.6 LABELING

A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage an independent qualified testing agency to perform tests and inspections. Refer to section

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

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

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. EMT: Electrical metal tubing

C. ENT: Electrical non-metallic tubing

D. GRC: Galvanized rigid steel conduit.

E. HDPE: High density polyethylene pipe

F. IMC: Intermediate metal conduit.

G. LFMC: Liquidtite flexible metal conduit

H. LFNC: Liquitite flexible non-metallic conduit.

I. RNC: Rigid non-metallic conduit

J. RTRC: Reinforced thermosetting resin conduit

1.4 QUALITY ASSURANCE:

A. Each conduit shall bear manufacturer’s trademark and UL label.

B. B. Each type of conduit and fittings shall be of a single manufacturer. Multiple manufacturers of the same material are not acceptable.

C. C. Comply with California Electric Code (CEC)

1.5 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. O-Z/Gedney; a brand of EGS Electrical Group.
3. Thomas & Betts Corporation.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be UL listed and labeled as defined in NFPA 70, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel or die cast.
b. Type: compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CANTEX Inc.
2. RACO; a Hubbell company.
3. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660.

F. Rigid HDPE: Comply with UL 651A.

G. Continuous HDPE: Comply with UL 651B.

H. Coilable HDPE: Preassembled with conductors or cables and complying with ASTM D 3485.

I. RTRC: Comply with UL 1684A and NEMA TC 14.

J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

K. Fittings for LFNC: Comply with UL 514B.

L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Cooper Technologies Company; Cooper Crouse-Hinds.
2. Hubbell Incorporated; Killark Division.
3. RACO; a Hubbell Company.
4. Thomas & Betts Corporation.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

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

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

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

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are prohibited.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jensen Precast Inc.
b. CDR Systems Corporation; Hubbell Power Systems.
c. Oldcastle Precast, Inc.; Christy Concrete Products.
d. Synertech Moulded Products; a division of Oldcastle Precast, Inc.

2. Standard: Comply with SCTE 77.

3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.". Boxes containing conductors and cables over 600V, the cover shall include permanently engraved name of the utility company (e.g UCSD), type of utility (e.g. ELECTRIC), DANGER-HIGH VOLTAGE-KEEP OUT" in minimum 1/2" inch size, block letters.

7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.

2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

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

1. Exposed Conduit: IMC.
2. Concealed Conduit, Aboveground: GRC EMT. Use EPC-40PVC inside concrete walls and columns only.
3. Underground Conduit: Type EPC-40-PVC, direct buried.

4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Concealed in concrete walls and columns: RNC Type EPC-40-PVC.
4. Damp or Wet Locations: IMC.

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

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, fittings. Comply with NEMA FB 2.10.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

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

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to IMC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 250lbs (113 kgs) tensile strength. Leave at least 12 inches of slack at each end of pull wire. Provide acrylic identification tags (2”X4”) at each end indicating the source. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

U. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Locate boxes so that cover or plate will not span different building finishes.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Z. Set metal floor boxes level and flush with finished floor surface.

AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances. Top of conduits inside the handhole/box shall be minimum 4 inches above the bottom of the handhole/box.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel (minimum 6 inch high), graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

B. PROTECTION

C. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's catalog cut sheets for each electrical identification product indicated.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969. Adhesive type labels shall be used for only applications indicated in this section.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Feeders and Circuits at 600 V or Less:

1. Black letters on an orange field
2. Legend: Indicate voltage and system or service type.

C. Colors for Raceways Carrying Feeders and Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING."

D. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.

H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

I. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
3. Use write-on tags for temporary service only if specified on the documents.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Colors for Cables Carrying Circuits at 600 V and Less:

1. Black letters on an orange field
2. Legend: Indicate voltage and system or service type.

C. Colors for Cables Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER HIGH VOLTAGE WIRING."

D. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

E. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

F. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

G. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

H. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR AND CABLES IDENTIFICATION MATERIALS

A. Color coding of conductors: Provide color coded insulation by conductor manufacturer. Coordinate with Division 26, Section "Low Voltage Electrical Power Conductors and Cables". If permitted by owner’s representative, install color coding conductor tape for temporary installations only.

B. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

F. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

G. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

H. Provide tags on each pull rope of spare conduits showing starting point and end point of spare conduits.

2.5 FLOOR MARKING TAPE

A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: CAUTION-BURIED ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: CAUTION-BURIED TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch except designation which will be in 1/2 inch letters .

B. Adhesive labels and nameplates are not acceptable.

2.9 WIRING DEVICES LABELS

A. Identify wiring devices with heavy duty clear vinyl polyester tape “Weber” unless otherwise indicated. Provide labels on the device cover plate made of non-metallic materials. Color of letters shall be black for device connected to normal power, color of letters shall be red for device connected to emergency power. Labels shall be printed, flexible, self-adhesive type. In addition write the circuit no. (e.g. 1PA-2) on the inside of the device cover plate of non-metallic material using a permanent marker.

B. For stainless steel cover plates, engrave information on the device cover plate.

C. Device (receptacles, switches etc.) label shall include panel designation and circuit number.

2.10 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

J. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch-wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.

3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at 10-foot maximum intervals.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label bands. Install labels at 10-foot maximum intervals.

D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power
2. Power
3. UPS

4. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service, feeders and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral : White
5) Ground Green

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral : Grey
5) Ground : Green

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

E. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive vinyl labels with the conductor designation.

H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

J. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
3. During backfilling of trenches install continuous underground-line warning tape directly above the line at 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

N. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems Verify requirements with Owner's representative.

1. Labeling Instructions:

   a. Indoor Equipment: Engraved, laminated acrylic or melamine label.
   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
   c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

   a. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION

SECTION 31 22 00.1 GRADING

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The scope of this section includes but is not limited to earthwork, grading operations, labor, materials, equipment, and services necessary to install subgrade, finished fill tolerances and associated work.

1.2 RELATED SECTIONS

A. 01 33 23 Shop Drawings, Product Data and Sample Submittals

B. 02 41 13 Demolition

C. 31 23 33 Trenching & Backfill

D. 32 16 00 Concrete

E. 32 18 13 Synthetic Turf

F. 32 84 00 Irrigation

G. 33 46 00 33 40 00 Storm Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards unless otherwise documented by the construction documents.

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition (Green Book)
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

B. Grading materials and operations shall adhere to the requirements and recommendations of the Geotechnical Reports completed by Geocon West, Inc., including all supplements, addendums, and clarifications, unless otherwise specified herein.

C. Construction operations and earthwork shall adhere to the requirements of the California State Water Resources Board General Permit:2009-0009-DWQ OR 2022-0057-DWQ (effective 9/1/23) CONSTRUCTION GENERAL PERMIT.

1.4 DEFINITIONS

A. “Subgrade” as used herein, refers to:

1. The native material underneath a constructed surface such as sidewalk, roadway, or field.

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

1. Top of synthetic turf infill.

2. Top of landscape grade.

C. “Finished Surface" as used herein, refers to:

1. Top of curb or finished grade of hardscape (asphalt, concrete, pavers etc.), of which another surface will not be placed.

1.5 PROJECT CONDITIONS

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

B. The Geotechnical Engineer or Geotechnical Field Engineer shall provide observation and testing during the grading operations.

C. The Contractor shall be responsible to obtain Notice to Intent (NOI) and Notice of Termination (NOT) and maintain all observations, reporting and other requirements associated with these permits. This includes but is not limited to installing and maintaining necessary erosion control items such as silt fencing, hay bales, sediment roles, stabilized construction entrances, inlet sediment traps, etc.

D. The Contractor shall provide dust control in conformance with all environmental regulations.

E. The Contractor shall adhere to all the requirements of the project SWPPP (Stormwater Pollution Prevention Plan and erosion control plan. The Contractor is responsible for all necessary QSP (Qualified Stormwater Practitioner) services as required by the project SWPPP documents.

F. Contractor shall, prior to commencement of work, submit a letter to Owner stating locations of disposal sites for excess materials, and certifying that they have obtained property Owner's permission for disposal of surplus materials.

G. The Contractor shall protect existing structures and facilities which are to remain.

H. The Contractor shall not interfere with use of adjacent buildings or block access to facilities to remain open during grading operations.

I. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas outside the project limits.

J. The Contractor shall prevent movement or settlement of walls and structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

K. The Contractor shall cease operations and notify Owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.

L. The Contractor shall provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

M. The Contractor shall provide all necessary shoring and safety means and methods required for stabilizing trenches and excavations to the depths indicated on the plans per OSHA requirements.

N. The Contractor shall provide necessary clean and potable water for construction activities, moisture conditioning and compaction.

O. The Contractor shall provide and maintain, at all times, during construction, the means and devises to promptly remove and properly dispose for water from any source entering low points, trenches, or other excavations at no additional cost to the Owner.

P. The Contractor shall provide and pay for costs of a licensed surveyor for conformance surveys.

1.6 SUBMITTALS

A. The following information shall be submitted prior to installation of specified work or as required per this section and Section 01 33 23 Shop Drawings, Product Data and Sample Submittals.

1. Material disposal site information and approval letter
2. Soil staging and haul plans as required by Owner
3. Digital PDF conformance surveys with grid elevations at scale and orientation of the design plan drawings.
4. Particle size distribution for materials/proctor
5. As-built and volume certification certificates

1.7 CONTRACTOR QUALIFICATIONS

A. The Contractor shall be experienced in the grading scope and tolerances of synthetic turf fields as required by this project.

B. The Contractor shall be trained and use specialized laser grading equipment, as required, for this project.

1.8 QUALITY ASSURANCE

A. An approved independent testing laboratory shall test soils and compaction for conformance with the plans and specifications. Tests shall be submitted to Engineer for review. Contractor shall schedule soils testing a minimum of 72 hours before testing date or as required by the independent testing laboratory.

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

C. Subgrade Conformance Surveys:

1. Conformance surveys shall be performed to verify that constructed elevations meet the specified tolerances of the design grades, proposed slopes, and grade breaks. The Contractor is responsible to make all required corrections to meet the specified design grade tolerances at no cost to the Owner.
2. Additional conformance surveys are required as part of the synthetic turf aggregate base installation; these requirements can be found in the associated specification sections.

3. See specification 32 11 23.23 for additional conformance surveys required.
4. Synthetic Turf Subgrade:
    a. After preparation and compaction of the synthetic turf subgrade, the Contractor shall prepare a survey of subgrade with a 25’ x 25’ maximum spaced grid starting within 1’ of the field perimeter including all grade breaks, and edges of the field.
    b. The Contractor shall submit the subgrade conformance survey to the Engineer for review prior to installation of base and/or pavement. Finished subgrades shall not vary more than 0.04’ from design grades.

D. The Contractor is responsible to make all required corrections to meet the specified design grade tolerances at no cost to the Owner.

E. The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including but not limited to inspection and testing to assure compliance with the requirement of this section and in accordance with Special Conditions Section.

PART 2 – MATERIALS

2.1 EXCESS OR UNSUITABLE MATERIAL

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

2.2 FILL MATERIALS

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

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

C. Fill shall exhibit uniform densities and shall be consistent and not differ in gradation or material makeup from adjacent or underlying fill material.

2.3 TOPSOIL

A. Topsoil material collected on site shall be excavated from the top 6-inches of existing planting area and grass lawns. Prior to excavation of and processing, the top inch of sod lawn shall be stripped and disposed. Material shall be free of roots, rocks larger than 2-inches, subsoil, debris, weeds, mats of grass and other deleterious material.

PART 3 – EXECUTION

3.1 GEOTECHNICAL TESTING AND INSPECTION

A. All grading operations including earthwork, subgrade preparation, and placing fill is to be tested and inspected by a Geotechnical Engineer prior to proceeding with work.

B. The Contractor shall make accommodations and provide scheduling for testing and inspection as required by the Geotechnical Engineer.

3.2 GRADE STAKES AND LINES

A. Grading, including subgrade and finished grade of synthetic turf and paved areas, shall be controlled by such intermediate grade stakes and lines as may be necessary to obtain slopes and levels required by finished grade elevations shown on plans. Compacted subgrades and finished grade surfaces shall parallel and conform to control planes established by grade stakes and lines.

3.3 DISPOSAL OF EXCESS OR UNSUITABLE MATERIAL

A. Excess or unsuitable material, rubble, large rocks, broken asphaltic concrete, broken concrete, pipes, etc., shall be removed and disposed of at an approved disposal site by the Contractor at no additional cost to the Owner.

3.4 TOPSOIL EXCAVATION & PLACEMENT

A. Remove all trees, shrubs and plants.

B. Strip the top inch of sod from grass areas scheduled for paving or synthetic surfaces. Dispose of stripped sod in approved disposal site.

C. Excavate the top 6-inches of topsoil and stockpile in windrows of a height not to exceed 72 inches. Protect stockpiles from wind and erosion by covering as necessary to prevent blowing dust.

D. Where planting areas are to receive topsoil, supply a minimum of 6-inches of clean and acceptable topsoil.

E. Topsoil shall not be placed until all subgrade preparation and utility installation operations are complete.

F. Place and compact topsoil to 85% relative density.

G. Once topsoil has been placed and compacted, no equipment other than those required for installation of irrigation and planting and shall be permitted to cross over or be stored on the topsoil bed.

3.5 EXCAVATION

A. Excavate areas shown on plans or as specified herein may include cutting for paving area and construction subgrades, pipeline trenches, and turf areas.

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

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

3.6 FILL OPERATION

A. Geotechnical Engineer to observe and approve all fill material.

B. Unsuitable subgrade materials shall be removed and replaced with non-expansive fill under the Geotechnical Engineers observation.

C. Fill shall be placed in accordance with Geotechnical Report requirements.

D. Fill slopes shall not exceed 1 foot of rise per 2 feet of run.

3.7 SUBGRADE PREPARATION

A. The subgrade preparation shall be performed under observation of the Geotechnical Engineer.

B. When subgrade elevations are not shown on plan drawings they are to be calculated by the Contractor from finished grade and material thickness identified in construction details and specifications.

C. Prepare subgrade after stripping the existing natural grass, organics and existing soil to an elevation consistent with the proposed subgrade. Subgrade preparation may include but is not limited to ripping, scarifying, moisture management and compaction.

D. After the subgrade is exposed, it shall be proof rolled with a fully loaded single axle dump truck or water truck under the observation of the Geotechnical Engineer. Any areas exhibiting pumping or yielding shall be remediated by over excavating to a firm, native soil to a depth determined by the Geotechnical Engineer and backfilled with engineered fill or onsite material specifically approved the Geotechnical Engineer.

E. Preparation of subgrade shall conform to the Geotechnical Report. At a minimum all subgrade shall be scarified to a depth of 6 inches, moisture conditioned to optimum (+/- 2 percent) and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698. Moisture content may be adjusted based on field conditions if approved by the Geotechnical Engineer.

F. The Contractor shall prepare the subgrade and construct all subgrade fill in a manner resulting in uniform water contents and densities after compaction.

G. Surfaces shall be finished to uniform grades and slopes per drawings, and in such a manner as to drain properly and be free of depressions, which may cause areas of standing water.

H. The presence of unsuitable soil may require supplemental preparations that may include removal of the upper 12” of subgrade and replacement with engineered fill, with recommendations by the Geotechnical Engineer.

I. During any excavation or earthmoving operations, any materials that are saturated in their native condition and cannot be brought to firm and unyielding conditions during compaction, as determined by the Engineer, shall be considered as unsatisfactory material. Soils that are deemed unsatisfactory material for reuse shall be classified as surplus material. Surplus material shall be legally disposed of in accordance with local, state, and federal permits and licenses required for disposal of non-hazardous waste.

3.8 FINISHED GRADE

A. The tolerances for each grading operation are outlined below, this includes finished surfaces and finished grades after all materials have been placed and/or installed.

B. If a mass grade plan is provided the tolerance shall be +/- 0.1'. After completion of the mass grade operations the Contractor shall be required to provide finished grading operations which meet the tolerances as specified in this section.

C. Finished subgrades and finished landscape and planter grades shall not vary more than 1/2" from design grades.

D. Regardless of tolerances, the Contractor is responsible to provide smooth transitions where necessary to provide smooth even traffic ways and routes of travel unless otherwise specified in the construction documents.

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

F. Unless otherwise indicated, provide uniform slopes with smooth, even transitions between points for which finished grades are indicated. As well as, between finished grades and existing grades at the limit of grading.

G. Round-off all tops of slopes and feather all toes of slopes.

H. At completion of grading operations, the site shall be left in a clean and finished condition conforming to the drawings.

I. All playing field crowns shall be radiused to provide a smooth transition along, and over the crown. Ridges and/or abrupt transitions are not permitted.

3.9 MAINTENANCE

A. Maintain all slopes, gradients and landforms established during grading operations for the duration of construction.

B. Inspect and adjust as necessary all BMPs and erosion control measures daily to prevent soil raveling, blowing dust and erosion.

END OF SECTION

SECTION 31 23 33 TRENCHING & BACKFILL

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and tools necessary for the complete installation of all excavations, trenching, backfill and associated compaction.

B. Excavation for appurtenant structures, such as manholes, inlets, transition structures, junctions, structures, vaults, valve boxes, catch basins, etc., shall be deemed to be in this category.

C. Trenching and backfilling and related work as shown on the project drawings and specified herein shall include but not be limited to the following:

1. Stormwater Drain Lines
2. Sanitary Sewer Systems
3. Potable/Domestic Water Lines
4. Fire Lines
5. Irrigation Lines
6. Electrical and Communication Lines
7. Utility Lines

1.2 RELATED SECTIONS

A. 02 41 13 Demolition
B. 31 22 00 Grading
C. 32 11 23.23 Synthetic Turf Permeable Base
D. 32 12 00 Asphalt Paving
E. 32 16 00 Concrete
F. 32 18 13 Synthetic Turf
G. 32 18 23 Synthetic Surfacing
H. 32 84 00 Irrigation
I. 33 40 00 Storm Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition

5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

B. Operations shall follow the requirements of the Geotechnical Reports completed by Geocon West, Inc., unless otherwise modified herein.

1.4 PROJECT CONDITIONS

A. The Contractor shall contact Underground Services Alert (U.S.A.) 800-642-2444 or 811 and mark the limits of construction per their requirements prior to construction.

B. The Contractor shall pothole existing utilities prior to trenching or excavation to field verify locations, determine depth of existing utilities, and identify potential conflicts or obstructions.

C. The Contractor shall be responsible for all trench safety complying with Standard Specifications, OSHA and all agencies having jurisdiction.

D. The Contractor is responsible for shipping to the site and handling and storing materials in a manner that does not segregate, contaminate, or alter the material from its original manufactured state.

E. The Contractor is responsible for maintaining waterproofing, drainage, irrigation, utilities or any other system below the field during trenching and earthwork activities.

F. The Contractor shall provide necessary clean and potable water for construction activities, moisture conditioning and compaction. The Contractor must prevent movement or settlement of walls and structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

G. The Contractor must cease operations and notify Owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.

H. The Contractor must provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

I. No trenching or excavation shall occur when excessively wet conditions exist as determined by the Engineer.

J. The Contractor to provide dewatering and surface water control systems to permit work to be completed.

K. No jetting shall be allowed.

L. The Contractor shall provide dust control in conformance with all environmental regulations.

M. The Contractor shall relocate, reconstruct, or repair surface and subsurface to condition to equal or better than the preconstruction conditions. Repairs shall include all surface or subsurface disturbances which are in the line of construction, or which may be damaged or disturbed by trenching activities.

N. All materials shall be installed per Geotechnical recommendations. Contact Engineer when recommendations conflict with plans or specifications.

1.5 SUBMITTALS

A. The Contractor shall submit in a PDF digital file material data or product cut sheets within 15 days from notice to proceed for the following:

1. Pipe Bedding & Select Backfill

2. Crushed Drain Stone Backfill

B. The Contractor shall submit proposed quarry or supplier, source location and certification that the supplier can deliver the total quantity of material needed to complete the project within the constraints of the project schedule.

C. A mockup of the crushed drain stone backfill shall be performed prior to trenching. The mockup shall consist of a minimum 4’ x 4’ x 4’ trench, Contractor should plate compact all lifts, including the final lift, so that the trench backfill is stable and the surface is firm and unyielding.

D. Test results for Crushed Drain Stone.

1.6 QUALITY ASSURANCE

A. Work shall be observed by the Engineer and all testing shall be performed by the Geotechnical Engineer.

B. Testing methods for compaction may be adjusted to comply with the various types of materials specified, any adjustments require the Engineer’s approval.

1. ASTM D-698 Compaction Testing

C. An approved independent testing laboratory shall test soils and compaction for conformance with the plans and specifications. Tests shall be submitted to Engineer for approval.

D. Testing Protocol for Crushed Drain Stone

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

a. ASTM C136 or CT 202 – Sieve Analysis of Fine and Coarse Stones

b. ASTM D854 – Specific Gravity of Soils

c. ASTM D2216 – Laboratory Determination of Water (Moisture) Content of Soil and Rock

d. ASTM D2434 – Saturated Hydraulic Conductivity (KSAT) or Constant Head Permeability

e. CT 301 – Resistance (R-Value)

f. CT 229 – Durability Index

g. ASTM D2419 or CT 217 – Sand Equivalent

h. ASTM D6928-17 – Test Method for Resistance of Course Aggregate to Degradation by Abrasion

2. The Contractor must submit all test results for review and acceptance a minimum of 45 days prior to shipping and installation. Neither the Owner nor the Engineer are responsible for delays or costs incurred by shipping or installation of untested or rejected materials.
3. All crushed drain stone must be sourced from a single supplier and a single location. Use of multiple crushed drain stone sources is not accepted.
4. During construction, the crushed drain stone must be tested every 1000 tons by the approved testing laboratory for quality control or QC. After initial testing and source selection only sieve analysis (gradation testing) and infiltration rate testing is required for quality control (QC) testing.
5. If irregularity of materials is noted during installation and the specifications are not satisfied, then then the Contractor shall remove and replace, or amend the materials. All costs shall be bore solely by the Contractor.

1.7 WARRANTY

A. Contractor is responsible for remediating any trench settlement for the duration of the warranty of the project, synthetic turf field, or a minimum of one year, whichever is longer.

PART 2 – PRODUCTS

2.1 NATIVE SOIL BACKFILL

A. Native Soil backfill shall be soil material excavated from the project site and processed as needed to be free of trash, debris, deleterious materials, stones larger than 3”, sticks and organics.

B. Use of native backfill must be approved by the geotechnical Engineer.

2.2 BEDDING & SELECT BACKFILL

A. Bedding / Select Backfill for solid pipes shall be washed concrete sand which provides a stable, consolidated base. See requirements below:

Sieve sizes	Percentage passing
No. 4	90–100
No. 200	0–5

2.3 CRUSHED DRAIN STONE BACKFILL

A. The bedding and backfill for the perimeter storm drain trench shall be a fully fractured, free draining ¾” drain stone with no material passing the 1/4" sieve; an equivalent #57 or #67 stone may be used. The stone shall be fully fractured and have no smooth or rounded edges, faces or parts.

B. The stone shall have no smooth or rounded edges, faces or parts. The material shall be placed in lifts not exceeding 8” in thickness and compacted using a plate compactor until a firm, stable surface underfoot is achieved. (unyielding) If a firm, stable surface is not achieved the Contractor may incorporate a washed, crushed gravel into the upper 2” – 4” of the crushed drain stone to achieve stability. The gravel may range in diameter from 1/4” – 3/8” and the Contractor shall install at their own expense. The gravel must be incorporated into the existing stone and cannot overlay the crushed drain stone.

2.4 CONTROLLED LOW STRENGTH MATERIAL (CLSM / SLURRY)

A. The Contractor shall submit, to the Engineer, a mix design, including the proportions and source of materials, admixtures, and dry cubic yard batch weights. The mix shall contain a minimum of 50 pounds of cement and 250 pounds fly ash per cubic yard, with the remainder of the volume composed of sand, water, and any approved admixtures.

B. CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM D4832. There should be no significant strength gain after 28 days. Test specimens shall be made in accordance with ASTM D4832.

PART 3 – EXECUTION

3.1 MOCKUP

A. A mockup of the permeable trench backfill shall be performed prior to trenching.

B. Contractor shall schedule review of the mockup, with the Engineer, a minimum of 5 business days prior.

3.2 PREPARATION

A. Coordinate all underground locating and perform all potholing and/or video inspection necessary to locate existing utilities prior to trenching or excavations. Identify all previously undocumented utilities on plan sheets and submit to the Owner. Utilities that remain shall be included in as-builts to be provided by the Contractor.

B. Trenching in Existing Asphalt Pavement:

1. Sawcut asphalt paving with clean straight edges at least 6-inches wider than the trench on each side.

2. Where asphalt meets concrete or where curb and gutter are to be replaced, cutback asphalt at least 24-inches and replace.

C. Trenching in Concrete Pavement:

1. Sawcut concrete with clean straight edges a minimum of 2-inches below the surface prior to being broken out.

2. Remove sections no smaller than 30-inches in length. Remove sections to the nearest construction joint, control joint or edge where joints or edges are within 12-inches of the saw cut.

D. Excavated material for backfill shall be laid alongside the trench unless otherwise stockpiled per the site control plan. Excavated material shall be kept trimmed and protected from erosion.

E. Remove all material and legally dispose of all excavated material not required for backfill or that is not of value to the Owner.

F. Prior to bedding and installing utilities, trench bottom shall be firm, stable and dewatered as necessary. The Engineer shall determine the suitability of the trench bottom and determine the amount of sand, gravel, crushed aggregate, or slurry mix to stabilize the trench foundation if required.

G. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work.

H. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades as shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable.

I. Trench bottoms shall be compacted to 95% relative compaction per ASTM D1557.

J. Do not over excavate without written authorization of Engineer or approval from Geotechnical Report.

K. If rock is encountered in the trench bottom, rock shall be over excavated no less than 6 inches below the exterior bottom of the pipe. The over excavation shall be backfilled with ABC material compacted to a uniform density of not less than 95%.

L. Water jetting is prohibited in all trench work.

3.3 DELIVERY, STORAGE AND HANDLING

A. All material shall be shipped using clean trucks. Loads will be rejected if there is any foreign material.

B. All materials shall be moisture conditioned to eliminate settlement during trucking or shipping to site.

3.4 SAND BEDDING

A. Prior to placing bedding material, the Owner or Engineer must inspect the trench and confirm the utilities/pipe conform to the plans and specifications.

B. Install bedding material in 4-inch maximum lifts to depths and dimensions per plans. Bedding material shall completely encase utilities/pipe and fill all voids around pipe and in the trench.

C. Compact all bedding to 95% ASTM D1557.

D. Where trenches with sand bedding enter building pads, the trench shall be backfilled with an impermeable plug of compacted bentonite or CLSM. Bentonite or CLSM plug to extend a minimum of 2-feet from building foundation within specified trench.

3.5 SLURRY

A. CLSM may be placed by any reasonable means from a mixing unit into the space to be filled.

B. Agitation is required during transportation and waiting time.

C. Placement shall be performed in such a manner that structures or pipes are not displaced from their desired final position and intrusion of CLSM into undesirable areas is avoided.

D. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the Engineer. Each placement of CLSM shall be as continuous an operation as possible.

E. If CLSM is placed in more than one layer, the base layer shall be free of surface water and loose of foreign material prior to placement of the next layer.

F. If CLSM is placed over several days for the same trench, 24 hours of cure time should be given before a new layer is placed on the previously cured CLSM layer.

3.6 TRENCH BACKFILL

A. General

1. Construct backfill in two operations (initial and final).
2. Do not backfill where the foundation material in trench is already saturated, except as acceptable to the Engineer. Provide a minimum cover as may be specified.
3. If settling occurs in trenches and pits, excavate to a depth necessary to rectify the problem; then backfill and compact as specified herein and restore surface to required elevation.
4. Where trenches cut across paved surfaces and synthetic turf, place backfill in eight-inch (8") maximum loose lifts. Compact backfill to 95 percent of ASTM D-698 maximum density.
5. Compaction of the trench shall be accomplished in such a way that rolling and compacting the completed backfill along with the adjoining subgrade material shall provide the specified density necessary to enable paving of the area immediately after backfilling has been completed.

B. Initial Backfill:

1. Prior to trench backfill, Engineer or inspector shall be notified so that they may review the condition of the trench and installation of pipe.
2. Free-draining sand backfill material shall be used as initial backfill for utilities except perforated storm pipe and irrigation piping, unless otherwise noted. After the pipe has been properly installed and reviewed by Engineer, select backfill material shall be placed on both sides of the pipe and compacted to depth shown on Drawings. Initial backfill material shall be mechanically compacted in layers not exceeding eight inches (8") in un-compacted depth and shall be brought up uniformly on both sides of pipe to avoid bending or distortional stress. Relative compaction of initial backfill material shall be at least 95% relative compaction.

C. Final Backfill:

1. If approved by the Engineer, native backfill material shall be used for final backfill, unless otherwise noted herein.
2. Final backfill compaction shall be accomplished by mechanical means with backfill material placed in layers not exceeding eight inches (8") in loose depth. Each layer shall be thoroughly compacted before the succeeding layers are placed.
3. Final backfill shall be compacted to a relative compaction of 95%.

3.7 TRENCH SURFACING

A. In landscape areas, the trench shall be restored to its original condition with a clean finished grade and any mulch or topdressing blended with that planter.

B. All trench surface conditions shall be flush with adjoining grade in a firm, unyielding condition with no visible settling for the life of the facilities.

C. Crushed drain stone backfill shall be firm and unyielding underfoot, and installed to a smooth consistent level with the adjoining surface.

3.8 WARRANTY

A. Contractor is responsible for removing and replacing all surfacing and improvements impacted by warranty work. All work to be performed at Contractors' own cost.

END OF SECTION

SECTION 32 11 23 AGGREGATE BASE COURSES

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish labor, materials, equipment, facilities, transportation and services to complete all base course preparation, installation and related work as shown on the drawings and/or specified herein.

1.2 SCOPE OF WORK

A. The general extend of the base course work is shown on the drawings and may include, but is not necessarily limited to, the following:
   1. Grading and compaction of sub-grade soil.
   2. Furnishing and placing of aggregate base material.

B. Related sections can include, but not be limited to:

1. Section 31 11 00 Demolition
2. Section 31 22 00 Grading
3. Section 32 12 16 Asphalt Paving
4. Section 32 16 00 Concrete
5. Section 32 18 13 Synthetic Turf
6. Section 31 23 33 Trenching & Backfill
7. Section 32 18 13 Synthetic Track Surfacing
8. Section 32 84 00 Irrigation
9. Section 33 40 00 Storm Drainage Utilities

1.3 JOB CONDITIONS

A. Prior to installation of aggregate base course the Contractor must accept conditions of subgrade and drainage systems.

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

C. The Contractor is responsible for maintaining drainage, irrigation, utilities, or any other system below the field that is not specifically called out for demolition.

D. Wet Conditions: No subgrade preparation or base material placement shall occur when excessively wet conditions exist in the opinion of the Owner's Representative.

E. Dry Conditions: Contractor shall provide dust control and shall provide water to subgrades and base courses as necessary to achieve compaction goals.

1.4 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

   1. American Society for Testing and Materials (ASTM)

2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition (Green Book)
5. Flexible Pavement Rehabilitation Using Pulverization California Department of Transportation

B. Grading materials and operations shall adhere to the requirements and recommendations of the Geotechnical Reports, including all supplements, addendums, and clarifications, unless otherwise specified herein.

1.5 QUALIFICATIONS

A. The Contractor shall have a minimum of five (5) years experience in the installation of synthetic turf aggregate base course systems.

B. The Contractor must provide contact information for five (5) similar installations, greater than 50,000 square feet, which were completed within the past five (5) years.

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

1.6 SUBMITTALS

A. The Contractor must submit aggregate base course materials to the Owner's approved testing laboratory within 15-days from notice to proceed. Test results must be submitted for review within 30-days from notice to proceed. Testing requirements are per this specification section Part 2 and Part 3.

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

1. Geotextile Underlayment
2. Nailer Board
3. Aggregate Base Course Material

1.7 QUALITY ASSURANCE (TESTING AND INSPECTIONS)

A. An approved independent testing laboratory shall test soils and compaction for conformance with the plans and specifications. Tests shall be submitted to the Engineer for review. Contractor shall schedule soils testing a minimum of 72 hours before testing date or as required by the independent testing laboratory

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

C. Aggregate Base Course Conformance Surveys:

1. Conformance surveys shall be performed to verify that constructed elevations meet the specified tolerances of the design grades, proposed slopes, and grade breaks. The Contractor is responsible to make all required corrections to meet the specified design grade tolerances at no cost to the Owner.

2. Additional conformance surveys are required as part of the synthetic track asphalt paving and synthetic turf aggregate base installation, these requirements can be found in the associated specification sections.

3. Synthetic Turf Stringline:

   a. After final preparation and compaction of the aggregate base course and all quality control has been completed, the Contractor shall, in the presence of the Owner or the Engineer, perform a string line test. The string line is to be run at 10' intervals over the entire area in both length and width directions. Run string line from grade break to grade break. Any depressions or ridges exceeding 1/4" shall be marked and then corrected by the Contractor at no cost to the Owner.

   b. The Contractor shall document the aggregate base course elevations at all grade breaks, including the edges of the track and edges of the field. The purpose of this documentation is to confirm proposed cross slopes are met. These elevations shall be recorded on a spacing of approximately 50'. The Contractor may provide a hand written sketch of these elevations or perform the survey in the presence of the Owner or Engineer using a laser level or other survey instrument.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be stockpiled on site in locations that, in the option of the Contractor, cause least interference with construction operations and as acceptable to the Owner's Representative.

B. Materials shall not be stockpiled in proposed planting areas.

C. Protect materials from segregation, contamination, wind, and water erosion.

1.9 SEQUENCING AND SCHEDULING

A. Work of this section shall not proceed until underground utilities and irrigation sleeves have been installed and accepted.

B. Schedule work so that installation of paving/surfacing occurs no later than five (5) working days after placement and proper compaction of base materials. Base materials left un-paved longer than this time period shall be subject to testing and recompaction at the Contractor's expense.

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

PART 2 – PRODUCTS

2.1 MATERIALS

A. Class 2 Aggregate Base shall be ¾" maximum size conforming to Section 26-1.02A of the Standard Specifications.

B. Recycled Aggregate Base created from pulverizing shall conform to Section 30-2.02A of the Standard Specifications, and the following gradation requirements.

A. All aggregate base course shall be sourced from a single supplier and a single location. Use of multiple aggregate base course sources is not accepted.

B. Geotextile filter fabric below drain pad must meet drain pad manufacturer's requirements.

2.2 NAILER BOARD

A. Nailer board must be plastic Trex composite boards, or approved equal. Nominal dimension 2"x4", minimum actual dimensions must be greater than 1-3/8"x 3-1/2".
B. Splitting of 2"x6" boards is not acceptable.
C. Nailer board shall be installed with a minimum of ½" spacing between boards to allow for expansion and contraction. Spacing shall be adjusted based on manufacturers recommendations.

2.3 GEOTEXTILE FABRIC

A. Non-woven Geotextile Filter Fabric shall be Tencate, Mirafi 140N, or approved equal.

2.4 TESTING PROTOCOL FOR AGGREGATE BASE COURSE

A. The Contractor must submit results for all tests listed. The Contractor must utilize an Owner approved third party testing laboratory to perform all material testing. The testing agent must be qualified to perform all of the following testing protocols:
    1. ASTM C136 or CT 202 – Sieve Analysis of Fine and Course Stones
    2. ASTM D854 – Specific Gravity of Soils
    3. ASTM D2216 – Laboratory Determination of Water (Moisture) Content of Soil and Rock
    4. CT 301– Resistance (R-Value)
    5. CT 229 – Durability Index
    6. ASTM D2419 or CT 217 – Sand Equivalent
B. The Contractor must submit all test results for review and acceptance a minimum of 45-days prior to shipping and installation. Neither the Owner nor the Engineer are responsible for delays or costs incurred by shipping or installation of untested or rejected materials.
C. The Contractor must submit proposed aggregate base course supplier, source location, and certification that the supplier can deliver the total quantity of material needed to complete the project within the constraints of the project schedule.
D. All aggregate base course must be sourced from a single supplier and a single location. Use of multiple sources is not accepted.
E. During construction, the aggregate base course must be tested every 1,000 tons by the approved testing laboratory for quality control (QC) or the suppliers quality control office. After initial testing and source selection only sieve analysis (gradation testing) is required for quality control (QC) testing.
F. If irregularity of materials are noted during installation the engineer reserves the right to request additional testing of installed material. Testing expenses shall be bore by the Contractor.

PART 3 – EXECUTION

3.1 SUBGRADE PREPARATION

A. All subgrade preparation must be done in accordance with geotechnical report and specifications.
B. Preparation of subgrade shall conform to the plans and Section 31 22 00 of these specifications.
C. To avoid material contamination the Contractor must not install aggregate base course until subgrade is complete and approved, and irrigation and drainage systems are installed.

3.2 NAILER BOARD INSTALLATION

A. Attach nailer board to concrete curb with 3/8" x 3" concrete expansion bolts spaced at a maximum of 4-feet on-center (O.C.). Mechanical fasteners may be used with approval of the Engineer.

B. Set nailer board height based on specified infill depth. The Contractor is responsible for providing smooth transition grade from top of infill to top of synthetic track surfacing or adjacent surfacing.

3.3 FILTER FABRIC

A. The Contractor must install geotextile fabric per construction documents and per drain pad manufacturer's requirements with a minimum overlap of 1-foot at all seams.

3.4 MOCKUP

A. If the Contractor has concern about the stability of the aggregate base course or achieving the construction tolerances than they shall prepare a 30'x30' mockup of the synthetic turf base profile and perform a stringline test in the presence of the Owner or Engineer.

3.5 BASE MATERIAL PLACEMENT

A. The weight and type of all construction equipment which will be used to install the aggregate base course must be submitted to the Geotechnical Engineer for review and approval.

B. The aggregate base course must be laid without damaging the subgrade. The aggregate base course supplied must conform to the specifications and must be stable.

C. In performing this work, the Contractor must avoid damage to any existing structures or features of the playing fields or features under construction, such as drainage and irrigation systems. The Contractor is responsible for repair of any such damage.

D. The aggregate base course must be carefully and evenly spread to avoid segregation of materials. Excess water should not be applied when dumping and rough grading.

E. The aggregate base course must then be carefully smoothed and uniformly compacted to the appropriate grade by alternately raking, watering, and rolling. All surfaces must then be checked for irregularities due to settling and brought back to a uniform grade. Refer to grading specification for grade conformance and tolerance requirements.

F. The aggregate base course must be a uniform thickness. The aggregate base course shall be placed in maximum 4-inch lifts, unless otherwise approved by the Engineer. The aggregate base course must be compacted in both directions and water settled to attain

uniform 95% compaction. Maintain 8%-10% moisture content during installation. Vibratory compacting is not permitted without the approval of the Engineer.

G. The finished surface of the aggregate base course must comply with grading tolerances required by grading specification. The finished surface shall be firm and unyielding. The measure of "firm and unyielding" is as follows: When using reasonable and industry-standard equipment or light-duty track (<1/2 ton) the finished aggregate base course surface will not deflect or displace more than 1/8".

H. Contractor must provide a survey of the completed aggregate base course that verifies the field is within tolerance for grade and planarity per grading specifications.

I. The synthetic turf contractor must visit the site and inspect the aggregate base course for grade and planarity and provide a written acceptance of the surface prior to beginning the installation of the drain pad and synthetic turf.

J. The synthetic turf manufacturer's representative must be given the opportunity to inspect aggregate base course prior to installation if they so desire. A minimum of two (2) weeks notice of scheduled final finished grade is required.

K. Obtain acceptance of subgrade preparation work prior to placing base material thereon.

3.6 FINISHED GRADE

A. All playing field crowns and grade breaks shall be radiused to provide a smooth transition along and over the crown and grade break. Ridges and/or abrupt transitions are not permitted.

3.7 CLEAN-UP OF WORK AREA

A. Remove and legally dispose of excess materials/spoils and debris from the job site daily.

3.8 PROTECTION OF FINISHED PRODUCT

A. Provide lighted barricades, signs, and other devices as necessary to prevent damage to finished base courses.

B. The Contractor shall maintain the base in finished condition ready to receive the synthetic turf and avoid parking, driving, or moving construction equipment not used for installation of synthetic turf on the finished permeable base.

END OF SECTION

SECTION 32 16 00 CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 – GENERAL

1.1 SCOPE OF WORK

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

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

1.2 RELATED SECTIONS

A. 01 33 23 Shop Drawings, Product Data and Sample Submittals
B. 02 41 13 Demolition
C. 11 68 33 Sports Equipment
D. 32 11 23 Aggregate Base Courses
E. 32 18 13 Synthetic Turf
F. 32 31 13 Chain Link Fence
G. 33 46 00 Storm Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
   a. ASTM C 94, Specification for ready-mixed concrete
2. Occupational Safety and Health Standards (OSHA)
3. American Concrete Institute
   a. ACI 347, Guide to Formwork for Concrete
4. California Building Code (CBC), current edition.
   a. Materials and procedures for forming and reinforcing concrete shall conform to sections 51, 52 and 90 of the Standard Specifications, unless otherwise noted on the drawings or in these specifications.
5. State of California Department of Transportation Standard Specifications, current edition (Green Book)
6. Standard Specifications for Public Works Construction (SSPWC), Latest Edition

7. Standard Plans for Public Works Construction (SSPWC), Latest Edition

1.4 PROJECT CONDITIONS

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

B. The Contractor shall protect existing structures and facilities which are to remain.

C. The Contractor shall not interfere with use of adjacent buildings or block access to facilities to remain open during grading operations.

D. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas outside the project limits.

E. The Contractor shall cease operations and notify Owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.

F. The Contractor shall provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

G. The Contractor shall provide necessary clean and potable water for construction activities and moisture conditioning.

H. At all times during construction, the Contractor shall provide and maintain, the means and devises to promptly remove and properly dispose of water from any source entering low points, trenches, or other excavations at no additional cost to the Owner.

I. The Contractor shall provide and pay for costs of a licensed land surveyor for conformance surveys.

J. All materials shall be installed per manufacturer recommendations. Contact Engineer where recommendations conflict with plans or specifications.

1.5 SUBMITTALS

A. Product Data for each product

B. Design Mixtures for each concrete paving mixture. Provide alternate design mixture when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Materials Certificates from the manufacturer for the following:

1. Cementitious materials
2. Steel reinforcement and reinforcement accessories
3. Admixtures
4. Curing compounds
5. Bonding agent or epoxy adhesive
6. Joint Fillers

D. Material Test Reports for each of the following:

1. Aggregates
2. Field Quality Control Reports

E. Shop Drawing of score joints

F. Mockups

1. Contractor to build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for material and execution.

2. Build mockup of full-thickness sections of concrete paving to demonstrate typical joints; surface finishes, textures, and colors; curing; and standard of workmanship.

3. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Owner's Representative and not less than 10' x 10' of each type.

4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner's Representative specifically approves such deviation in writing.

1.6 CONTRACTOR QUALIFICATIONS

A. The Concrete Installer shall have a minimum of five (5) years' experience in the installation of concrete paving and walls.

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

1.7 QUALITY ASSURANCE

A. Quantities shown on plans and sections are for the Contractor's convenience and not guaranteed. Discrepancies between such mentioned quantities and plans or sections, and requirements of plans and/or specifications, will not entitle the Contractor to additional remuneration.

B. Tolerances

1. All transitions at door and gate thresholds shall be flush or have a maximum of a 1/4" lip where indicated on the plans.

2. All door, gate, stair, or ramp landings, shall have a minimum of 60" clear in all directions and shall have a maximum slope of 2% in all directions.

3. All walkways with multi-directional circulation shall have a maximum slope of 2% in all directions, where indicated on the plans.

4. All sloped walks that have a single direction for circulation (no handrails) shall have a maximum of 5% slope in the direction of travel and a maximum 2% cross slope, where indicated on the plans.

5. All ADA ramps shall have a maximum slope of 8.33% in the direction of travel with a maximum of 2% cross slope. All ADA ramps shall have a maximum run of 30'-0" and handrails. See plans for additional information.

6. Grade breaks are shown on plans.

C. Conformance Surveys:

1. See specifications 32 11 23 and 31 22 00.1 for additional conformance surveys required.
2. Conformance surveys shall be performed to verify that constructed elevations meet the specified tolerances of the design grades.
3. Conformance surveys are to be conducted and signed by a licensed land surveyor.
4. After track curbs are installed and after the subgrade is prepared, the Contractor shall prepare a survey of the subgrade per 31 22 00, which shall include the concrete curbs on the interior and exterior of the track. The curbs shall have points indicated every 10' around the entire track.
5. The Contractor is responsible for making all required corrections to meet the specified design grade tolerances at no cost to the Owner.

D. Testing

1. An approved independent testing laboratory shall test structural concrete for conformance with the plans and specifications. Tests shall be submitted to the Owner's representative for approval. The Owner will pay for testing of structural concrete.
2. At the discretion of Owner, non-structural concrete like pavement may be tested by an independent testing laboratory for conformance with plans and specifications. The Owner will pay testing services for non-structural concrete.
3. Concrete not conforming to requirements of plans and specifications shall be removed from site and replaced at contractor's expense.
4. If concrete does not conform to requirements of contract documents as determined by testing, contractor shall reimburse Owner for testing costs relating to non-structural concrete.
5. Owner retains right to test replaced concrete and to require contractor to reimburse Owner for additional testing expenses.

PART 2 – PRODUCTS

2.1 MINIMUM STRENGTH REQUIREMENTS

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

Description of Work	Strength Measured In psi	Max. Slump (ASTM C-143)	Size of Aggregate	Min. Cement Content (Lbs. Per C.Y.)	W/C Ratio
Fence Post Footings	3000	4"	3/4"	517	0.40-0.45

Curbs/Walls	3000	4”	3/4”	517	0.40-0.45
Walks/Paving/Slabs	4,000	4”	3/4”	617	0.40-0.45

2.2 CONCRETE MIX

A. Concrete shall be Portland cement concrete conforming to Standard Specifications, section 90.

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

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

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

E. Mix concrete in accordance with ACI 304.

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

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

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

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

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

2.3 FORMING MATERIALS

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

B. Exposed sharp edges shall be troweled with not less than 3/16” prevent mortar runs and to preserve smooth, straight lines, unless otherwise directed by Owner or the drawings.

C. Use forming materials that will not discolor concrete.

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

1. Curved surfaces shall be formed with materials of sufficient strength to provide that all lines are straight, true, and plumb and that all dimensions shown on the plans will be complied with once the formwork has been removed.

2.4 DOWELING

A. Doweling shall be 18” Greenstreak Speed Dowel #4 or approved equal.

B. Pervious backfill shall conform to Standard Specifications, section 19.3.065.

C. Expansion joint material shall be pre-molded joint filler conforming to Standard Specifications, section 51-1.12C.

D. Expansion joint caulk shall be an approved polyurethane sealant, conforming to Standard Specifications, section 51-1.12F.

2.5 STEEL REINFORMENT

A. Reinforcing bars (re-bars) shall be intermediate grade deformed bars conforming to CalTrans Standard Specifications, section 52-1.02A. Bars shall be clean new stock, free of rust, scale or other coatings that could affect the bond.

PART 3 – EXECUTION

3.1 EXCAVATION

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

3.2 FORMING

A. Forming shall comply with Standard Specifications section 51-1.05 and shall result in surface finished as follows:

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

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

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

3.3 CONCRETE JOINTS

A. Joints shall be constructed at locations specified below.

B. Where expansion material is specified, cut expansion material back and caulk exposed surfaces with an approved polyurethane joint sealant, color to match concrete, or approved by Owner.

C. Dowel expansion joints with speed dowels.

D. Construct Concrete Joints as Follows:

1. Expansion Joints

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

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

c. Edge of joints between sections of concrete slabs shall have ¼” troweled radius edge.

d. Expansion joints shall have reinforcing joints per plans and details.

2. Control Joints

a. Control joints shall be a 3/16" wide and have a minimum ¾" deep sawcut.

3. Contractor shall submit shop drawings of control & expansion joints for approval.

3.4 EDGING

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

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

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

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

3.5 REINFORCEMENT

A. Reinforcement installation shall conform to Standard Specifications as follows:

1. Cleaning – Section 52-1.05.

2. Bending – Section 52-1.06.

3. Placing – Section 52-1.07.

4. Splicing – Section 52-1.08.

5. Lapped Splices – Section 52-1.08A

3.6 OBSERVATION

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

3.7 CONCRETE PLACEMENT

A. Conform to Standard Specifications, section 51-1.09.

3.8 BONDING

A. Construction joints shall conform to Standard Specifications, section 51-1.13.

3.9 PAVEMENT

A. Concrete pavement shall be constructed in accordance with Standard Specifications, section 73-1.06. Pavements shall be marked or jointed as shown on drawings. Provide weakened plane joints maximum of ten (10) feet on center and/or as detailed on drawings.

3.10 SURFACE DRAINAGE

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

3.11 CURING

A. Cure new concrete in accordance with Standard Specifications, section 90-7.02 ("Curing Concrete") by "Pigmented Curing Compound Method" or "Waterproof Membrane

Method". Method used shall be compatible with sealers, concrete colors, exposed aggregate (if applies), other finishes and materials specified in this and other sections of the Contract Documents.

B. Air entraining agent shall conform to Standard Specifications, section 90-4.07. Add to concrete mix at a rate of three to six (3-6) fluid ounces per cubic yard during mixing period.

3.12 PROTECTION

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

3.13 CONCRETE FINISHES

A. Color shall be natural gray concrete color.

B. Concrete work shall have even surfaces of uniform texture and appearance, free of unsightly bulges, depressions, and other imperfections. The Owner and Landscape Architect/Engineer shall be the judge in this respect.

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

D. Provide concrete finishes as follows:

1. Trowel Finish Curbs:
    a. Finish surface shall be smooth and clean with no obvious trowel marks.
2. Paving Medium Broom Finish:
    a. Concrete shall be poured to line and grade as shown on plans.
    b. Trowel and work the concrete to smooth even finish.
    c. Brush with bristled broom lightly across width of path to a uniformly roughened surface. Finished surface shall be clean with uniform and reasonably straight lines.
    d. Broom finish shall be in accordance with the drawings and details. Broom in a uniform direction as shown on the drawings and details.

3.14 FIELD QUALITY CONTROL

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

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

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

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

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

3.15 PROTECTION

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

END OF SECTION

SECTION 32 18 13 SYNTHETIC TURF

PART 1 – GENERAL

1.1 SCOPE OF WORK

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

1. Synthetic Turf: Low-friction, polyethylene-blended fibers, tufted to a permeable or perforated backing.
2. A resilient infill system.
3. Field striping and markings.
4. Complete installation of synthetic turf on an underlayment.
5. Warranty, testing, and maintenance equipment as outlined in this specification.
6. Geotextile Fabric
7. Nailer Board

1.2 RELATED SECTIONS

A. 01 33 23 Shop Drawings, Product Data and Sample Submittals
B. 02 41 13 Demolition
C. 31 22 00 Grading
D. 31 23 33 Trenching & Backfill
E. 32 16 00 Concrete
F. 32 84 00 Irrigation
G. 33 40 00 Storm Drainage Utilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. Synthetic Turf Council (STC)
4. California Building Code (CBC), current edition.
5. State of California Department of Transportation Standard Specifications, current edition (Green Book)
6. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
7. Standard Plans for Public Works Construction (SSPWC), Latest Edition

1.4 DEFINITIONS

A. Contractor – Registered general building contractor entered into agreement by the Owner as described in the contract documents.

B. Installer – Synthetic turf subcontractor certified by the synthetic turf manufacturer specifically hired by the General Contractor to install synthetic turf, pads and associated materials.

C. Synthetic turf Manufacturer – includes the synthetic turf manufacturer and may also include their installer.

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

1. Top of synthetic turf infill.

E. “Finished Surface"

1. Top of curb or finished grade of hardscape (asphalt, concrete, pavers etc.), of which another surface will not be placed.

2. Top of synthetic track surfacing.

F. Underlayment – a product installed under the synthetic turf that can be a shock pad, drainage pad or combination thereof.

1.5 PROJECT CONDITIONS

A. The Contractor shall be responsible for maintaining finish grades in all areas to receive the synthetic turf.

B. The synthetic turf installer shall be responsible for coordinating their work with the Contractor and Owner.

C. The field base stone shall not be contaminated with other soil. Any stone contaminated by other soil will be removed and replaced at the Contractor’s expense.

D. The synthetic turf installer shall be responsible to review and accept the base for the synthetic turf prior to installation. If the installer rejects the base then they shall do so formally, in writing, and notify the Owner immediately.

E. All products, materials and systems shall not infringe on any patents or trademarks.

F. All products and materials shall be approved for use in the state in which the turf will be installed.

G. All products and materials shall conform to Owner standards, including lead and heavy metal content.

H. All materials shall be installed per manufacturer recommendations. Contact Engineer when recommendations conflict with plans or specifications.

1.6 SUBMITTALS

A. The Contractor shall comply with the following:

1. All submittals shall be provided within 15 days from notice to proceed or as deemed

necessary by the project schedule.

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

B. The Contractor shall submit the following:

1. The synthetic turf installers resume and relevant project experience.
2. Details of maintenance program
3. Indicate the following information for the submitted turf product(s):
   a. Product name and description
   b. Pile Height ASTM D5823-05A
   c. Face Weight ASTM D5848-07
   d. Total Weight ASTM D5848-07
   e. Fiber Denier ASTM D1907-07
   f. Grab Tear Strength ASTM D5034-09
   g. Tuft Bind ASTM D1335-05
   h. Machine Gauge ASTM D5793-05
   i. Infiltration Rate BS7044 Method 4
   j. Flammability ASTM D2859-06
   k. Fiber manufacturer and product name
   l. Primary Backing system type and weight
   m. Secondary backing system type and weight
   n. Pile height above infill
   o. Color uniformity
   p. UV inhibiting protection
   q. Type and unit weight of infill
   r. Gradations of infill materials
4. Results of a recent Lisport Test for the specified product, results shall include 100,000 cycles.
5. Synthetic Turf Warranty (Copy).

C. The following shall be submitted within 15 business days of Notice to Proceed.

1. Material data sheets for the Geotextile Underlayment.
2. Material data sheets for the Nailer Board.
3. Submit a 7½” x 12” minimum sample of the exact synthetic turf and infill system

that is specified for this project.

4. The Contractor shall submit a comprehensive non-infill sample of all turf colors. The swatches shall be a minimum dimension of 12” x 12”.
5. Product information for the seaming material which may include thread, glue, and seaming tape.
6. Product information including installation requirements for seam glue and/or thread.
7. The Contractor shall include complete shop drawings for the installation of the synthetic turf.
    a. To scale and dimensioned, color drawings of all lines and markings. All colors shall represent exact pantones and/or manufacturer colors.
    b. Dimensions of all turf extents, lines and markings.
    c. Enlarged details of line intersections and other markings.
    d. Turf panel layout and seaming plan.
    e. Reviewed submittals do not relieve the manufacturer and installer from all applicable governing codes and regulations as it relates to striping and layout.
8. Operation and Maintenance Manuals. An electronic file of the Operation and Maintenance manual are to be submitted for review. The manuals shall be submitted in PDF format with the Project Name, Manufacturer information, name, address, phone number and contact name, local representative contact information.
9. The Contractor shall provide a complete material testing certification from an independent laboratory. The testing shall be performed on the exact turf which will be shipped to the project for installation.
10. Maintenance equipment

D. Extra materials per Section 3.2 G.

1.7 QUALIFICATIONS

A. The synthetic turf Installer shall have a minimum of five (5) years’ experience in the installation of synthetic turf.

B. The installer shall provide an experienced site supervisor and crew. An alternate installation supervisor and crew are to be provided if, for any reason, the Owner is dissatisfied with the installation process.

C. Local unskilled laborers may be hired only for non-technical work, and in accordance with local labor laws and regulations.

D. The Contractor shall provide the turf installers resume which shall include the following:

1. Current contact information for five (5) installations, greater than 50,000 square feet, which were completed within the past five (5) years.

2. A letter which confirms that the installer is certified by the Manufacturer to install the specific synthetic turf product(s).

E. The synthetic turf manufacturer shall meet the following requirements:

1. Shall have ISO 9001, ISO 14001, and OHSAS 18001 certification.

2. Shall have a minimum of (500) five hundred existing synthetic turf installations in North America greater than 70,000 square feet.

1.8 QUALITY ASSURANCE

A. Verification of Quantities:

1. Quantities shown on plans, sections and details are for the Contractors' convenience only.

2. All synthetic turf installation shall be done in conformance with plans and specifications.

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

4. The synthetic turf installer shall provide written approval and acceptance of the synthetic turf base and trench prior to installing the underlayment and/or synthetic turf.

5. Contractor shall at the completion of the base installation and approved conformance survey, perform a string line test. Prior to installation of the underlayment or synthetic turf, the synthetic turf installer shall perform their own string line test. Once the installer approves the string line test, in writing, the Owner shall be notified, and a final string line test shall be performed in the presence of the Owner or Engineer.

B. Testing

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

2. The Contractor shall provide Gmax testing per ASTM F1936 upon final completion.

3. The Contractor shall provide the necessary testing data to the Owner that the finished field meets or exceeds the required shock attenuation. G-max shall not be less than 80 or more than 120 at time of project acceptance. The G-max range shall be between 80 and 165 for the life of the warranty, in accordance with ASTM 355. If the results of the Gmax test do not meet the requirements as listed in this specification then the turf manufacturer shall remediate at their own cost. This may include amending the infill with practices such as adding sand or further remediating the infill. The Contractor shall provide additional Gmax testing at their own expense until the Gmax requirements are met.

1.9 MAINTENANCE

A. Synthetic turf manufacturer shall provide a maintenance program for a duration of ten - years. The maintenance program shall include an annual visit to perform cleaning, repair and replenish the infill. Information outlining the specifics of the program shall be

provided to the Owner at time of bid.

1.10 WARRANTY

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

B. The manufacturer's warranty shall cover damage caused by general wear and damage caused from UV degradation.

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

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

E. The warranty shall cover defects in the installation workmanship, including the integrity of seams, straightness of lines and symmetrical layout of letters, numbers, and logos.

F. The warranty shall include remediation or replacement of the synthetic turf in its entirety if Gmax exceeds 165 during the duration of the warranty.

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

H. The warranty shall be prepaid and insured by an A rated, third party insurer.

PART 2 – PRODUCTS

2.1 SUBSTITUTION REQUESTS

A. An equivalent ("or equal") may be offered by the Bidder (prior to the deadline stated in the bid documents), subject to evaluation and acceptance by the Owner. It is the bidder's responsibility to provide, at bidder's expense, samples, test data, and other documentation the Owner may require to fully evaluate and determine acceptability of an offered substitute so that it might be addressed prior to bid deadline. The Owner reserves the sole right to reject a substituted component that will not meet or exceed Owner standards and the requirements of this specification.

B. For each equivalent product submission to receive an appropriate and expeditious review, all relevant data for the proposed equivalent product shall be submitted for Owner review. This shall include all detailed product data, performance testing, and warranty. The Contractor shall generate and submit a side-by-side analysis, with supporting documentation, comparing all items/categories detailed in this specification Part 1- General; 1.7 Qualifications & 1.6 Submittals and Part 2- Products; 2.2 Synthetic Turf. Failure to provide a clear, comprehensive, and summarized matrix, supported by testing and or performance data will result in a rejection of the submission.

2.2 SYNTHETIC TURF

A. The synthetic turf shall meet the following qualifications:

1. The synthetic turf shall be considered a premium product and a blend of monofilament and slit film fibers unless otherwise specified.
2. The synthetic turf system shall be designed to maintain integrity and visual aesthetic appeal for high, multisport use for a minimum duration of eight/ten years.
3. The carpet's permeable primary backing shall be a dimensionally stable double-layered polypropylene fabric.

B. All synthetic turf systems shall meet the following requirements: (subject to change based on owner selected turf manufacturer and type).

1.	Average Pile Yarn Weight	ASTM D 5848	46 oz/sy minimum
2.	Total Carpet Weight	ASTM D 5848	70 oz/sy minimum
3.	Secondary Backing Weight	ASTM D 5848	18 oz/sy minimum
4.	Primary Backing (3 layer minimum)	ASTM D 5848	7 oz/sy
5.	Average Tuft Length	ASTM D 5823	2.0" minimum
6.	Tufting Gauge	ASTM D 5793	1/2" or ¾" (Vertex only)
7.	Tuft Bind	ASTM D 1335	> 8 lbs
8.	Yarn Denier (monofilament)	ASTM D 1577	10,000 minimum
9.	Yarn Denier (slit film)	ASTM D 1577	5,000 minimum
10.	Surface Flammability	ASTM D 2859	PASS
11.	Permeability	ASTM F 1551	>25 in/hr
12.	Fiber Melt Point	ASTM D 789	min of 240 Fahrenheit
13.	UV Inhibiting Protection		10,000 PPM
14.	Grab Tear Length	ASTM D5034	>200
15.	Grab Tear Width	ASTM D5034	>200
16.	Tape Thickness	ASTM D3218	360 Microns

C. Approved synthetic turf systems include:

1. SHAW (Type TBD)
2. ASTROTURF (Type TBD)
3. FIELDTURF (Type TBD)
4. Sprinturf (Type TBD)

2.3 LINES/MARKINGS

A. The carpet shall be delivered in 15' wide rolls with all white lines (5-yard lines, sidelines, goal lines, coach's boxes, etc.) tufted into each roll. The rolls shall be of sufficient length to go from sideline to sideline. Head seams, between the sideline rolls, will not be acceptable.

B. All lines shall be tufted into the rolls; letters for school names, logos, numbers, arrows and hash marks shall be inlaid. Refer to plans for approximate size and color of field markings. The Owner shall make final determinations based on the submitted shop drawings.

C. No painting will be acceptable.

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

E. Contractor shall submit complete shop drawings, color samples, and logo design for review and approval by the Owner.

2.4 INFILL MATERIALS

A. All infill shall be provided as outlined in this section, unless otherwise specified by the manufacturer at time of bid.

B. As applicable all granulated SBR rubber shall be washed after processing and be certified to be 100% metal and fiber free; any other rubber will not be accepted. The rubber infill shall be sized between the 10- 20 sieve openings, unless otherwise specified by the turf Manufacturer as part of their proprietary system design.

C. Sand shall be washed so that it is dust free, silica sand, and kiln dried; any other sand will not be accepted. Sand shall fall within the 20 – 40 mesh (0.85mm – 4.25mm).

D. The total depth of the initial infill shall be no less than ¾" below the top of the highest turf fiber, unless otherwise specified by the turf Manufacturer as part of their proprietary system design.

E. Infill tolerance shall be+/- 1/8" or 3mm.

2.5 SHOCK/DRAIN PAD UNDERLAYMENT

A. The following underlayments are approved, or equal:

1. Schmitz Foam, Proplay 20D with drain channels
2. Thermagreen, Sportlite 20mm with drain channels
3. Or equal to be submitted and approved prior to bid.

B. All underlayment shall come with a 25-year manufacturer's warranty.

C. All underlayment shall be installed per manufacturer's recommendations.

2.6 SEAMS

A. All seams between turf panels shall be sewn or glued.

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

C. All sewn seams shall be butt joint, overlapping seams are not permitted.

D. The Contractor shall protect the underlayment where the seams are glued. This may include plastic or other sheeting below all glued seams to prevent turf from binding to underlayment.

2.7 COLORS AND GRAPHICS

A. A color rendering for the playing field striping is included in the bid documents from which the Synthetic Turf Manufacturer shall prepare and submit color shop drawings.

B. The colors shall be stock colors unless otherwise stated in the plans or this section.

2.8 INLAYS

A. All graphics, lines, and inlays shall be tufted or inlayed. Inlays shall be cut in only, whereas the synthetic turf panel is cut to the exact dimensions of the inlay and seamed per this specification.

B. Inlays that are adhered to the synthetic turf panel backing are only permitted with written approval of the Owner.

C. If approved by the Owner, the inlay turf fibers shall be sheared so that the fiber height is consistent between the panel and inlay where specifically identified during installation.

2.9 MAINTENANCE EQUIPMENT

A. Synthetic turf manufacturer/installer shall provide each of the following equipment, or approved equal (complete product descriptions shall accompany the Contractor's proposal if any equipment is proposed as an equal to the equipment listed below):

1. GreensGroomer LitterKat Synthetic Turf Sweeper, Model 760 with Sportsfield Magnet, Model SFM or equal.
2. GreensGroomer Synthetic Turf Groom, Model 920SDE with extension wings with super duty blue brushes attachment Model 924SD or equal.

2.10 NAILER BOARD

A. Nailer board shall be plastic composite boards, Trex or approved equal. Nominal dimension 2"x4".

B. Splitting of 2x6 boards is not acceptable.

C. Nailer board shall be installed with a ½" spacing between boards to allow for expansion and contraction. Spacing shall be adjusted based on manufacturers recommendations.

D. Nailer board concrete fasteners shall be 3/8" x 3" heavy duty concrete hex screws or an approved mechanical fastener.

2.11 GEOTEXTILE FABRIC

A. Non-woven Geotextile Filter Fabric shall be Tencate, Mirafi 140N, or approved equal.

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall coordinate delivery and storage with the Owner prior to delivery. The synthetic turf installer shall coordinate the delivery and storage of materials with the general Contractor prior to shipping.

B. Products and materials shall not be placed, stored, or stockpiled on adjacent surfaces including running tracks, long jump runways, or paved D-zones. Contractor is responsible to repair any damage they cause including resurfacing of track surfaces, replacement of broken concrete, drains, rutted asphalt or other structures and apparatus.

C. Materials shall be protected at the job site to ensure they do not become contaminated by other materials, vandalized, or stolen.

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

3.2 INSTALLATION

A. Maintaining the base stone, and trench

1. The Contractor and Installer shall maintain the stability, planarity, and grades of the base stone and trench; any damage shall be repaired at their expense.
2. Any damaged ancillary structures or surfaces, including landscape, pavement, and curbing shall be repaired at the Contractors expense.

B. Nailer Board Installation

1. Attach nailer board to concrete curb with 3/8” x 3” heavy duty concrete hex screws or an approved mechanical fastener, spaced at a maximum of 3’ O.C. and maximum of 6” from board edge.
2. Predrill holes in concrete curbing per manufacture recommendations.
3. Set nailer board height based on specified infill depth. The Contractor is responsible for providing smooth transition grade from top of infill to top of synthetic track surfacing or adjacent surfacing.
4. Appropriate spacing shall be left between nailer boards to allow for thermal expansion and contraction.

C. Filter Fabric

1. The Contractor shall install geotextile fabric per construction documents and per underlayment manufacturer’s requirements with a minimum overlap of 1’ at all seams.

D. Installing the synthetic turf

1. The Contractor shall strictly adhere to the manufacturer’s installation requirements and published guidelines, this includes synthetic turf, underlayment, adhesives, infill, and all other materials required for the complete installation of the synthetic turf system. Any variance from these requirements shall be accepted in writing, by the manufacturer’s onsite representative, and submitted to the Engineer/m, verifying that the changes do not in any way affect the warranty.

2. The turf manufacturer and Contractor shall accept the stone base prior to the installation of the synthetic turf system. The surface planarity tolerance shall not exceed 1/4" over 10' in any direction, or more stringent if required by the underlayment or turf manufacturers written specifications.
3. The carpet rolls are to be installed directly over the underlayment per the published requirements of the manufacturers. The installation of the synthetic turf may not commence until all synthetic turf panels, not including logos, are onsite.
4. The full width rolls shall be laid out across the field. Using standard state of the art attachment procedures each roll shall be attached to the next in the manner as recommended by the manufacturer. When all the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.
5. The synthetic turf shall be securely attached to the nailer board. Synthetic turf shall be mechanically fastened to the nailer board at a maximum spacing of 6 inches.
6. All graphics including logos and lettering shall be reviewed by the Owner prior to installation. Graphics shall be loosely placed in the proper orientation prior to cut-in.
7. The synthetic turf shall be neatly attached to all existing surface structures including junction boxes, grates, lids, etc. The turf shall be precisely cut to allow the opening and closing of all boxes, grates, lids, etc. unless specifically requested otherwise by the Owner.
8. The infill shall be installed according to the manufacturer's recommendations. When the infill is placed to within 3/4" of the top of the synthetic grass fibers, the Contractor shall notify the Owner for inspection. The balance of the infill shall be placed in the presence of the Owner to a height or level determined by the Owner.
9. The planarity of the infill shall not vary more than 5mm when measured using a 1m straightedge. If the infill settles to a depth exceeding 10% of initial install within 2 years after final completion the Contractor shall install additional infill to a depth consistent with that during final completion.
10. The Contractor shall water settle the infill after installation.
11. The installation shall provide for a wrinkle free synthetic turf, including no rips, tears, or loose seams. All lines and markings shall be straight with no undulations.
12. The Contractor shall thoroughly clean the site after completion of the installation. This shall include loose turf fiber, turf fragments, tools, debris, fasteners, glue and other foreign materials.
13. After completion of the synthetic turf installation the Contractor shall drag the field with a magnet specifically designed to remove metal objects from synthetic turf fields. This procedure shall be performed a minimum of two times.
14. The Contractor shall provide the necessary testing data to the Owner that the finished field meets or exceeds the required shock attenuation outlined in section 1.8 C.

E. Repairs

1. In circumstances where field repairs are needed including failure to meet HIC

tolerance, seam repair or infill repairs the Contractor shall have qualified personnel and materials onsite and ready to make repairs within 5 days notification by the Owner.

F. Extra Materials

1. Prior to final completion the Contractor shall provide the following materials and equipment to the Owner. Copies of written documentation of delivery shall be provided to the Owner.

a. Provide a separate piece of turf for each color used for the field, each piece of turf shall be at least 10’ x 10’.

b. Provide a minimum of (5) heavy duty 32-gallon containers and lids which are filled with the SBR. Supersacks are not acceptable.

c. Provide a minimum of 1 gallon of the glue which was used for inlays.

3.3 MAINTENANCE

A. Synthetic turf manufacturer/installer’s representative shall provide training and maintenance information relative to the grooming, care, installation, storing, and removal of the synthetic turf systems to the extent that the Owner is comfortable with independently performing these operations.

B. Synthetic turf manufacturer shall provide an optional plan for maintenance on an annual basis, based on terms of the agreement with the Owner.

3.4 WARRANTY

A. The Contractor shall provide all product manuals, closeout documents and signed warranty certificates at substantial completion.

B. The warranty period for the synthetic turf, pads and associated materials shall begin upon acceptance of the synthetic turf filed by the Owner.

END OF SECTION

SECTI2ON 32 31 13 CHAIN LINK FENCE

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall provide all labor, materials, equipment, tools and taxes necessary for the complete installation of a new chain link fence.

B. Project requires removal of fence fabric and removal of loose paint or vinyl coating from rails and posts for preparation and application of paint.

1.2 RELATED SECTIONS

A. 01 33 23 Shop Drawings, Product Data and Sample Submittals

B. 02 41 13 Demolition

C. 11 68 33 Sports Equipment

D. 32 12 00 Asphalt Paving

E. 32 16 00 Concrete

F. 32 18 13 Synthetic Turf

G. 32 18 23.33 Synthetic Track Surfacing

H. 32 18 23.53 Acrylic Surfacing

I. 32 31 19 Tubular Steel Fencing

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)

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

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

c. ASTM F552 Standard Terminology Relating to Chain Link Fencing

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

e. ASTM F626 Specification for Fence Fittings

f. ASTM F900 Specification for Industrial and Commercial Swing Gates

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

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

2. Occupational Safety and Health Standards (OSHA)

3. California Building Code (CBC), current edition.

4. State of California Department of Transportation Standard Specifications, current edition (Green Book)
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

1.4 PROJECT CONDITIONS

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

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

C. The Contractor shall not interfere with use of adjacent buildings or block access to facilities to remain open during grading operations.

D. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas outside the project limits.

1.5 SUBMITTALS

A. Material data sheets for all posts, rails, gates, mesh, windscreen and hardware.

B. Warranty information for products that are vinyl coated.

C. Shop drawings indicating fence post layout with dimensions based on field conditions as well as details for gates, special edge conditions, and footings.

D. Material Samples:

1. Chain link mesh with specified size, gauge, coating and color.
2. 6” section of railing with paint/coating.

E. The Contractor shall supply structural calculations and details specific to project conditions. Calculations are to be signed and sealed by a Professional Structural Engineer registered in the state of California.

1.6 CONTRACTOR QUALIFICATIONS

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

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

1.7 QUALITY ASSURANCE

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

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

C. All materials, hardware, assemblies, and workmanship, including footings are subject to Owner’s representative or Inspector review. Work not observed is subject to un-covering and if required, replacement.

D. Verification of Quantities:

1. Quantities and dimensions shown on plans, sections and details are for Contractor's convenience only. The Contractor is responsible for their own quantity take offs and shall provide all materials necessary for installation of fence and gates as shown on Construction Documents.
2. Discrepancies between such mentioned quantities and/or sections, and requirements of plans and/or specifications, will not entitle the Contractor to additional enumeration.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vinyl coated chain link fabric and wires:

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

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

1. SCH 40 steel Hot-Dipped Zinc-Coated (Galvanized) per ASTM 1083.
2. Powder coated. Color shall be "Dodger Blue", unless otherwise stated.
3. Color to match chain link fabric unless otherwise approved by Owner.
4. The top and bottom rail shall be the Manufacturer's longest length.

C. Gates

1. Fabric to match fence.
2. Frames to be SCH 40 steel per ASTM 1083.
3. Color to match chain link fabric unless otherwise approved by Owner.
4. Install diagonal bracing as required per Manufacture's recommendations.
5. Install stretcher bars as required per Manufacturer's recommendations.

D. Gate Hardware

1. Furnish heavy duty hardware as shown on the plans and details.
2. Repair or replace to match existing.

E. Fittings and Accessories:

1. Material:

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

b. Steel and Iron: Unless specified otherwise, hot-dip galvanized pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. Zinc per sq. ft. as determined by ASTM A-90.

2. Finish

a. Apply one coat of primer and one coat of Dunn Edwards Premium Exterior paint for metal. Color shall be “Dodger Blue” unless otherwise stated.

b. Powder coated color shall be “Dodger Blue”.

3. Post and Line Caps:

a. Provide weather tight closure cap for each post.

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

4. Post Brace Assembly:

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

5. Tension or Stretcher Bars:

a. Manufacturer’s standard per Contractor provided shop drawings.

6. Tension and Brace Bands:

a. Manufacturer’s standard per Contractor provided shop drawings.

7. Tension Wires:

a. 9 gage minimum

b. Manufacturer’s standard per Contractor provided shop drawings.

8. Tie Wires:

a. 11 gage minimum, spaced at 24” maximum.

b. Manufacturer’s standard per Contractor provided shop drawings.

9. Concrete Footings

F. Windscreen: See specification 11 68 33 Sports Equipment.

2.2 VINYL COATING

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

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

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

D. Vinyl coating shall be black in color.

E. All posts receiving vinyl coated fabric shall be primed and painted black.

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall coordinate the delivery and storage of materials with the Owner prior to shipping.

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

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

D. All materials shall be installed per manufacturer recommendations. Contact Engineer where recommendations conflict with plans or specifications.

3.2 PREPARATION

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

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

3.3 INSTALLATION

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

B. Fence posts shall be equally spaced, from corner post or end posts, unless otherwise noted on the plans.

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

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

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

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

G. Gates shall move freely without sag.

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

I. Slope top of concrete footings for water runoff.

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

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

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

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

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

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

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

Q. Install gate fabric to match fence.

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

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

T. Install windscreen to field side/ inside dugout sides of fence and gates using tie wires with one tight turn to hold the fabric firmly to the fence. Bend ends of wire inward to avoid person or clothing snag points.

END OF SECTION

SECTION 32 84 00 IRRIGATION

PART 1 – GENERAL

1.1 SCOPE OF WORK

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

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

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

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

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

E. Furnish labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to install automatic irrigation system.

F. Unless specifically stated otherwise, the Contractor is responsible for the purchase and installation of all specified equipment and materials.

1.2 RELATED SECTIONS

A. Section 02 41 00 – Demolition

B. Section 11 68 33 – Sports Equipment

C. Section 31 22 00 – Grading

D. Section 32 23 33 – Trenching and Backfill

E. Section 32 18 13 – Synthetic Turf

F. Section 33 40 00 – Storm Drainage Facilities

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition (Green Book)
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

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

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

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

1.4 DEFINITIONS

A. Abbreviations

1. QC = Quick Coupler Valve
2. RCV = Remote Control Valve

1.5 PROJECT CONDITIONS

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

B. Special requirements:

1. Tolerances - Specified depths of mainline and lateral pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, re-compaction, and repair of finish grade treatment.

2. Coordination with Other Contracts - Protect, maintain, and coordinate Work with the Work under other Sections.

3. Damage To Other Improvements - Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, or planting done under other Sections during Work associated with installation of irrigation system at no additional cost to the Owner.

4. A licensed and bonded plumber shall execute work involving substantial plumbing for installation of backflow preventers, copper service and related work.

5. A licensed and bonded electrician shall execute Work-involving connection to, installation, or extension of 120 volt or greater electrical services.

C. Protection of Property

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to Work of this Section. In the event damage does occur, items shall be completely repaired or replaced to the satisfaction of the Owner.

2. Protect buildings, walks, walls, and other property from damage. Barricade open trenches. Damage caused to asphalt, concrete, or other building material surfaces shall be repaired or replaced at no cost to the Owner. Restore disturbed areas to the original condition

D. Protection and Repair of Underground Utility Lines

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

E. Replacement of Paving and Curbs

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

F. All materials shall be installed per manufacturer recommendations. Contact engineer when recommendations conflict with plans or specifications.

1.6 SUBMITTALS

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

1. Manufacturer published product cut sheets indicating the product number, nominal size, materials and with all proposed options/variations indicated.

2. Manufacturer warranty.

3. Shop drawings, as required per drawings, details or this specification.

4. Sizing calculations (pipes, restraints, or thrust blocks), as required per drawings, details or this specification.

5. Manufacturer installation requirements and/or recommendations.

B. The following testing results shall be submitted during construction.

1. Pressure testing results as indicated in this specification.
2. Cross connection testing as necessary per this specification.

C. The following items shall be provided by the contractor prior to final acceptance.

1. As-built drawings per this specification.
2. Final warranty.
3. Extra material as indicated in this specification.
4. Controller Drawings as indicated in this specification.
5. Operations Manuals as indicated in this specification.

D. Shop Drawings

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

E. Manufacturer Literature

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

F. Record Drawings (AS-BUILTS)

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

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

h. Communication cable routing.

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

j. Flow sensors.

k. Control wire splice boxes.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

H. Pressure Testing

1. Contractor shall submit pressure testing certification for each mainline segment constructed to Engineer and Owner's Representative for approval. Certification shall

document the test; date, time, duration, pressures and mainline segment location. All pressure testing shall conform to requirements noted in these specifications.

2. Lateral pipe must also be pressure tested for all laterals below synthetic turf. Laterals must be pressure tested to same requirements as mainline pipe. Laterals are to be pressure tested prior to installation of swing joints and sprinklers. Temporary caps or plugs are to be installed in swing joint tee fittings during testing.

I. Cross-Connection Testing

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

J. Operation Manual

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

1.7 CONTRACTOR QUALIFICATIONS

A. Installer shall have experience and demonstrated ability in the installation of irrigation system(s) in accordance with recognized laws, codes and standards of workmanship. To demonstrate ability, (experience necessary for this Project), submit the following prior to contract award, if requested by the Owner:

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

1.8 QUALITY ASSURANCE

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

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

1.9 MAINTENANCE

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

1. Two (2) Sets of all special tools required for removing, disassembling, and adjusting each type of sprinkler head and valve supplied on this Project.
2. Two (2) six (6)-foot valve keys for operation of isolation valves (if applicable).
3. Two (2) keys for each automatic controller.
4. Two (2) quick coupler keys and two (2) matching hose swivels for each type of quick coupling valve installed.

1.10 WARRANTY/GUARANTY

A. The Contractor shall warrant all materials against defects for a period of Two (2) year from date of Substantial Completion. The Contractor shall also guarantee workmanship for the same Two (2) year period. The Contractor shall also be responsible for coordinating all material warranty items with the manufacturer/distributor.

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

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

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

PART 2 – PRODUCTS

2.1 MATERIALS

A. Mainline Pipe and Fitting

1. Irrigation mainline pipe –C900 or C905 PVC gasketed end (10" through 16”) with ductile iron fittings.
2. Irrigation mainline pipe –Class 200 PVC gasketed end (3" through 8”) with ductile iron fittings.
3. Irrigation mainline pipe - SCH 40 PVC solvent weld (1" through 2 1/2") with SCH 80 solvent weld PVC fittings

B. Ductile Iron Pipe and Fittings

1. Ductile Iron Pipe – Centrifugal cast ductile iron in metal molds for water pipe in accordance with ANSI C151 and AWWA A21.51 with asphaltic exterior coating and interior lining and coating in accordance with ANSI C151 and AWWA A21.51.
2. Fittings – Mechanical restrained joint as supplied by the pipe manufacturer and rate for working pressures of 350 psi.
3. Gaskets – Furnish in accordance with ANSI C111 and AWWA A21.11.

C. Copper Pipe and Fittings

1. Copper Pipe – Type 'K' hard tempered, in accordance with ASTM B4284.
2. Fittings – Wrought copper, solder joint type (ANSI B16.22).

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

D. Brass Pipe and Fittings

1. Brass Pipe – 85% red brass, AMSI Schedule 40 screwed pipe.
2. Fittings – Medium brass, screwed 125-pound class.

E. Plastic Pipe and Fittings

1. Identification Markings: - All pipe shall be identified with the following indelible markings:
   a. Manufacturer's name.
   b. Nominal pipe size.
   c. Schedule or class.
   d. Pressure rating.
   e. NSF (National Sanitation Foundation) seal of approval.
   f. Date of extrusion.
   g. Note: When installed, markings shall be face up.
2. Solvent Weld Pipe – Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B, Type 1, Grade 1.
   a. Mainline fittings (2.5” and smaller)– Standard weight, Schedule 80, injection molded PVC; complying with ASTM D1784 and D2466, cell classification 12454-B.
   b. Lateral fittings – Standard weight, Schedule 80, injection molded PVC; complying with ASTM D1784 and D2466, cell classification 12454-B.
   c. Threads – Injection molded type (where required).
   d. Tees and ells – Side gated.
   e. Threaded Nipples – ASTM D2464, Schedule 80 with molded threads.
   f. Joint Cement and Primer – Type as recommended by manufacturer of pipe and fittings. Solvent weld joints shall be made in accordance with ASTM D-2855.
3. Gasketed End Pipe – Manufactured from virgin polyvinyl chloride compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B, Type 1, Grade 1.
   a. Fittings – Ductile iron with push-on joints or mechanical joint.
   b. Gaskets – Factory installed in pipe and fittings, having a metal or plastic support within gasket or a plastic retainer ring for gasket.
   c. Lubricant – As recommended by manufacturer of pipe fittings.

F. Isolation Valves

1. Isolation valves (Control Valves) for ¾-inch through 2-Inch Pipe – Bronze two-piece full port construction with PTFE seats rated at rated at 400 PSI.
2. Isolation valves (Sub-Mainline) for 1-inch through 2 1/2-Inch Pipe – Brass two-piece full port construction with cast brass ball with TFE coating and Buna-N seats rated at rated at 300 PSI. The valve operation shall be by a flathead cap and stem with internal 90 degree check stops. The valve shall include a brass 2-inch square operating nut pinned to the flathead stem.
3. Isolation valves for 3-inch and Larger Pipe – Iron body with a brass or bronze mounted AWWA resilient wedge seat gate with a clear waterway equal to full nominal diameter of valve; rubber gasket or mechanical joint-type only. Valves shall be able to withstand a continuous working pressure of 150 PSI and be equipped with a square-operating nut.

G. Quick Coupling Valves

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

H. Valve Boxes

1. As indicated in drawings
2. All valve boxes shall be green when installed in natural grass or tan when installed in other landscape material.
3. Valve boxes shall only be installed in concrete or other hardscape when specifically directed to in plans or details. All valve boxes in hardscape must be concrete and have a medium duty traffic rating.
4. Valve boxes shall only be installed in synthetic turf when specifically directed to in plans or details. All valve boxes in synthetic turf must be aluminum with rubber infill retention system.

I. Low Voltage Electrical Control Wiring (Traditional Wire Systems)

1. Electrical Control Wire - AWG UF UL approved No. 14 gauge direct burial copper wire for all control wires, and No. 12 gauge direct burial copper wire for all common and spare wires.
   a. Control Wires - Red.
   b. Common Wires - White.
   c. Master Valve Wires - Blue.
   d. Spare Wires - Green (labeled at terminations).
   e. Future Wires – Same as control and common wire (labeled at terminations).
2. If multiple controllers are used, and wire paths of different controllers cross each other, both the common and the control wires from each controller shall be different colors approved by the Consultant.
3. Control wire connections and splices shall be made with Northstar Industries Suresplice direct bury splice kits or 3M DBR/Y splice kits.

J. Line Voltage

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

K. Electric Control Valves

1. As indicated on the drawings.

L. Sprinkler Heads

1. As indicated on the drawings.
2. Pre-fabricate risers or swing joints in accordance with the details on the drawings - with riser nipples of same size as riser opening in sprinkler body.
3. Flex pipe swing joints are allowed for spray type sprinklers only.
4. All rotor heads must have stainless steel risers.
5. All rotor heads installed within the limits of synthetic turf must be equipped with rubber turf cup top.

M. Pipe bedding material

1. Clean native soil as approved by Owner's Representative and Landscape Architect except where construction grade pipe bedding sand is required per construction details.

N. Irrigation Satellite Controller

1. Field Satellite Unit assembly as specified on the drawings.
2. Satellite pedestal or wall mount as specified on the drawings and installed per manufacturer's recommendations and requirements.
3. Electrical grounding and lightning protection to be installed on all controllers per manufacturer's recommendations and requirements. Grounding plates and or rods must meet the minimum resistance as required by controller manufacturer.

O. Mainline Piping Locating Tape:

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

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

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

B. Handling of PVC Pipe - Exercise care in handling, loading and storing of PVC pipe. All PVC pipe shall be transported in a vehicle, which allows length of pipe to lie flat so as not to subject it to undue bending or concentrated external loads. All sections of pipe that

have been dented or damaged shall be discarded, and if installed, shall be removed and replaced with new piping.

3.2 INSPECTION

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

3.3 PREPARATION

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

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

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

1. Refer to design drawings for sleeving schedule and sizing requirements.
2. At a minimum the diameter of all sleeve pipes must be 2 times larger than the nominal diameter of carrier pipe or 3-inch, whichever is greater.
3. No single sleeve is to contain more than a single carrier pipe.
4. Pipes and control wires must be installed in separate sleeves.

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

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

3.4 INSTALLATION

A. PVC Piping

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

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

B. Gasketed End Pipes

1. Lay pipe and make pipe to fitting or pipe to pipe joint following pipe manufacturer's recommendations.

C. Ductile Iron Fittings

1. All ductile iron fittings are to be installed per manufacturer’s requirements.
2. All ductile iron fittings are to be fully covered in polywrap. Polywrap is to be watertight and separate the fitting from the thrust block. Polywrap is to be installed in both corrosive and non-corrosive soils without exception.

D. Thrust Blocks

1. Contractor must use joint restraints as required on drawings and details. Thrust blocks are allowable only with written approval from engineer.
2. If allowed, the Contractor must install thrust blocks behind all gasketed fittings, tees, bends, reducers, line valves, and caps in accordance with pipe manufacturer's recommendations.
3. If allowed, thrust block sizing requirements will be submitted for review by contractor or engineer will provide to contractor. Contractor shall not install thrust block prior to approval of thrust block sizing calculations.
4. If allowed, all thrust block installations are to be reviewed by Owner’s Representative or Engineer prior to backfill. The Contractor must provide adequate notice (3 – business days) to call for review of thrust blocks.

E. Ductile Iron Joint Restraints

1. The Contractor must use joint restraints in lieu of thrust blocks unless the Owner, Engineer, local code or design drawings specifically dictate the use of thrust blocks. The option to install joint restraints must be submitted with equipment cut sheets and restraint length calculations prior to the start of construction.
2. The Contractor must select thrust blocks or joint restraints at the start of installation. Mixed use of thrust blocks and joint restraints is not accepted.

3. Install all ductile iron fittings, joint restraints and pipe restraints per manufacturer's recommendations and requirements.
4. All joint restraints are to be covered in polywrap. Polywrap is to be watertight. Polywrap is to be installed in both corrosive and non-corrosive soils without exception.

F. Low Voltage Wiring

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

G. Communication Cable

1. Installed as per manufacturer's specifications and the plan details.
2. Splices to occur only at controller pedestal and at designated wire splice boxes

H. Line Voltage Wiring

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

I. Irrigation Satellite Controller

1. Install controller in accordance with manufacturer's instructions as detailed and where shown on the drawings.

2. Connect remote control valves to the controller in numerical sequence as shown on the drawings.
3. The Owner's Representative shall approve final location of irrigation controllers prior to installation.
4. Each controller shall have a dedicated separate ground wire, installed per manufacturer's recommendations and requirements.
5. Above ground conduit shall be rigid galvanized with appropriate fittings. Below ground conduit shall be schedule 80 PVC.
6. Label each controller with a letter or number designation (indicated on drawings) with four (4)-inch high vinyl adhesive letters on inside of front panel cover.

J. Electric Control Valves

1. Install cross handle two 2-inches below finished grade where shown on the drawings and as detailed.
2. When grouped together, allow at least twelve (12) inches between valve box sides.
3. Install each remote control valve in a separate valve box unless construction details specifically indicate multi-valve boxes.
4. When parallel to roadway, sidewalk, or other permanent element or structure, control valve and box to be installed perpendicular to element or structure, spaced equally.

K. Quick Coupling Valves

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

L. Valve Boxes

1. Valve box extensions are not acceptable except where specifically called for in construction details.
2. All valve boxes are to be set on 2x4 inch stabilization bricks.
3. Install gravel sump after compaction of all trenches. Place final portion of gravel inside valve box after valve box is backfilled and compacted.
4. Install valve boxes relative to finished grade as indicated in construction details.
   a. Sod = 1/4 inch below top of sod
   b. Seeded = 1/4 inch above finished grade
   c. Landscape or Decomposed Granite = 1/2 inch above finished grade
5. All valve boxes are to have T-Style lids. Flush lids are not accepted.
6. All valve boxes are to be green in grass or tan in landscape unless purple reclaimed water warning boxes are required.

7. Brand all valve box lids. Letter and number size shall be no smaller than one (1)-inch and no greater in size than 1 1/2 inches. Depth of branding shall be no more than 1/8 inch into valve box lid as follows:
    a. Control valves – Brand controller letter and station number on lid of each control valve box.
    b. Quick Coupling Valves – Brand quick coupling valve box lids with letters "Q.C."
    c. Wire Splices – Brand all wire splice box lids with letters "W.S.".
    d. Drip Piping Blowout Stubs - Brand controller letter and station number on lid of each drip tubing blow out box lid.
    e. Isolation Gate Valves – Brand all isolation gate valve box lids with letters "G.V.".
    f. Air Release Valves – Brand all air release valve box lids with word "AIR".
8. Valves installed below synthetic turf must be installed in aluminum comboxes with synthetic turf infill retention system as indicated in the drawings.
9. Valve boxes install within hardscape must be concrete must have a medium duty traffic rating.

M. Isolation Valves

1. Isolation valves 3-inch and larger are to be ductile, resilient wedge, square nut, non-rising stem.
2. Separate isolation valves from thrust or bearing blocks with polywrap. Do not encase valves in concrete.
3. Isolation valves smaller than 3 inch are to be bronze. PVC ball valves are not accepted unless specifically called for on construction details.

N. Sprinkler Heads

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

O. Backfilling

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

P. Piping Under Paving

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

3.5 FIELD QUALITY CONTROL

A. Flushing

1. After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupling valves, and air release valves, thoroughly flush piping

system under full head of water pressure from dead end fittings. Maintain flushing for ten (10) minutes through furthermost valves. Cap risers after flushing.

B. Pressure Testing

1. All new mainline must be pressure tested. It is not recommended to put any existing to remain mainline under test pressures. Contractor will be responsible for existing mainline isolation and any damage to existing mainline resulting from pressure testing.
2. All lateral pipe below synthetic turf must be tested. Laterals must be pressure tested to same requirements as mainline pipe. Laterals are to be pressure tested prior to installation of swing joints and sprinklers. Temporary caps or plugs are to be installed in swing joint tee fittings during testing.
3. Conduct tests in the presence of the Owner's Representative. Arrange for presence of reviewer a minimum of 48 hours in advance of testing. Supply force pump and all other test equipment.
4. After center load backfilling, (All pipe joints and fittings shall remain uncovered) and installation of all control valves, quick coupling valves, drain valves, and air release valves, fill mainline pipe with clean clear water, and pressurize to 50 psi over the designated static pressure or 125 psi, whichever is greater, for a period of 6 hours.
5. The contractor must wait for initial small pressure loss due to air release prior to recordings starting pressure. No pressure loss after recording starting pressure for the duration of the test is accepted.
6. If leaks or pressure loss are detected than the Contractor is to repair and retest system until test pressure can be maintained for duration of pressure test.
7. No more than 2,000 feet of mainline is to be tested in a single pressure test.
8. Before substantial completion, all mainline pipe shall remain under pressure for a minimum period of 48 hours.

C. Walk-Through for Substantial Completion

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

D. Walk-Through for Final Completion

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

3.6 ADJUSTING

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

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

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

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

3.7 CLEANING

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

3.8 MAINTENANCE

A. The contractor shall maintain the irrigation system for the same duration as specified in the natural grass / landscape maintenance agreement.

B. Maintenance period requirements

1. Controller scheduling and water management.
2. Additional adjustment as needed to provide full coverage.
3. Repair and replacement of damaged equipment.

3.9 WARRANTY

A. The contractor shall provide warranty meeting or exceeding the requirements of this specification.

B. Warranty claims shall be completed in a timely manner. Damage to plant material resulting from irrigation system failures shall be replaced by contractor.

END OF SECTION

SECTION 33 40 00 STORM DRAINAGE UTILITIES

PART 1 – GENERAL

1.1 SCOPE OF WORK

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

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

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

1.2 RELATED SECTIONS

A. 02 41 13 Demolition
B. 31 22 00 Grading
C. 31 23 33 Trenching & Backfill
D. 32 16 00 Concrete
E. 32 18 13 Synthetic Turf
F. 32 84 00 Irrigation

1.3 CODES AND STANDARDS

A. All work shall be performed in accordance with the latest edition of the following codes and standards:

1. American Society for Testing and Materials (ASTM)
2. Occupational Safety and Health Standards (OSHA)
3. California Building Code (CBC), current edition.
4. State of California Department of Transportation Standard Specifications, current edition (Green Book)
5. Standard Specifications for Public Works Construction (SSPWC), Latest Edition
6. Standard Plans for Public Works Construction (SSPWC), Latest Edition

B. Grading materials and operations shall adhere to the requirements and recommendations of the Geotechnical Reports completed by Geocon West, Inc.,

including all supplements, addendums, and clarifications, unless otherwise specified herein.

C. Construction operations and earthwork shall adhere to the requirements of the California State Water Resources Board General Permit:2009-0009-DWQ OR 2022-0057-DWQ (effective 9/1/23) CONSTRUCTION GENERAL PERMIT.

1.4 PROJECT CONDITIONS

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

B. The Contractor shall verify existing conditions before starting work.

C. The contractor shall flush all existing drain lines to remain within the project area to the nearest junction or outfall and collect all flushed water and debris. All flushing operation shall adhere to the requirements of the California State Water Resources Board General Permit:2009-0009-DWQ CONSTRUCTION GENERAL PERMIT.

D. The Geotechnical Engineer or Geotechnical Field Engineer shall provide observation and testing during the trenching operations.

E. The Contractor shall be responsible to obtain Notice to Intent (NOI) and Notice of Termination (NOT) and maintain all observations, reporting and other requirements associated with these permits. This includes but is not limited to installing and maintaining necessary erosion control items such as silt fencing, hay bales, sediment roles, stabilized construction entrances, inlet sediment traps, etc.

F. The Contractor shall provide dust control in conformance with all environmental regulations.

G. The Contractor shall adhere to all the requirements of the project SWPPP (Stormwater Pollution Prevention Plan and erosion control plan. The Contractor is responsible for all necessary QSP (Qualified Stormwater Practitioner) services as required by the project SWPPP documents.

H. Contractor shall, prior to commencement of work, submit a letter to owner stating locations of disposal sites for excess materials, and certifying that they have obtained property owner's permission for disposal of surplus materials.

I. The Contractor shall protect existing structures and facilities which are to remain.

J. The Contractor shall not interfere with use of adjacent buildings or block access to facilities to remain open during grading operations.

K. The Contractor shall maintain free and safe passage to and from adjacent buildings and maintenance areas outside the project limits.

L. The Contractor shall prevent movement or settlement of walls and structures, provide bracing or shoring, be responsible for safety and support of structures and assume liability for building movement, settlement, damage, or injury.

M. The Contractor shall cease operations and notify owner immediately if safety of structures appears to be endangered, take precautions to properly support structures, and resume operations only after safety is restored.

N. The Contractor shall provide, and maintain barricades, lighting, and guardrails required by applicable regulatory advisory to protect passersby, workers and building occupants.

O. The Contractor shall provide all necessary shoring and safety means and methods required for stabilizing trenches and excavations to the depths indicated on the plans per OSHA requirements.

P. The Contractor shall provide necessary clean and potable water for construction activities, moisture conditioning and compaction.

Q. The Contractor shall provide and maintain, at all times, during construction, the means and devises to promptly remove and properly dispose for water from any source entering low points, trenches, or other excavations at no additional cost to the Owner.

R. Quantities shown on plans are for Contractor's convenience and not guaranteed. Discrepancies between such mentioned quantities and requirements of grading and drainage plans and/or specifications, will not entitle Contractor to additional remuneration.

S. All materials shall be installed per manufacturer recommendations. Contact Engineer where recommendations conflict with plans or specifications.

1.5 SUBMITTALS

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

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

2. Certificates of inspection, as applicable.

3. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

4. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

5. Warranty information, as applicable.

6. Mockup of subdrain and crushed stone as described in specification 31 23 33 Trenching & Backfill, item 1.5 C.

B. The following information shall be submitted at the time of project closeout.

1. Accurately record actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations with tie in distances from at least two surface features.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 MAINTENANCE

A. The Contractor shall keep drainage structures free and clear of soil and debris throughout the course of the construction process.

B. The Contractor shall maintain drainage system to meet local storm water pollution regulations.

PART 2 – PRODUCTS

2.1 CEMENT MORTAR

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

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

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

1. 4-inch through 10-inch diameters shall meet the strength requirements of AASHTO M252. All pipe shall be double wall.
2. 12-inch through 36-inch diameters shall conform to AASHTO M294 Type S. Material shall conform to ASTM D1248 Type III, Category 4, Grade P33, Class C, or ASTM D3350 cell classification 324420 C. All pipe shall be double wall.
3. Minimum conveyance factors shall be 7.3 for 6" pipe and 293.9 for 18" pipe.
4. All fittings shall be watertight.
5. Pipe to concrete drain basin connections shall be A-LOK water-stop connectors or approved equal. Grout in per manufacture recommendations.

2.3 FRAMES, COVERS AND GRATES

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

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

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

2.4 DRAINAGE CLEANOUTS

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

B. Size of cleanout shall be equal to the size of the drainpipe on which it is installed, up to 8”.

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

2.5 NON-WOVEN GEOTEXTILE FILTER FABRIC

A. Non-woven Geotextile Filter Fabric for subdrains drain shall be Tencate, Mirafi 140N, or approved equal.

2.6 PIPE BEDDING

A. Perforated drainpipe bedding shall be crushed drain stone or 3/8” fully fractured chips.

2.7 CRUSHED DRAIN STONE

A. See Specification 31 23 33 Trenching & Backfill for more information.

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Ship and transport all materials in a safe manner protecting from damage, corrosion, and wear.

B. Offload all products with appropriate equipment and care preventing any damage.

C. Store in a neat and orderly manner protected from elements to prevent damage, corrosion, or wear. Provide additional covering or conditioning as needed per manufacturer requirements.

A. All aggregate material shall be shipped using clean trucks. Loads will be rejected if there is any foreign material.

B. All aggregate materials shall be moisture conditioned to eliminate settlement during trucking or shipping to site.

3.2 EXISTING CONDITIONS

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

B. Contractor shall verify existing invert elevations for storm drain construction prior to site work. Work for storm drain installation shall begin at downstream connection point. This will allow for necessary adjustments to be made prior to installation of entire line. If the Contractor fails to begin at the downstream connection point and works up-stream, Contractor shall be responsible for necessary adjustments.

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

D. Contractor shall take special care in locating and protecting existing utilities. Verify with Owner’s representative, existing utilities to be relocated, or removed, or preserved. Correct damage done to existing utilities at no cost to Owner.

3.3 FIELD MEASUREMENTS

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

B. Confirm box location, alignment, rotation in paved surfaces with the Landscape Architect or Engineer prior casting or permanently paving.

3.4 GENERAL CONSTRUCTION

A. Trenches

1. Excavate trench and trench bed for storm drains in accordance with pertinent provisions of the codes and standards listed in section 1.3 OR 31 23 33 Trenching and Backfilling.

2. Unless otherwise shown, provide separate trenches for pipelines. Minimum cover shall be twelve inches (12").
3. Lay pipe in open trenches except when Owner's representative gives permission for tunneling.
4. Excavate trenches to widths no greater than necessary for proper installation of the work and per manufacturers published documents.
5. Material excavated for utility trenches shall be non-classified and shall include earth or other material encountered. Contract price is understood to cover removal of such materials to depths and extents indicated in contract documents and necessary to complete the work.
6. Grade bottom of trenches evenly in preparation for placement of bedding and to ensure uniform bearing for full length of pipes. Cut holes as necessary for joints and joint-making. Excavate cemented gravel, old masonry, or other hard material to at least six inches (6") below pipe points. Refill such space and other cuts below grade with bedding & select backfill.
7. Install geotextile fabric in trench according to manufacturer's instruction. Line the trench bottom and walls, leaving 12" of fabric as overlap with field geotextile fabric on both sides of the trench.
8. Sheet and brace trenches; remove water as necessary to fully protect workers and adjacent structures and permit proper installation of the work. Comply with OSHA regulations. Under no circumstances lay pipe or install appurtenances in water and keep trenches free from water until pipe joint material has hardened.
9. Presence of ground water in soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which any extra remuneration may be claimed.
10. Prior to placing pipe, trench shall be clear of all debris.

B. Pipe Installation

1. General: Carefully examine each pipe prior to placing.
2. Promptly set aside defective pipe and damaged pipe.
3. Do not install defective pipe or damaged pipe.
4. Continually remove extraneous material from pipe.
5. Do not place pipe in water, nor place when trench or weather is unsuitable for such work.
6. Pipe of size and type noted on drawings shall be laid on firm bearing, aligned, and graded in direction of flow. Suitable fittings shall be provided where various lines connect and where changes in pipe size occur. Connections shall be made to catch basins etc. as indicated.
7. Make required connections to existing drains ensuring systems are connected and flowing correctly.

8. Commence pipe installation at lowest point in system and install pipe with bell end upgrade. Clean interior and joint surfaces and test pipe for soundness before lowering pipe into trench.
9. Lay pipe in straight lines and on uniform grades between points where changes in alignments or grades are shown. Fit pipes to form a smooth uniform invert. Keep a stopper in pipe mouths when pipe installation is not in progress.
10. Flush closed lines with water in sufficient volume to obtain free flow through each line. Remove obstructions and correct defects discovered. Remove silt and trash from catch basins and inlets prior to inspection of work.
11. Backfill trenches only after piping has been inspected, tested and the location of pipes and appurtenances has been recorded. Backfill material, placement and compaction shall conform to the requirements of Section 31 23 33 Trenching and Backfilling.
12. If using CLSM / SLURRY as backfill, CHDPE shall be secured via tie downs.
13. Install area drains and cleanouts per section the codes and standards listed in section 1.3.

C. Geotextile Fabric Installation:

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

3.5 JOINTS

A. General

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

B. Flexible Watertight Joints:

1. Equal materials may be used when specifically approved in advance by Owner's representative.
2. Install gaskets and joint materials in accordance with manufacturer's recommendations as approved by Owner's representative.

a. Protect from sun, blowing dust and other deleterious agents.

b. Align pipe with previously installed pipe and pull joints together. If gasket or joining material becomes loose and can be seen through exterior joint recess when joint is pulled to within 1" of closure, remove pipe and remake joint.

c. Inspect gaskets and replace loose and improperly affixed gaskets and joining materials.

3.6 EXISTING MANHOLES, INLETS AND CLEANOUTS

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

3.7 TESTING AND INSPECTING

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

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

3.8 DRAWINGS OF RECORD

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

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

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

3.9 MAINTENANCE

A. Maintain all BMP's until completion of the project as required by the stormwater pollution prevention plan.

B. Flush the system upon project completion, collecting and disposing of all sediment and debris.

END OF SECTION