

PROJECT MANUAL

Volume I of I

Fillmore Unified School District

Sierra High School Baseball Field Improvements

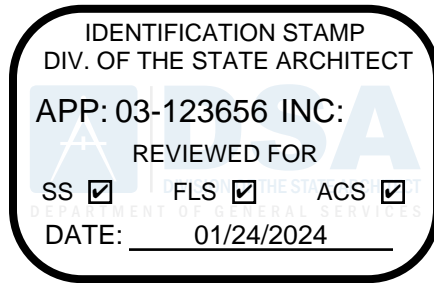
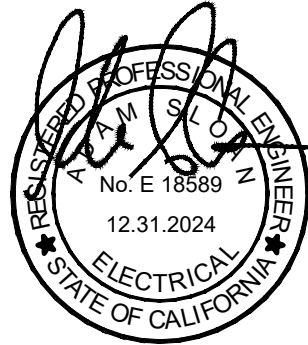
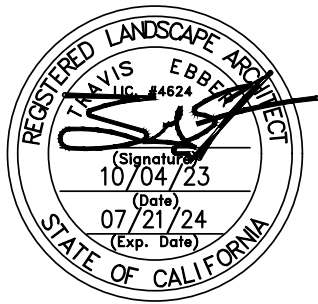
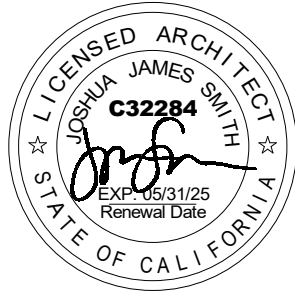
615 Shiells Dr
Fillmore CA, 93015

A#03-123656
DSA File Number 56-H1

WD Project #23414

SECTION 00 00 07

Seals Page



SECTION 00 01 10
TABLE OF CONTENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 01 07 – Seals Page
- 00 01 10 - Table of Contents
- 00 40 00 - Procurement Forms and Supplements

DIVISION 01 -- GENERAL REQUIREMENTS

- 01 10 00 - Summary
- 01 30 00 - Administrative Requirements
- 01 33 00 - Submittal Procedures
- 01 40 00 - Quality Control
- 01 56 00 – Temporary Tree and Plant Protection
- 01 60 00 - Product Requirements
- 01 63 00 - Product Substitution Procedures
- 01 70 00 - Contract Closeout

DIVISION 11 – EQUIPMENT

- 11 68 33.33 – Baseball Field Equipment (Solid Vinyl Batters Eye)
- 11 68 33.34 - Baseball Field Equipment (Knotless Netting)
- 11 68 33.35 - Baseball Field Equipment (Dugout 10x32)
- 11 68 33.36 - Baseball Field Equipment (4' Semi-Permanent Fence System)
- 11 68 33.37 - Baseball Field Equipment (6' Semi-Permanent Fence System)
- 11 68 43 – Scoreboard

DIVISION 26 – ELECTRICAL

- 26 00 10 General Electrical Requirements

DIVISION 31 – EARTHWORK

- 31 10 00 – Site Clearing
- 31 22 00 – Grading
- 31 23 00 – Evacuating, Backfilling and Compaction
- 31 23 16 – Evacuation, Backfilling and Compaction for Pavement

DIVISION 32 – EXTERIOR IMPROVEMENTS

- 32 92 00 – Turf and Grasses
- 32 11 23 – Base Course
- 32 12 17 – Site Concrete Paving
- 32 12 18 – Site Concrete Paving Reinforcement
- 32 13 13 – Concrete Paving
- 32 13 73 – Joint Sealants
- 32 24 00 – Environmental Import and Export Materials Testing
- 32 31 13 – Chain Link Fencing - Gates
- 32 84 00 – Planting Irrigation – Domestic Water
- 32 91 13 – Soil Preparation
- 32 92 00 – Turf and Grasses
- 32 93 00 – Plants

DIVISION 33 – UTILITIES

- 33 14 16 – Site Water Distribution System

END OF SECTION

SECTION 00 40 00
PROCUREMENT FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements.
1. Bid Bond
 2. Non Collusion Affidavit
 3. Prevailing Wage
 4. Performance Bond
 5. Payment Bond
 6. Certificate of Contractor and Subcontractor Division of Industrial Relations Registration
 7. Information Required for Bidder
 8. List of Designated Subcontractors
 9. Certification of Financial Relationships in Regard to Window Project

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 10 00
SUMMARY**

PROJECT: Sierra High School – Baseball Field Improvements

PROJECT ADDRESS: 615 Shiells Dr, Fillmore CA 93015

OWNER: FILLMORE UNIFIED SCHOOL DISTRICT

THE PROJECT CONSISTS OF Baseball Field Improvements:

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Contractor's daily reports.
- G. Progress photographs.
- H. Coordination drawings.
- I. Submittals for review, information, and project closeout.
- J. Requests for Interpretation (RFI) procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures
- B. Section 01 70 00 - Closeout Contract Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Submission of initial Submittal schedule.
 - 6. Designation of personnel representing the parties to Contract, Fillmore USD and Architect.

7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

302 SITE MOBILIZATION MEETING

- A. Owner will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Use of premises by Owner and Contractor.
 2. Owner's requirements.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

303 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals. Meeting to be hosted virtually as well as in person for remote attendance.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect (Remote Attendance)
 4. Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.

11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

304 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

305 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work.
- D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.

306 REQUESTS FOR INTERPRETATION (RFI)

- A. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 3. Combine RFI and its attachments into a single PDF electronic file.
- B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Contractor's names.
 3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- E. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Highlight items requiring priority or expedited response.
- F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to the complexity of the RFI.
- G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

307 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
1. Coordinate with Contractor's construction schedule and schedule of values.
 2. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 3. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

308 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

309 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

310 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout.
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

311 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Refer to Section 01 33 00 - Submittal Procedures

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1. - GENERAL

1.01 SUMMARY

- A. Submit to the Architect, progress schedule, application for payment, shop drawings, project data, and miscellaneous submittals required by the Contract Documents.
- B. Related Requirements Specified Elsewhere:
 - 1. General Conditions
 - 2. Supplementary Conditions
- C. Designate in a progress schedule, or in a separate coordinated schedule, the dates for submission and the dates reviewed shop drawings, and project data will be needed for each product.

1.02 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, and product data prior to submission. Provide review stamp on submittals. See Example "A" form at the end of this section and General Conditions for specific requirements. Submittals are to be organized and concise. Content of submittals is to be project specific (disorganized submittals or submittals containing erroneous information will result in an immediate revise and resubmit)
- B. Determine and Verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with specifications.
- C. Coordinate each submittal with requirements of the work and of the Contract documents.
- D. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- E. Do not begin fabrication or work, which requires submittals until return of submittals with Architect's approval.

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that requires sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

1.04 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other contractor.
- B. Schedule submissions for the Architect to receive them at least 10 working days before dates reviewed submittals will be needed.
- C. Accompany submittals with transmittal form provided by Architect, (sample provided at end of this section) in duplicate, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The number of each shop drawing and product data submitted.

5. Notification of deviations from Contract Documents.
 6. Other pertinent data.
- D. Submittals to include:
1. Date and revision dates.
 2. Project title and number.
 3. The names of:
 - a. Architect/Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate detailer when pertinent.
 4. Identification of product or material.
 5. Relation to adjacent materials.
 6. Field dimensions, clearly identified as such.
 7. Specification section number.
 8. Applicable standards, such as ASTM number or Federal Specification.
 9. A blank space, 8" x 3", for the Contractor and Architect stamps.
 10. Identification of deviations from Contract Documents.
 11. Contractor's stamp, signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents. Sample text of Contractors Review Stamp is provided at the end of this Section, identified as "Example 'A'."
- E. All items required to be submitted for review are to bear the review stamp of the Contractor certifying that he has reviewed the content of the submittal, that the submittal complies with the Contract Documents and contains no unauthorized substitutions.
- F. The Architect reserves the right to reject and return, unreviewed, all submittals not bearing the review stamp of the Contractor; poor quality or incomplete Shop Drawings and all submittal which do not meet the requirements of this Section and General Conditions Article 23, Shop Drawings, Product Data, and Samples. Construction delays resulting from returned, incomplete or incorrect submittals are the responsibility of the Contractor and not the Architect

1.05 RESUBMISSION REQUIREMENTS

- A. Shop Drawings:
1. Revise initial drawings as required and resubmit as specified for initial submittal.
 2. Indicate on drawings any changes, which have been made other than those, requested by Architect.
 3. Product Data: Submit new data as required for initial submittal.

1.06 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Critical-Path Schedule: Prepare a fully developed, Critical Path Method type Contractor's construction schedule. Submit within 7 days after the date established for "Award of Contract". Submit Schedule in compliance with General Conditions Article 32, Progress Schedule.
1. Provide a separate time for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 2. Within each time period indicate estimated completion percentage in 10 percent increments. As Work progresses, indicate Actual Completion.
 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 4. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

5. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

1.07 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 30" x 42".
 - a. One of the prints returned shall be marked-up and maintained as a "Record Document".
 7. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- C. Number of copies submittals:
 1. Electronic document submittals:
 - a. Small sheet (8-1/2" x 11" and 11" x 17"), submit electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
 2. Hard copy submittals:
 - a. Large sheet, not larger than 30" x 42": submit 3 copies. One to be returned to the contractor for contractors use and reproduction, with other copies retained by architect and architects consultant.

1.08 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information. Delete information, which is not applicable.
 2. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 3. Distribution: Furnish copies of approved submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession. Do not permit use of unmarked _copies of Product Data in connection with construction.

1.09 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 - 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 - 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - b. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
 - 3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - 4. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal. Sample sets may be used to obtain final acceptance of the construction associated with each set.
 - 5. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.

1.11 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Contractor is to distribute reproductions of Shop Drawings and copies of Product Data which carry the Architect or Engineer stamp to:
 - 1. Job site file.
 - 2. Record Documents file.
 - 3. Other affected contractors.
 - 4. Subcontractors.
 - 5. Supplier or Fabricator.
 - 6. Owner's Inspector.

1.12 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide the required time for reviews, for securing necessary approvals of DSA if required, for possible revision and resubmittals, for placing orders and securing delivery.
- B. Delays: Cost of delays occasioned by tardiness of Contractor submittals may be back-charged as necessary and is not to be borne by the School District or Architect.

PART 2. PRODUCTS

NOT APPLICABLE

PART 3. EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 40 00
QUALITY CONTROL

PART 1 GENERAL

101 SECTION INCLUDES

- A. General Quality Assurance.
 - 1. Workmanship.
 - 2. Tolerances
 - a. References.
 - b. Mockup.
 - c. Manufacturers' Field Services and Reports.
- B. RELATED SECTIONS
 - 1. Section 01 30 00 - Administrative Requirements
 - 2. Section 01 63 00 - Product Substitution Procedures
- C. WORKMANSHIP
 - 1. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
 - a. Comply with manufacturers' instructions, in full detail, including each step in sequence.
 - b. Should manufacturers' instructions conflict with Project Documents, request clarification from Architect before proceeding.
 - c. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 - d. Perform work by persons qualified to produce workmanship of specified quality.
 - e. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- D. TOLERANCES
 - 1. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate to result in unacceptable field conditions.
 - a. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Project Documents, request clarification from Architect before proceeding.
 - b. Adjust Products to appropriate dimensions; position before securing Products in place.
- E. MOCK-UP
 - 1. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
 - 2. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
 - 3. Accepted mock-ups shall be representative of the quality required for the Work.
 - a. here mock-up has been accepted by Architect and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.
- F. MANUFACTURERS' FIELD SERVICES AND REPORTS
 - 1. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
 - a. Manufacturers' representative shall be subject to approval of Architect.
 - b. Manufacturers' representative shall submit a written report of observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
 - c. Submit report in duplicate within 30 days of observation to Architect, DSA, IOR, and District for information.

PART 2 PRODUCTS
2.01 NOT USED
PART 3 EXECUTION
NOT USED

END OF SECTION

SECTION 01 56 39
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.02 DEFINITIONS

- A. Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle concentric with each tree or shrub with a radius 1.25 times the diameter of the drip line unless otherwise indicated.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of organic mulch in sealed plastic bags labeled with composition of materials by percentage of weight, protection-zone fencing and protection-zone signage.
- C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- F. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.04 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.
- B. Preinstallation Conference: Conduct conference at Project site.

1.05 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.
- B. Topsoil: Stockpiled topsoil from location shown on Drawings.
- C. Organic Mulch: Ground or shredded bark, free from deleterious materials.
- D. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements. Previously used materials may be used when approved by Architect.
 - 1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top rails

- and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
- 2. Height of Fencing: 6 feet.
- 3. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.
- E. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Protection Zones: Mulch areas inside protection zones and other areas indicated with 6 inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.02 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected area except by entrance gates.
 - 1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
 - 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
 - 3. Access Gates: Install where indicated.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.
- C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.03 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 2000 - Earth Moving.
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots for root pruning.
- C. Do not allow exposed roots to dry out before placing permanent backfill.

3.04 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Temporarily support and protect roots from damage until they are permanently covered with soil.
 - 3. Cover exposed roots with burlap and water regularly.
 - 4. Backfill as soon as possible according to requirements in Section 312000 - Earth Moving.
- B. Root Pruning at Edge of Protection Zone: Prune roots by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.05 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
 3. Cut branches with sharp pruning instruments; do not break or chop.
 4. Do not apply pruning paint to wounds.
- B. Chip removed branches and dispose of off-site.
- 3.06 REGRADING**
- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
 - B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
 - C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- 3.07 FIELD QUALITY CONTROL**
- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.
- 3.08 REPAIR AND REPLACEMENT**
- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
 1. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
 2. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 3. Perform repairs within 24 hours.
 4. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- 3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS**
- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1. - GENERAL

SECTION INCLUDES

201 THIS SECTION ESTABLISHES PROCEDURES FOR SPECIFIED PRODUCT OPTIONS.

- A. The intent of this section is to ensure that specified product options exceed or equal the quality of the specified products and are furnished and installed in accordance with the design intent.
- B. RELATED SECTIONS
 - 1. General and Supplementary Conditions
 - a. Section 01 30 00 - Administrative Requirements
 - b. Section 01 63 00 - Product Substitution Procedures
 - 2. Where product options are included in the specifications sections and are specified by naming more than one, or several acceptable products or manufacturers, select any product or manufacturer listed.
 - 3. Where more than one manufacturer or product is listed in the specifications and only one manufacturer or product is specified in detail with model numbers and features, the one specified in detail shall be considered the standard of quality required for all manufacturers or products listed.
 - a. Where product options are included in the specifications and they are followed by an "or equal " or "approved equal" or equal meeting a specified standard, review and approval by the Architect and School District is required for Contractor proposed equal items. Procedures specified in Section 01 63 00 are to be followed.
 - b. For items specified only by Reference Standards, select any item meeting standards.
 - c. Performance Specifications: For items specified by performance requirements, select any item meeting the performance standards specified.
 - d. Descriptive Specifications: When specifications describe a product or assembly, listing exact components and characteristics, without the use of a brand or trade name, provide a product or assembly that contains the components and characteristics specified.
 - 1) Compliance with Standards Specifications: When specifications only require compliance with a Code, Regulation or Voluntary Standard, Provide products that comply with the specified Codes, Regulations or Standards.
 - 2) Submit request, as required for substitution, for any item or manufacturer not specifically named in the specifications on the Substitution Request Form enclosed with the Bidding Documents.
 - 3) Architect and School District will determine acceptability of proposed substitutions.

PART 2. - PRODUCTS

3.01 NOT APPLICABLE

PART 3. - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 63 00
PRODUCT SUBSTITUTION PROCEDURES

PART 1. GENERAL

1.01 SECTION INCLUDES

- A. This Section establishes procedures for Contractor submittal of substitutions.
- B. This Section provides procedures for review and compliance with Public Contract Code Section 3400 for the "or equal" clause allowing bidders to furnish any equal material, product, thing or service. Or equal items proposed by bidders are considered substitutions and are subject to approval of the Architect and School District. Burden of proof for "Or Equals is the responsibility of the Contractor.
- C. The intent of this section is to insure that proposed substitutions exceed or equal the quality of the specified products and are furnished and installed in accordance with the Contract Documents.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Section 01 60 00 - Product Requirements

1.03 SUBSTITUTIONS

- A. Substitution requests are to be submitted by General Contractors only. Requests submitted by Subcontractors, Material Suppliers, Manufacturers and other interested parties, other than General Contractors, will not be considered. Submit requests on the SUBSTITUTION REQUEST FORM at the end of this section.
- B. Comply with provisions of Articles for Substitutions in the General Conditions and any modifications to General Conditions provided in the Supplementary Conditions.
- C. Tabulate products by specification section number and title.
- D. Submit separate request for each substitution. In addition to SUBSTITUTION REQUEST FORM", support each request with a side by side itemized comparison of the proposed substitution with product specified; including significant variations. Substitution requests without side by side itemized comparisons will not be reviewed, not accepted. Support each request with:
 - 1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - 4) Fire resistance and fire ratings.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which product has been used, and date of each installation.
 - 2. List significant variations.
 - 3. Any effect the substitution may have on other trade contracts.
 - 4. List of changes required in other work or products.
 - 5. Accurate cost data comparing proposed substitution with product specified.
 - a. Amount of any change in cost.
 - 6. Designation of required license fees or royalties.
 - 7. Designation of availability of maintenance services, sources of replacement materials.
 - 8. Comparison of physical size and weight with product specified.
 - 9. Comparison of physical shape and available finishes.
- E. Substitutions will not be considered for acceptance when:
 - 1. They are indicated or implied on shop drawings or product data submittals and where not approved in compliance with the General Conditions and this section.

2. They are requested after the Contract has been executed.
 3. Substitution request procedures included in this Section and in the General and Supplementary Conditions are not complied with by the Contractor.
 4. The School District has determined that compatibility, standardization, technological sophistication, service and uniformity are necessary with regard to technological and certain safety items across the Schools in the District.
- F. Substitute products shall not be installed in the construction without written acceptance of the Architect and School District.
- G. Architect and School District will determine acceptability of proposed substitutions prior to awarding of the Contract. Substitutions may be approved after award of the contract only where the following conditions exist.
1. Specified item has been discontinued or is not unavailable to meet project schedule.
 2. The School District requested the Substitution.
 3. Substitution will reduce the Contract Amount and Contract Time (Credit Back to the District) without reducing quality.

1.04 CONTRACTOR'S SUBSTITUTION CERTIFICATION

- A. In making formal request for substitution contractor certifies that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitution as for product specified.
 3. He will coordinate installation of accepted substitution into the work, and will make such changes as may be required for the work to be complete in all respects including modification of the work of other trades.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 5. Substituted material is similar in physical appearance, size and weight and will install with the same opening and attachments.
 6. Substituted material has the same or better fire rating and fire resistive qualities, including flame spread, smoke developed, UL tested and listing.

1.05 ARCHITECT'S DUTIES

- A. Review contractor's request for substitutions with reasonable promptness.
- B. Consult with District and provide notification to contractor, in writing, of decision to accept or reject requested substitution.

1.06 AVAILABILITY OF SPECIFIED ITEMS

- A. Verify prior to bidding that all specified and substituted items will be available in time for installation during orderly and timely progress of the work.
- B. In the event specified items will not be available, notify the Architect prior to receipt of bids.
- C. Cost of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Architect or School District.

1.07 SUBSTITUTION WARRANTY REQUIREMENTS

- A. Submit with the substitution request an executed Substitution Warranty.
- B. The Contractor is to warrant, in writing, that the substituted items are to perform as specified, and assume complete responsibility for the same. This includes responsibility and costs required for modifications to building, other materials, or equipment, and any additional coordination with work of other trades. Testing, of Substitution proposed, if required or requested by the Architect or School District shall be paid for by the Contractor.

PART 2. PRODUCTS
NOT APPLICABLE
PART 3. EXECUTION
NOT APPLICABLE

SUBSTITUTION REQUEST FORM

We hereby submit for your consideration the following product instead of the specified item for the following project:

PROJECT: _____ PROJECT NO. _____

DRAWING NO. _____ DRAWING NAME _____

SPEC. SECT.	SPEC. NAME	PARAGRAPH	SPECIFIED ITEM
-------------	------------	-----------	----------------

Proposed Substitution: _____

Attach complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Submit, with request, all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted by:

Signature Title

Company

Address

Telephone FAX Number Date

Signature shall be by person having authority to legally bind his company to the above terms. Failure to provide legally binding signature will result in retraction of approval.

For Use by Design Professional:

____ Recommended _____ Recommended as Noted
____ Not Recommended _____ Received Too Late

Signed By _____

Date _____

For Use by Owner's Representative or Owner:

____ Accepted _____ Accepted as Noted
____ Not Accepted _____ Received Too Late

Signed By: _____

Date: _____

Fill in Blanks Below:

A. Does the substitution affect dimensions shown on Drawings? Yes _____ No _____

B. If yes, clearly indicate changes:

C. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes _____ No _____

If no, fully explain: _____

D. What effect does substitution have on other Contracts or other trades?

E. What effect does substitution have on construction schedule?

F. Manufacturer's warranties of the proposed and specified items are:
____ Same ___ Different (Explain on Attachment)

G. Reason for Request: _____

H. Itemized comparison of specified item(s) with the proposed substitution. List significant variations:

I. Accurate cost data comparing proposed substitution with product specified:

J. Designation of maintenance services and sources:

(ATTACH ADDITIONAL SHEETS IF REQUIRED)

**01 70 00 – Contract
Closeout**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Adjusting.
- D. Final Inspections
- E. Project Record Documents.
- F. Operation and Maintenance Data.
- G. Warranties.
- H. Spare Parts and Maintenance Materials.

1.02 RELATED SECTIONS

- A. General Conditions

1.03 CLOSEOUT PROCEDURES

- A. When work is complete, submit written certification that Project Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Project Documents and ready for Inspector, District, and Architect review. Certification shall request final inspection by District.
- B. Submit the following:
 - 1. Close-out submittals as required by State and local agencies.
 - 2. Close-out submittals as required in individual specification sections.
 - 3. Completed Record Drawings.
 - 4. Guarantee: Division 0
- C. Owner may occupy portions of the Work prior to its completion by the Contractor.

1.04 REQUIREMENTS PREPARATORY TO COMPLETION

- A. All temporary facilities shall be removed from the site.
- B. All plumbing and mechanical equipment shall operate quietly and free from vibration. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration. Provide additional brackets, bracing, water hammer arrestors, or other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.
- C. All operating instructions for equipment shall be properly mounted and posted as specified in their respective sections.
- D. Record (As-built) drawings shall be completed, signed, endorsed by the Inspector, and submitted to the Architect as specified herein.
- E. The Material and Equipment maintenance instructions, as specified in the body of the Specifications, shall be submitted to the Architect.
- F. All guarantees and warranties shall be submitted to the Architect.
- G. All tools, which are a permanent part of equipment installed in the Work, shall be delivered to the District.
- H. All keys, construction and permanent, properly identified shall be delivered to the District.

1.05 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment. Employ skilled workmen experienced in cleaning construction materials.

- B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- E. Wash and shine glazing and mirrors.

1.06 ADJUSTING

- A. Adjust operating products, systems, and equipment to ensure smooth and unhindered operation.

1.07 OBSERVATION OF COMPLETED WORK

- A. When the Work is complete, and after all requirements preparatory to Completion have been performed as herein specified, Contractor shall notify the Architect in writing.
- B. When requested by the District or Architect, the Contractor (and subcontractors as required by District or Architect), shall accompany the District and/or Architect on a tour of the Work.
- C. If corrective work is identified, the Contractor may be provided with a "punch-list" identifying work that is incomplete and/or in need of correction. A "punch-list" shall not relieve the Contractor of any requirement of the Project Documents, nor shall such a list be considered to be all-inclusive of remaining work. The Contractor is responsible for completing all work required by the Project Documents, including all incomplete and corrective work, within the time requirements of the Contract.
- D. If a "punch-list" or other notice of correction is issued to the Contractor, Contractor shall notify the Architect in writing, when all such work is complete. Contractor shall include with the written notification, a copy of all punch-lists issued to him. Each punch-list item shall be annotated with the construction superintendent's initials, and the date that the item was observed by him to have been completed. The Contractor shall reimburse all costs incurred by the District, Architect, or Architect's consultants, associated with reviewing incomplete or corrective work of the Contractor.

1.08 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set each of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract including, but not limited to, all RFI's, CCD's and CO's.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress. Do not permanently conceal any work until required information has been recorded.
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish main floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Include all plumbing systems, fire protection systems, and electrical systems. For gravity flow lines such as sewers and storm drains, locate all cleanouts, and indicate invert elevations at building lines, changes in direction, intersections, and property lines.
 5. Field changes of dimension and detail.
 6. Details not on original Contract Drawings.
- G. Methods of documenting changes:
1. Make reproducible transparencies of the Contract Drawings, and a reproducible copy of the Project Manual, all Addenda, Change Orders, and other Contract Documents.
 2. Legibly mark documents with permanent ink; color code as appropriate to separate various types of work.
 3. Provide all required data for Inspector verification prior to closing in concealed work.
 4. Make all changes, corrections, deletions, or additions on transparencies by a competent draftsman.
 5. The construction superintendent shall endorse the transparencies certifying the record drawings are an accurate illustration of the completed Work.
- H. Remove Architect title block and all registration seals from all documents.
- I. Submit documents to Architect prior to final Application for Payment.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11-inch text pages, three ring (D shape) side binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project. Include subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 30-pound white paper, in three parts as follows:
1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- E. Data specified in Article 1.07 D above shall incorporate the following:
1. Manufacturer's Manuals: Complete installation, operation, maintenance and service manuals, and printed instructions and parts lists for all materials and equipment where

such printed matter is regularly available from the manufacturer. This includes, but is not limited to such service manuals as may be sold by the manufacturer covering the operation and maintenance of his items, and complete replacement parts lists sufficiently detailed for parts replacement ordering to manufacturer. Bound publications need not be assembled in binders.

2. Equipment Nameplate Data: A typewritten list of all mechanical and electrical equipment showing all equipment nameplate data exactly. Identify equipment by means of names, symbols, and numbers used in the contract documents.
 3. System Operating Instructions: Typewritten instructions covering operation of the entire system as installed (not duplicating manufacturer's instructions for operating individual components). Include schematic flow and control diagrams as appropriate and show or list valves, control elements, and equipment components using identification symbols and numbers. List rooms, area of equipment served, and show proper settings for valves, controls and switches.
 4. System Maintenance Instructions: Typewritten instructions covering routine maintenance of system. List each item of equipment requiring inspection, lubrication, or service and briefly describe such maintenance, including types of lubricants and frequency of service. It is not intended that these instructions duplicate manufacturer's detailed instructions. Give name, address and phone number of nearest firm authorized or qualified to service equipment or provide parts.
- F. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
- G. Submit two sets of revised final volumes, within 10 days after final inspection.
- H. Wall-Mounted Data: Frame one set of typewritten system instructions and diagrams as required under Paragraph 3 and 4 above, covered with glass and mounted in locations as directed by the District. This set of instruction is in addition to those required herein before.

1.10 WARRANTIES

- A. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble in three ring (D-shape) side ring binder with durable plastic cover.
- C. Name District as the beneficiary. In addition, for all equipment and machinery, or components thereof, bearing a manufacturer's warranty that extends for a longer time period than the Contractor's warranty, secure and deliver the manufacturer's warranties in the same manner.
- D. Submit prior to final inspection.
- E. Form of Warranty: Written warranties, except manufacturers' standard printed warranties, shall be on the Contractor's, subcontractor's, material suppliers', or manufacturer's own letterhead, addressed to the District. All warranties shall be submitted in duplicate, and in the form shown on the following page, modified as approved to suit the conditions pertaining to the warranty.
- F. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.11 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS
NOT USED
PART 3 EXECUTION
NOT USED

END OF SECTION

SECTION 03 30 01
CAST-IN-PLACE CONCRETE FOR LANDSCAPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Section 32 13 13 "Concrete Paving" for surface finish.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. That do not contain Portland cement replacements.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- D. Samples: Provide a 3' tall x 3' long x 8" wide job site sample of each site wall finish specified, for review and approval by Owner's Representative prior to installation. Sample shall represent final appearance of the site wall, including construction joints and any stain, sealer or other surface applications. Provide additional samples until finish is considered acceptable by the Owner's Representative, at no additional cost to the Owner. The approved sample shall serve as a standard of appearance for the final work to be produced and shall remain on site until all site walls have been reviewed and approved by the Owner's Representative.

1.3 INFORMATIONAL SUBMITTALS

- A. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly and support of formwork.
- B. Material certificates.
- C. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, deformed.
 - 1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.
 - 2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- E. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.
- F. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, deformed steel.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, gray.
 2. Blended Hydraulic Cement: ASTM C 595, cement.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C 330, 1/2 inch nominal maximum aggregate size.
- D. Water: ASTM C 94/C 94M and potable.
- 2.4 ADMIXTURES**
- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- 2.5 FIBER REINFORCEMENT**
- A. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.
- 2.6 WATERSTOPS**
- A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
- C. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- D. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
- E. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.
- 2.7 VAPOR RETARDERS**
- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 millimeters thick.
- 2.8 CURING MATERIALS**
- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2.9 RELATED MATERIALS**
- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 4819, light weight polyethylene closed-cell expansion joint filler.

2.10 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days, unless otherwise indicated on the contract drawings.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
 - 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - 7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 pound /cubic yards.
- E. Proportion structural lightweight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 5000 psi at 28 days, unless otherwise indicated on the contract drawings.
 - 2. Calculated Equilibrium Unit Weight: 115 lb. /cubic feet, plus or minus 3 pound /cubic feet, as determined by ASTM C 567.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch.
 - 5. Air Content: 7 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size 3/8 inch or less.
 - 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - 7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 pound /cubic yard.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

2.13 ACCESSORIES

- A. Pre-emergent Herbicide: Surflan.
- B. Integral Color (Non-immersion Conditions: Davis Concrete Color or approved equal.
- C. Chemical Surface Retarder: 'Top-Cast' by Grace Construction Products.
- D. Liquid Surface Sealer: 'HLQ-125 by Sinak Corporation.
- E. Patch Bond: Weld-Crete.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer or radius exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 CONCRETE FINISHING

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, steps, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- E. See plan for finishes and finish locations.

3.8 CONCRETE PROTECTION, CURING AND SEALING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 pound/square foot x height before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Concrete surface sealer: All concrete paving shall be sealed with a clear penetrating concrete sealer. If efflorescence or alkali-staining is evident after the concrete has cured, lightly wash the surface with a mild muriatic acid solution (usually a 10:1 dilution) that has been thoroughly rinsed with water and cleaned with diluted Lithochrome Floor Cleaner by L.M. Scofield, or approved equal. Rinse again and dry thoroughly. After concrete mix has cured for at least one month, the concrete surface shall be thoroughly washed with fresh, clean water. After surface is thoroughly dried, apply 'HLQ-125' as manufactured by SINAK Corporation, or approved equal, per manufacturer's specifications.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

**SECTION 04 20 00
UNIT MASONRY**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units (CMU's).
- B. Related Sections:
 - 1. Section 05 50 00 - Metal Fabrications, for furnishing steel lintels and shelf angles for unit masonry.

1.02 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
 - 1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
 - 2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 3. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
 - 4. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, Details and Detailing of Concrete Reinforcement.
- D. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

1.04 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.
- B. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.05 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.

1.06 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
 - 2. Density Classification: Normal weight unless otherwise indicated.
- D. Concrete Facing Brick: ASTM C 1634.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3750 psi.

2.03 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.
- E. Masonry Cement: ASTM C 91.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- G. Colored Cement Product: Packaged blend made from Portland cement and hydrated lime or masonry cement and mortar pigments, complying with specified requirements, and containing no other ingredients.
- H. Aggregate for Mortar: ASTM C 144.
 - 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- I. Aggregate for Grout: ASTM C 404.
- J. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- K. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.
- M. Water: Potable.

2.04 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Wire Size for Veneer Ties: 0.148-inch diameter.

6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
- D. Masonry Joint Reinforcement for Multiwythe Masonry:
1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 2 side rods at each wythe of masonry 4 inches wide or less.
 2. Tab type, either ladder or truss design, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
 3. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
- E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized, carbon-steel continuous wire.
- 2.05 TIES AND ANCHORS**
- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.
- D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch-diameter, hot-dip galvanized steel wire.
- E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick, steel sheet, galvanized after fabrication.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.25-inch-diameter, hot-dip galvanized steel wire.
 3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick, steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.
- F. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- H. Adjustable Masonry-Veneer Anchors:
1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Contractor's Option: Unless otherwise indicated, provide one of the following types of anchors:
 3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
 4. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.
 - I. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- 2.06 MISCELLANEOUS MASONRY ACCESSORIES**
- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
 - B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
 - D. Weep/Vent Products: Use one of the following unless otherwise indicated:
 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 3. Vinyl Weep Hole/Vent: T-shaped units made from flexible PVC, consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.
 - E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
- 2.07 MASONRY CLEANERS**
- A. Detergent Type Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Acid cleaners are not acceptable.
- 2.08 MORTAR AND GROUT MIXES**
- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use Portland cement-lime or masonry cement mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
 - C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.
 - D. Pigmented Mortar: Use colored cement product.
 1. Pigments shall not exceed 10 percent of Portland cement by weight.
 2. Pigments shall not exceed 5 percent of masonry cement by weight.
 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement to produce required mortar color.
 1. Mix to match Architect's sample.
 2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.

- c. Concrete facing brick.
 - d. Face brick.
 - e. Hollow brick.
 - f. Glazed structural-clay facing tile.
- F. Grout for Unit Masonry: Comply with ASTM C 476.
- 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1.
 - 3. Provide grout with a slump of 10 to 11 inches as measured according to ASTM C 143/C 143M.
- G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
- 1. Application: Use epoxy pointing mortar for exposed mortar joints with the following units:
 - a. Pre-faced CMUs.
 - b. Glazed structural-clay facing tile.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.02 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
 - 2. For conspicuous horizontal lines; lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
 - 4. For conspicuous vertical lines, as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 - 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
 - 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.03 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
 - D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
 - E. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- 3.04 MORTAR BEDDING AND JOINTING**
- A. Lay hollow brick and CMUs as follows:
 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
 - B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
 - C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
 - D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- 3.05 MASONRY JOINT REINFORCEMENT**
- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 1. Space reinforcement not more than 16 inches o.c.
 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
 - B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
 - C. Provide continuity at wall intersections by using prefabricated T-shaped units.
 - D. Provide continuity at corners by using prefabricated L-shaped units.
- 3.06 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE**
- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.
- 3.07 REINFORCED UNIT MASONRY INSTALLATION**
- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
 - B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
 - C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches.
- 3.08 FIELD QUALITY CONTROL**
- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
 - B. Inspections: Level 1 special inspections according to the International Building Code.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 square feet of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- 3.09 PARGING**
- A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch
 - B. Use a steel-trowel finish to produce a smooth, flat, dense surface. Form a wash at top of parging and a cove at bottom.
 - C. Damp-cure parging for at least 24 hours and protect parging until cured.
- 3.10 REPAIRING, POINTING, AND CLEANING**
- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
 - B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 2. Protect surfaces from contact with cleaner.
 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- 3.11 MASONRY WASTE DISPOSAL**
- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
 - B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

**SECTION 05 05 19
POST-INSTALLED CONCRETE ANCHORS**

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Cast-in and drilled in anchors for concrete.

1.02 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
 - 1. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.
 - 2. Samples: Representative lengths and diameters of each type anchor shown on the Drawings.
 - 3. Quality Assurance Submittals:
 - a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - b. Certificates:
 - 1) ICC-ES Evaluation Reports.
 - 4. Manufacturer’s installation instructions.
 - 5. Installer Qualifications & Procedures: Submit installer qualifications as stated in Section 1.03.B. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.
- B. Closeout Submittals: Submit the following:
 - 1. Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout Submittals Section.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Drilled-in anchors shall be installed by a contractor with at least five years of experience performing similar installations.
- B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer’s representative for the contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
 - 1. hole drilling procedure
 - 2. hole preparation & cleaning technique
 - 3. adhesive injection technique & dispenser training / maintenance
 - 4. rebar dowel preparation and installation
 - 5. proof loading/torquing
- C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have one of the following certifications:
 - 1. ICC-ES Evaluation Report indicating conformance with current applicable ICC-ES Acceptance Criteria.
 - a. DELIVERY, STORAGE AND HANDLING
- D. General: Comply with Division 1 Section □Product Storage and Handling Requirements.
 - 1. Store anchors in accordance with manufacturer’s recommendations.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Fasteners and Anchors:
 - 1. Bolts and Studs: ASTM A307; ASTM A449 where “high strength” is indicated on the Drawings.
 - 2. Carbon and Alloy Steel Nuts: ASTM A563.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

3. Carbon Steel Washers: ASTM F436.
 4. Carbon Steel Threaded Rod: ASTM F1554 Grade 36, or ASTM F1554 Grade 55, or ASTM F1554 Grade 105.
 5. Wedge Anchors: ASTM A510; or ASTM A108.
 6. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
 7. Stainless Steel Nuts: ASTM F594.
 8. Zinc Plating: ASTM B633.
 9. Hot-Dip Galvanizing: ASTM A153.
 10. Metric Anchor Bolts, Screws, and Studs: ISO 898 Part 1.
 11. Metric Anchor Nuts: EN 24033.
 12. Metric Anchor Stainless Steel Bolts, Screws, and Studs: ISO 3506 Part 1.
 13. Metric Anchor Stainless Steel Nuts: ISO 3506 Part 2.
 14. Reinforcing Dowels: ASTM A615
 - a. CAST-IN-PLACE BOLTS
- B. Anchors, Bolts, Nuts, and Washers: Bolts and studs, nuts, and washers shall conform to ASTM A307, Grade A, and ASTM A449, ASTM A563, and ASTM F436, as applicable. Hot-dip galvanized bolts and studs including associated nuts and washers in accordance with ASTM A153.
- C. Screw Anchors: screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
1. Exterior Use: As indicated on the Drawings, provide mechanically galvanized or stainless steel anchors. Mechanically galvanized steel anchors shall meet ASTM B695, Class 55 specifications. Stainless steel anchors shall be AISI Type 316 stainless steel. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik HUS-EZ (KH-EZ), KH-EZ C, KH-EZ E, KH-EZ I, KH-EZ P, ICC ESR-3027 (carbon steel).
 - b. Hilti KH-EZ CRC, ICC ESR-3027 (mechanically galvanized carbon steel).
 - c. Hilti KH-EZ SS316, ICC ESR-3027 (stainless steel).
 - d. Hilti Kwik HUS.
 - e. Titan HD Heavy-Duty Screw Anchor, ESR-0056, stainless steel.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Cast-In-Place Bolts: Use templates to locate bolts accurately and securely in formwork.
- B. Drilled-In Anchors:
1. Drill holes with rotary impact hammer drills using carbide-tipped bits. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
 - a. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
 - b. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 2. Perform anchor installation in accordance with manufacturer instructions.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

3.02 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

3.03 FIELD QUALITY CONTROL

- A. Testing: 10% of each type and size of drilled-in anchor shall be proof loaded by the independent testing laboratory. If more than 10% of the tested anchors fail to achieve the specified torque or proof load within the limits as defined on the Drawings, all anchors of the same diameter and type as the failed anchor shall be tested, unless otherwise instructed by the Engineer.
 - 1. Tension testing should be performed in accordance with ASTM E488.
 - 2. Torque shall be applied with a calibrated torque wrench.
 - 3. Proof loads shall be applied with a calibrated hydraulic ram.
- B. Minimum anchor embedments, proof loads and torques shall be as shown on the Drawings.

END OF SECTION

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabrications - Provide miscellaneous metal fabrications complete as indicated, specified, and required. Including but not limited to:
 - 1. All miscellaneous metal fabrications to complete the work

1.02 RELATED SECTIONS

- A. Section 09 96 00 - High-Performance Coatings

1.03 REFERENCES

- A. AISC - Code of Standard Practice 360-10 - Steel Construction Manual, 14th Edition & AISC 303- 10.
- B. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- C. AWS D-1.1 - Welding in Building Construction.
- D. AWS A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.
- E. T24, CCR - Title 24, California Code of Regulations.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00: Submittal Procedures.
- B. Submit shop drawings indicating materials used, dimensions, anchoring details, and adjacent construction.
- C. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Perform all work in accordance with references.

1.06 PRODUCT HANDLING

- A. Store miscellaneous metal items above ground on platforms, skids or other approved supports.
- B. Protect metals from corrosion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structural Steel Shapes: Conform to ASTM A36.
- B. Steel Pipe: Steel pipe other than pipe used for structural purposes shall conform to ASTM A120, or ASTM A53, Fy = 35 ksi.
- C. Square and Rectangular Steel Tubing: Steel tubing other than tubing used for structural purposes shall be carbon steel conforming to ASTM A500. Fy = 46 ksi.
- D. Steel Bolts and Washers: ASTM A307, Grade A. Plain Washers: ANSI B27.2.
- E. Rolled Steel Plates and Shapes:
 - 1. Shapes and plates shall conform to ASTM A36, except for plates to be bent or cold-formed.
 - 2. Plates to be bent or cold-formed shall conform to ASTM A283, Grade C.
- F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.02 FABRICATION

- A. General:
 - 1. For fabrication of items which will be exposed to view, use only materials which are smooth and free of blemishes. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc- coatings.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

2. Form exposed work true to line and level with accurate angles and surfaces, and straight sharp edges.
 3. Ease exposed edges to a radius of approximately 1/32", unless otherwise indicated or specified.
 4. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
 5. Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible.
 6. Remove loose rust, mill scale, cutting and punching burrs.
 7. Fabricate items in as large sections as practical to minimize field jointing.
- B. Miscellaneous Framing and Supports: Provide miscellaneous steel framing and supports that are not a part of structural steel framework, as required to complete work.
1. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of necessary dimensions to receive adjacent work to be retained by framing.
 2. Shelf angles for exterior construction shall be galvanized steel of sizes indicated.
- C. Welding:
1. Weld connections in the shop, unless indicated or specified otherwise.
 2. Weld corners and seams continuously and in accordance with requirements of AWS Code. Welds shall be inspected as indicated in 01 41 00 - Testing and Inspection.
 3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Galvanizing:
1. Galvanizing shall conform to requirements of ASTM A123.
 2. Items to be galvanized shall be hot-dip galvanized in as large sections as possible.
 3. Treatment for damaged galvanized surfaces shall be Galvalloy, Galvabar, Galvicon, Drygalv or equal. Comply with ASTM A780.
- E. Shop Finish:
1. Miscellaneous metal fabrications which will be exposed when building is completed shall receive a coat of primer.
 2. Shop application at time steel products are fabricated:
 - a. Plain steel: Tnemec Series 94-97 Tneme-Zinc, two-component catalyzed epoxy coating at 2.5-3.5 mils DFT.
 - b. Galvanized steel: Tnemec Series L69 Epoxoline, two-component catalyzed epoxy coating at 2-3 mils DFT.
 3. Preparation for Painting: Miscellaneous ferrous metal, except items specified galvanized or shop primed, shall be thoroughly cleaned of all mill scale, grease, dirt or rust, by scraping, wire-brushing, or sandblasting and shall be delivered to job unpainted, but in proper condition for painting. Shipping oil or other protective coatings shall be removed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Drinking Fountain Rail Barriers: CBC Section 11B-601
1. Install as detailed and indicated in Drawings.
 2. When anchorage to horizontal concrete surfaces is not indicated, set standards into metal sleeves cast into concrete, and extending into same not less than 6". Wedge standards true and plumb and grout in place with non-shrink grout specified in Section 03600 - Grouts. Finish grout smooth and flush with floor surface.
 3. Where anchorage to vertical surfaces is not indicated, weld rail to rectangular or round pipe rail flange, shaped and sized so face of flange will firmly abut the vertical surface. Secure flange to concrete or masonry with 3/8 inch diameter wedge anchor bolts. Secure flange to wood framing with 3/8 inch diameter lag screws, unless otherwise indicated. Embedment to be 2-1/2 inches or greater. Secure flange to steel framing with 3/8 inch diameter machine bolts, unless otherwise indicated.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

	METAL FABRICATIONS
	05 50 00 - 3

- B. Miscellaneous Fabrications: Install and secure to structure as required to ensure component will support all loads anticipated, identified, or required by T24, CCR, and to result in a complete installation.

3.02 REPAIR OF DAMAGED GALVANIZED SURFACES

- A. Repair galvanized finish damaged or burned off in welding.

END OF SECTION

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

**SECTION 09 96 00
PERFORMANCE COATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings for all exposed, unfinished metal :
- B. Surface preparation.

1.02 RELATED REQUIREMENTS

- A. 05 50 00 - Metal Fabrications

1.03 REFERENCE STANDARDS

- A. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).
- D. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1 2016.
- E. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2 2021.
- F. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals 2016.
- G. SSPC-PA 2 - Procedure For Determining Conformance To Dry Coating Thickness Requirements 2018.
- H. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- I. SSPC-SP 2 - Hand Tool Cleaning 2018.
- J. SSPC-SP 3 - Power Tool Cleaning 2018.
- K. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- L. SSPC-SP 11 - Power-Tool Cleaning to Bare Metal 2020.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- C. Product Data: Provide data indicating coating materials .
- D. Samples: Submit three 8 -1/2 x 11 inch samples of selected colors.
- E. Manufacturer's Certificate: Certify that high-performance coatings comply with VOC limits specified.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Maintenance Data: Include cleaning procedures and repair and patching techniques.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Coating Materials: 1 gallon of each type and color.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

- 2. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.
- B. Single-Source Responsibility: Provide primers and undercoat material produced by the same manufacturer as the finish coats for each type of coating. Use only thinners recommended by the manufacturer and only within recommended limits.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Restrict traffic from area where coating is being applied or is curing.

1.08 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Tnemec Company, Inc., North Kansas City, MO (816/474-3400; regional representative, TPC Consultants, INC., Compton, CA, 310/637-2363).
- B. Acceptable Manufacturers: Equivalent products of the following manufacturers:
 - 1. Ameron Protective Coatings, Brea, CA (714/529-1951 or 800/344-0025).
 - 2. Carboline Company, St. Louis, MO (800/848-4645).
- C. Substitutions will be considered in accordance with the provisions of section 01 6300 - Product Substitutional Procedures

2.02 HIGH-PERFORMANCE COATING SYSTEMS

- A. General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
- B. Urethane Coating System:
 - 1. Primer Coating: For shop application at time steel products are fabricated.
 - a. Plain steel: Tnemec Series 94-97 Tneme-Zinc, two-component catalyzed epoxy coating at 2.5-3.5 mils DFT.
 - b. Galvanized steel: Tnemec Series L69 Epoxoline, two-component catalyzed epoxy coating at 2-3 mils DFT.
 - 2. Spot Primer Coating: For field application where primer coating is damaged due to erection, cutting, welding and installation of steel products, Tnemec Series 94-H20 Hydro-Zinc at 2.5 - 3.5 mils DFT over bare metal.
 - 3. Intermediate Coating: For field application over all surfaces of steel products after erection, cutting, welding and installation, Tnemec Series L69 Epoxoline, two-component catalyzed epoxy coating at 2 - 4 mils DFT.

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

4. Finish Colors: As indicated on the Drawings or, if not indicated, as directed by the Architect from full range of standard colors.
- C. Acrylic Polymer System: For Galvannealed Steel Doors and Frames.
1. Prime: Tnemec V115 Uni-Bond at 2.0 to 4.0 mils DFT.
 2. Intermediate Coat: Tnemec V115 Uni-Bond at 2.0 to 4.0 mils DFT.
 3. Finish Coat: Tnemec 1028 Enduratone at 2.0 to 3.0 mils DFT.

2.03 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- F. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Galvanized Surfaces:
 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 2. Prepare surface according to SSPC-SP 2.
- E. Ferrous Metal:
 1. Solvent clean according to SSPC-SP 1.
 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.

3.03 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in MPI - Architectural Painting and Specification Manual.
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for general requirements for field inspection.

WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	11/29/2023
----------	---	------------

3.06 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.07 PROTECTION

- A. Protect finished work from damage.

END OF SECTION

WD 23414	SIERRA HIGH SCHOOL	11/29/2023
	BASEBALL FIELD IMPROVEMENTS	

**SECTION 11 68 33.33
SOLID VINYL BATTERS EYE**

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:
1. BE2040 - 20' x 40' Solid Vinyl Batter's Eye

1.02 RELATED WORK

- A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:
1. Division 03 – Concrete; Sections: Cast-in-Place Concrete
 2. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
 3. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete and Asphalt

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. National Federation of State High School Associations (NFHS)
 2. National Collegiate Athletic Association (NCAA)
 3. International Association of Athletics Federations (IAAF)
 4. American Sports Builders Association (ASBA)
 5. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects or Owners representatives review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 BE2040 - 20' x 40' Solid Vinyl Batter's Eye

- A. BASE: BE2040 - 20' x 40' Solid Vinyl Batter's Eye as Manufactured and Supplied by:
Sportsfield Specialties, Inc.
P.O. Box 231
41155 State Highway 10
Delhi, NY 13753
p. 888-975-3343
www.sportsfield.com
- B. COMPONENTS:
1. Overall System Dimensions: 20'H x 40'W
 2. Vertical Structure:
 - a. Terminal Uprights:
 - i. W8x21 Steel I-Beams
 - ii. Black Super Durable Powder Coated Finish
 - b. Center Upright:

- i. W8x24 Steel I-Beam
 - ii. Black Super Durable Powder Coated Finish
 - c. 20' Height Above Finish Grade
 - d. 4' Embedment Depth (typ.)
- 3. Horizontal Structure:
 - a. W8x13 Steel I-Beams
 - i. Black Super Durable Powder Coated Finish
 - b. Fixed Upper Support Tube
 - i. Black Super Durable Powder Coated Finish
 - c. Lower Tensioning Tube
 - i. Black Super Durable Powder Coated Finish
 - ii. Includes 2" Ratchet Straps for Tensioning
 - d. Tensioned Cables to Support Wind Load on Solid Vinyl
- 4. Double Layer (Front and Back) Solid Vinyl:
 - a. Single-Piece Solid Vinyl Panels 15'-10 3/4" H x 39'-10" W
 - i. Opacity: 100%
 - ii. Finish: Matte
 - iii. Weight: 12 oz/yd² (ASTM D3776)
 - iv. Construction: 9 x 9/1", 1000 x 1000
 - v. Grab Tensile: 253 x 223 lbs./1" (ASTM D5034)
 - vi. Tongue Tear: 74 x 65 lbs./1" (ASDM D2261)
 - vii. Adhesion: 24 lbs./2" (ASTM D751)
 - viii. Cold Crack: -30° F (ASTM D2136)
 - ix. Treatments: Anti-Mildew, UV
 - x. Fire Retardant: Self-Extinguishing
 - xi. Various Standard Colors Available
 - b. Reinforced Perimeter Hem and Seams
 - c. Reinforced Pockets Top and Bottom for Support Tubes
 - d. Optional: Custom High-Resolution Digitally Printed Graphics
- 5. Includes All Necessary Assembly Hardware
- 6. Manufacturer to Provide Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of Project Location

PART 3 EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. All Batter's Eye systems shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Concrete anchoring foundations to be determined by responsible party based on local soil conditions and building codes. Installer should have a minimum of five (5) Batter's Eye system installations or similar experience in the previous three (3) years.

END OF SECTION

**SECTION 11 68 33.34
ULTRA CROSS KNOTLESS NETTING**

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:

1.02 RELATED WORK

- A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:
1. Division 03 – Concrete; Sections: Cast-in-Place Concrete
 2. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
 3. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete, Asphalt and Site Improvements

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. National Federation of State High School Associations (NFHS)
 2. National Collegiate Athletic Association (NCAA)
 3. International Association of Athletics Federations (IAAF)
 4. American Sports Builders Association (ASBA)
 5. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects or Owners representatives review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements. The Manufacturer shall have a current American Sports Builders Association (ASBA) Supplier Certificate of Distinction designation.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 BSSNUC Ultra Cross Knotless Dyneema® UHMWPE Netting

- A. BASE: BSSNUC Ultra Cross Knotless Dyneema® UHMWPE Netting as Manufactured and/or Supplied by:
Sportsfield Specialties, Inc.
P.O. Box 231
41155 State Highway 10
Delhi, NY 13753
p. 888-975-3343
f. 607-746-8481
www.sportsfieldspecialties.com
- B. COMPONENTS:
1. BSSNUC Ultra Cross Knotless Dyneema® UHMWPE Netting:
 - a. Length, Height and Configuration as Required

- b. Ultra Cross Knotless Netting
- c. Dyneema® Ultra-High Molecular Weight Polyethylene (UHMWPE) SK-75 Black Fiber Construction
- d. 4 Ply, 1.2 mm (0.0472") Diameter Twine
- e. 95% Open Mesh Area (See-Through Visibility)
- f. 58,445 psi Minimum Breaking Strength
- g. 30% Maximum Elongation at Break
- h. 1-3/4" (44 mm) Square Mesh Size, 0.009 lbs. per Square Foot
- i. 4-Strand, Braided, Continuous Monofilament Dyneema® Fiber
- j. Black Multi-Filament Polypropylene Solid Braid Derby Rope Sewn Binding on Perimeter Edges - 1/4" Diameter, 530 lb. Minimum Breaking Strength
- k. Urethane Black Bonded Finish
- l. Strong Resistance to Ultraviolet (UV) Light Degradation
- m. Excellent Resistance to Chemicals and Water Absorption

PART 3
3.01

A.

EXECUTION

INSTALLATION OF EQUIPMENT

All BSSNUC Ultra Cross Knotless Dyneema® UHMWPE Netting shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Concrete anchoring foundations to be determined by others based on local soil conditions and building codes. Installer should have a minimum of five (5) ball safety netting system installations or similar experience in the previous three (3) years.

END OF SECTION

SECTION 11 68 33.35
GAMESHADE® DUGOUT 10'W x 32'L

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:
1. GD10X32 - GameShade® Dugout 10'W x 32'L

1.02 RELATED WORK

- A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:
1. Division 03 – Concrete; Sections: Cast-in-Place Concrete
 2. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
 3. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete and Asphalt

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. National Federation of State High School Associations (NFHS)
 2. National Collegiate Athletic Association (NCAA)
 3. International Association of Athletics Federations (IAAF)
 4. American Sports Builders Association (ASBA)
 5. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects or Owners representatives review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 GD10X32 - GameShade® Dugout 10'W x 32'L

- A. BASE: GD10X32 - GameShade® Dugout 10'W x 32'L as Manufactured and Supplied by:
Sportsfield Specialties, Inc.
P.O. Box 231
41155 State Highway 10
Delhi, NY 13753
p. 607-746-1460
www.sportsfieldspecialties.com
- B. DESIGN CRITERIA:
Building Code: ASCE 7-10
1. Maximum Wind Speed Rating: 140mph, Exposure Category C
 2. Maximum Ground Snow Load: 60psf
 3. Seismic Design: Category E, Ss=1.5g, S1=0.75g
 4. Roof Pitch: 2" Rise Back-to-Front

C.

COMPONENTS:

1. GameShade® Dugout:
 - a. Overall Dimensions: 10'W x 32'L
 - b. Structural Columns Fabricated of:
 - i. 3-1/2" x 3-1/2" x 3/16" (0.1875") Structural Steel Tube with Factory Pre-Drilled 9" x 9" x 5/8" (0.625") A36 Steel Base Mounting Plates and 9" x 9" x 5/8" (0.625") A36 Steel Roof and Column Cap Plates
 - ii. Fully Welded Construction
 - iii. Maximum Allowable Spacing Between Structural Steel Columns is Fifteen (15') On-Center
 - c. Roof Frame Fabricated of:
 - i. 5" x 2" x 3/16" (0.1875") Structural Steel Rectangular Perimeter, Transverse, and Longitudinal Roof Tubes
 - ii. Fully Welded Construction
 - d. Structural Steel Columns and Roof Frame Receive a Powder Coated Primer and Coated Finish, Various Standard and Custom Colors Available
 - e. Roofing Material is 29 Gauge, Classic Rib® Style Corrugated Metal with J-Channel Drip Cap Installed on Front and Sides, Various Standard Paint Finish Colors Available
 - f. Structural Columns Attached to Roof Structure with Galvanized Hardware
 - g. Includes Carbon Steel Anchoring Hardware, Epoxy and Lifting Eye Bolts
 - h. Model Specific Hardware Kit and Installation Instructions
 - i. Optional Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of Project Location

PART 3

3.01

A.

EXECUTION

INSTALLATION OF EQUIPMENT

All Dugouts shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Concrete anchoring foundations to be determined by others based on local soil conditions and building codes. Installer should have a minimum of five (5) Dugout installations or similar experience in the previous three (3) years.

END OF SECTION

SECTION 11 68 33.36
4'H SEMI-PERMANENT FENCING SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:
1. SF4 - 4'H Semi-Permanent Fence System

1.02 RELATED WORK

- A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:
1. Division 03 – Concrete; Sections: Cast-in-Place Concrete
 2. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
 3. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete, Asphalt and Site Improvements

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. National Federation of State High School Associations (NFHS)
 2. National Collegiate Athletic Association (NCAA)
 3. International Association of Athletics Federations (IAAF)
 4. ASTM International
 5. American Sports Builders Association (ASBA)
 6. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects or Owners representatives review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 SF4 - 4'H Semi-Permanent Seasonal Fence System

- A. BASE: SF4 - 4'H Semi-Permanent Seasonal Fence System as Manufactured and/or Supplied by:
Sportsfield Specialties, Inc.
P.O. Box 231
41155 State Highway 10
Delhi, NY 13753
p. 888-975-3343
www.sportsfieldspecialties.com
- B. COMPONENTS:
1. SF4 - 4'H Semi-Permanent Fence System:
 - a. Vertical Posts:
 - i. 4" Aluminum Tube (4" O.D. x 1/8" Wall)

- ii. Durable Powder Coated Finish
 - 1. Various Standard Color Options Available
- iii. Typical Spacing: 10' On-Center
- b. Fence Panel:
 - i. Dimensions: 4'H x 9'-6"W
 - 1. Top of Fence Panel to Finish Grade: 4'-1"
 - ii. Fabricated of Stamped 1/8" (0.125") Aluminum Panel with Double Reinforced Bends Welded
 - iii. 2" Square Open Mesh Size
 - iv. 1/8" (0.125") Aluminum Panel Mounting Brackets
 - v. Durable Powder Coated Finish
 - 1. Various Standard Color Options Available
- c. Ground Sleeve:
 - i. 12" Depth
 - ii. Aluminum Construction
 - iii. Welded Leveling Plate
 - iv. Press Fit Ground Sleeve Plug

PART 3
3.01

A.

EXECUTION
INSTALLATION OF EQUIPMENT

All SF4 - 4'H Semi-Permanent Fence System shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Installer should have a minimum of five (5) semi-permanent fence installations or similar experience in the previous three (3) years.

END OF SECTION

SECTION 11 68 33.37
6'H SEMI-PERMANENT FENCING SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:
1. SF6 - 6'H Semi-Permanent Fence System

1.02 RELATED WORK

- A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:
1. Division 03 – Concrete; Sections: Cast-in-Place Concrete
 2. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
 3. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete, Asphalt and Site Improvements

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. National Federation of State High School Associations (NFHS)
 2. National Collegiate Athletic Association (NCAA)
 3. International Association of Athletics Federations (IAAF)
 4. ASTM International
 5. American Sports Builders Association (ASBA)
 6. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects or Owners representatives review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 SF6 - 6'H Semi-Permanent Seasonal Fence System

- A. BASE: SF6 - 6'H Semi-Permanent Seasonal Fence System as Manufactured and Supplied by:
- Sportsfield Specialties, Inc.
P.O. Box 231
41155 State Highway 10
Delhi, NY 13753
p. 888-975-3343
www.sportsfieldspecialties.com
- B. COMPONENTS:
1. SF6 - 6'H Semi-Permanent Seasonal Fence System:
 - a. Vertical Posts:
 - i. 4" Aluminum Tube (4" O.D. x 1/8" Wall)

- ii. Durable Powder Coated Finish
 - 1. Various Standard Color Options Available
- iii. Typical Spacing: 10' On-Center
- b. Fence Panel:
 - i. Dimensions: 5'-11"H x 9'-6"W
 - 1. Top of Fence Panel to Finish Grade: 6'
 - ii. Fabricated of Stamped 1/8" (0.125") Aluminum Panel with Double Reinforced Bends Welded
 - iii. 2" Square Open Mesh Size
 - iv. 1/8" (0.125") Aluminum Panel Mounting Brackets
 - v. Durable Powder Coated Finish
 - 1. Various Standard Color Options Available
- c. Ground Sleeve:
 - i. 24" Depth
 - ii. Aluminum Construction
 - iii. Welded Leveling Plate
 - iv. Press Fit Ground Sleeve Plug

PART 3
3.01
A.

EXECUTION
INSTALLATION OF EQUIPMENT

All SF6 - 6'H Semi-Permanent Fence System shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Installer should have a minimum of five (5) semi-permanent fence installations or similar experience in the previous three (3) years.

END OF SECTION

SECTION 11 68 43
BASEBALL SCOREBOARD

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-sided LED baseball scoreboard

1.02 REFERENCES

- A. Standard for Electric Signs, UL 48
- B. Standard for CSA C22.2 #207
- C. Federal Communications Commission Regulation Part 15
- D. National Electric Code

1.03 SUBMITTALS

- A. Product data: Submit manufacturer's product illustrations, data and literature that fully describe the scoreboards and accessories proposed for installation.
- B. Shop drawings: Submit mechanical and electrical drawings.
- C. Maintenance data: Submit manufacturer's installation, operation, and maintenance manuals.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Product delivered on site
- B. Scoreboard and equipment to be housed in a clean, dry environment

1.05 PROJECT CONDITIONS

- A. Environmental limitations: Do not install scoreboard equipment until mounting structure is secure and concrete has ample time to cure.
- B. Field measurements: Verify position and elevation of structure and its layout for scoreboard equipment. Verify dimensions by field measurements.
- C. Verify mounting structure is capable of supporting the scoreboard's weight and windload in addition to the auxiliary equipment.
- D. Installation may proceed within acceptable weather conditions.

1.06 QUALITY ASSURANCE

- A. For outdoor use
- B. Source Limitations: Obtain each type of scoring or related equipment through one source from a single manufacturer.
- C. ETL listed to UL 48
- D. NEC compliant
- E. FCC compliant
- F. ETLC listed to CSA 22.2 #207

1.07 WARRANTY

- A. Provide 5 years of no cost parts exchange including standard shipping on electronics parts and radios due to manufacturing defects
- B. Provide toll-free service coordination
- C. Provide technical phone support during Daktronics business hours

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Daktronics, Inc., 201 Daktronics Drive, P.O. Box 5128, Brookings, SD 57006-5128
- B. Electro-Mech Scoreboard Company
- C. Fair Play

2.02 PRODUCT

- A. Daktronics BA-2030 single-sided baseball scoreboard displays HOME and GUEST team scores for up to nine innings, total RUNS to 99 for each team, BALL to three, STRIKE to two and OUT to two.

2.03 SCOREBOARD – QUANTITY 1

- A. General information
 - 1. Dimensions: 6'-6" (1.98 m) high, 20'-0" (6.10 m) wide, 0'-8" (203 mm) deep
 - 2. Base weight: 600 lb (272 kg) with vinyl captions – options may increase weight
 - 3. Base power requirement: 230 W (red/amber digits) with vinyl captions
 - 4. Color: provide over 150 colors to choose from
- B. Construction
 - 1. Alcoa aluminum alloy 5052 for excellent corrosion resistance
 - 2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
 - 3. Scoreboard top and bottom: 0.125" (3.18 mm) thick
- C. Digits
 - 1. LED color
Amber
 - 2. BALL, STRIKE, and OUT digits: 18" (457 mm) high
 - 3. Inning scores and RUNS digits: 15" (381 mm) high
 - 4. Seven bar segments per digit
 - 5. PanaView® LED digit technology
 - 6. All digits are sealed front and back with weather-tight silicone gel
- D. Captions
 - 1. Vinyl applied directly to scoreboard face
 - 2. HOME and GUEST captions: 12" (305 mm) high
 - 3. BALL, STRIKE, and OUT captions: 10" (254 mm) high
 - 4. Inning numbers and RUNS captions: 8" (203 mm) high
 - 5. Color: standard white or others available upon request
- E. Accessory Equipment
 - 1. **Vinyl striping applied around the scoreboard face**
 - 2. **Programmable Team Name Message Centers (TNMCs) – add 80 lb (36 kg) and 270 W**
 - 3. **Two 25" (635 mm) high, 31" (787 mm) wide vinyl logo/sponsor areas on upper corners of display face**
 - 4. **Individual digit protective screens**

2.04 SCORING CONSOLE

- A. Console is an All Sport® 5000 controller
- B. Scores multiple sports using changeable keyboard inserts
- C. Controls multiple scoreboards and displays, including other All Sport 5000 controlled displays currently owned by customer
- D. Recalls clock, score, and period information if power is lost
- E. Runs Time of Day and Segment Timer modes
- F. Console includes:
 - 1. Rugged aluminum enclosure to house electronics
 - 2. Sealed membrane water-resistant keyboard
 - 3. 32-character LCD to verify entries and recall information currently displayed
 - 4. Power cord that plugs into a standard grounded outlet; 6 watts max
 - 5. Control cable to connect to the control receptacle junction box (wired system only)
 - 6. Hand-held switch for main clock start/stop and horn
 - 7. Soft-sided carrying case
- G. Accessory Equipment

1. **2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels; system includes a transmitter installed inside the console and a receiver installed inside the scoreboard(s)**
- H. Scoring System
1. Scoring system consists of an All Sport® MX-1 interface box and a compatible CUSTOMER-SUPPLIED mobile device or tablet with DAK Score application installed.
 2. DAK Score application scores multiple sports including baseball, football, and soccer.
 3. Scoreboard(s) may be controlled via wired signal connection or wireless radio.
 4. MX-1 interface box includes:
 - a. Sealed USB A to USB Micro power cord and wall-plug power supply
 - b. Control cable to connect to the control receptacle junction box (wired system only)
 - c. 2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels. Requires radio receiver installed inside the scoreboard(s).
 - d. Clearly visible TX, Status, and Power diagnostic LEDs for quick system troubleshooting
 - e. Wireless operating ranges:
 - 50' (15 m) between mobile device and interface box
 - 1500' (457 m) between interface box and scoreboard
- I. Accessory Equipment
1. Weather-sealed enclosure for permanently mounting the MX-1 unit outdoors

NON-BACKLIT AD & ID PANELS – 2FT X 20FT @1

- I. General information
1. Dimensions and weight shall vary with size of signage. Refer to **SL-03761**.
 2. Color: provide over 150 colors to choose from, plus unlimited digital image selection
- J. Construction
1. Signage cabinetry and metal parts shall be made of durable, lightweight aluminum.
 2. All sheet metal parts shall be constructed of 0.050" (1.3 mm) aluminum with an alloy content of 5052-H34 minimum.
 3. All painted surfaces shall be primed and painted using automotive industrial finish or better.
- K. Sign decoration
1. Sign decoration shall be constructed using self-adhesive vinyl materials with a minimum of a 3-year life expectancy.
 2. Digitally produced graphics shall be UV protected.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting structure is ready to receive scoreboard. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings. Verify concrete has cured adequately according to specifications.

3.02 INSTALLATION

- A. All power and control cables to scoreboards and displays will be routed in conduit. Power to the scoreboards/displays as well as raceways shown on electrical plans by the Electrical Contractor. Scoreboard control wiring including conduit will be the responsibility of the contractor assigned the scoreboard equipment.
- B. Install scoreboards and exterior displays to beams in location detailed and in accordance with manufacturer's instructions. Verify unit is plumb and level.

3.03 INSTALLATION—CONTROL CENTER

- A. Provide boxes, cover plates and jacks in locations per plans.
- B. Test connect control unit to all jacks and check for proper operation of control unit, scoreboard and all features. Leave control unit in carrying case and other loose accessories with owner's designated representative.
- C. Verify earth ground does not exceed 15 ohms.
- D. Conduct operator training on the scoreboard/controller operation.

END OF SECTION

SECTION 26 00 10 ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to, the following:

1. Examine all other sections for work related to those other sections and required to be included as work under this section.
2. General provisions and requirements for electrical work.

1.2 SUBMITTALS

A. General

1. Review of contractor's submittals is for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for quantities; dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of work with that of all other trades and satisfactory performance of their work.
2. The Contractor shall review each submittal in detail for compliance with the requirements of the contract documents prior to submittal to the district (or Owner). The Contractor shall "Ink Stamp" and sign each item of the submittal with a statement "CERTIFYING THE SUBMITTAL HAS BEEN REVIEWED BY THE CONTRACTOR AND COMPLIES WITH ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS".
3. Where the construction documents indicate specific manufacturer(s) for any given product, it shall be considered a substitution if the contractor proposes to use any manufacturer other than those specifically named. The Contractor shall clearly and specifically identify each individual proposed substitution or proposed deviation from the requirements of the contract documents with a statement "THIS ITEM IS A SUBSTITUTION".

B. Material Lists and Shop Drawings:

1. Submit material list and equipment manufacturers for approval within 35 days of award of contract. Give name of manufacturer and where applicable, brand name, type and/or catalog number of each item. Listing more than one manufacturer for any one item of equipment, or listing items "as specified", without both make and model or type designation, is not acceptable. Shop

WD 23414	FILMORE UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

drawings shall not be submitted before approval of manufacturers list. The right is reserved to require submission of samples of any material whether particularly mentioned herein.

2. Within three weeks after approval of the material and equipment manufacturers list, submit shop drawings for approval. Shop drawings shall be submitted in completed bound groups of materials. Shop drawings shall be prepared by factory authorized representatives. Departure from the above procedure will result in resubmittals and delays.
 3. Submittals which are intended to be reviewed as substitution or departure from the contract documents must be specifically noted as such or the requirements of the contract documents will prevail regardless of the acceptance of the submittal.
 4. Shop drawings shall include dimensioned wiring plans, elevations, details, component wiring diagrams and descriptive literature of components parts where applicable.
 5. The Contractor shall verify dimensions of equipment and be satisfied as to fit and that they comply with all code requirements relating to clear working space about electrical equipment prior to submitting shop drawings for approval.
 6. Shop drawings shall include the manufacturer's projected days for shipment from the factory of completed equipment, after the equipment is released for production by the Contractor. It shall be the responsibility of the Contractor to ensure that all material and equipment is ordered and installed in time to provide an orderly progression of the work, and to allow full occupancy and full operation of the facility at the scheduled completion date. The Contractor shall notify the district of any changes in delivery which would affect the project completion date.
- C. The Contractor shall be responsible for incidental, direct and indirect costs resulting from the substitution of specified contract materials or work.
- D. Portable or Detachable Parts: The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of contract work. These parts shall then be delivered to the district or his authorized representative and an itemized receipt obtained, with copies of receipt sent to the Architect.
- E. Record Drawings
1. Provide and maintain in good order at the job site a complete set of electrical contract prints. Changes to the contract to be clearly recorded on this set of prints. No pay request by the Contractor will be granted without verification that the jobsite prints are up-to-date and current with the project construction. At the end of the project, the Contractor shall transfer all changes to one set of

WD 23414	Filmore UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

transparencies to be delivered unfolded to the Architect. Transparency drawings shall be prepared in an organized and clearly legible fashion by persons skilled in drafting techniques.

2. The actual location and elevation of all buried lines, boxes, monuments, vaults, stub-outs and other provisions for future connections shall be referenced to the building lines or other clearly established base lines and to approved benchmarks. All measurements shall be witnessed by the job inspector who shall make his own record of the dimensions. Before the inspector signs the recorded drawings, he shall check his own dimensions against those on the drawings. If any necessary dimensions are omitted from the record drawings, the Contractor shall, at his own expense, do all excavation required to expose the buried work and to establish the correct locations.
3. The Contractor shall keep the "record" prints up to date and current with all work performed.

1.3 GENERAL SUMMARY OF ELECTRICAL WORK

- A. The specifications and drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.
- B. Refer to the drawings and shop drawings of other trades for additional details which affect the proper installation of this work. Diagrams and symbols showing electrical connections are diagrammatic only. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.
- C. Before submitting a bid, the Contractor shall familiarize himself with all features of the building drawings and site drawings which may affect the execution of the work. No extra payment will be allowed for failure to obtain this information.
- D. If there are omissions or conflicts between the drawings and specifications, clarify these points with the Architect before submitting bid.

1.4 LOCATIONS OF EQUIPMENT

- A. The drawings indicate diagrammatically the desired locations or arrangements of conduit runs, outlets, equipment, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the work to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structure conditions encountered.
- B. Where outlets are placed on a wall, located symmetrically with respect to each other and other features or finishes on the wall.

WD 23414	Filmore UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

- C. 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 made without 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.
- D. The locations of existing utilities and conduit shown on the drawings are approximate. Verify exact locations and routing of existing systems in the field. Include all costs in the contract price for adjustment required to accommodate existing conditions.
- E. Coordinate and cooperate in every way with other trades to avoid interference and assure a satisfactory job.

1.5 QUALITY ASSURANCE

- A. Work and materials in full accordance with the latest rules and regulations of the California Code of Regulations Title 24, Part 3 "California Electrical Codes", Title 8 "Division of Industrial Safety", the National Electrical Code, the National Life Safety Code, and other applicable Federal and State laws and regulations.
- B. All material and equipment shall be new and shall be delivered to the site in unbroken packages. All material and equipment shall be listed and labeled by Underwriters Laboratories or other recognized testing laboratories, where such listings are available. Comply with all installation requirements and restrictions pertaining to such listings.
- C. The work and material shown on the drawings and in the specifications is new and included in the contract unless specifically indicated as existing or N.I.C. (not-in-contract).
- D. Always keep a copy of all applicable codes available at the job site while performing work under this section. Nothing in the plans or specifications shall be construed to permit work not conforming to the most stringent of codes.

1.6 CLEANING EQUIPMENT, MATERIALS, PREMISES

All parts of the equipment shall be thoroughly cleaned of dirt, rust, cement, plaster, etc., and all cracks and corners scraped out clean. The surfaces to be painted shall be carefully cleaned of grease and oil spots and left smooth, clean and in proper condition to receive paint finish.

1.7 JOB CONDITIONS - PROTECTION

Protect all work, materials, and equipment from damage from any cause whatever and provide adequate and proper storage facilities during the progress of the work. All electrical equipment shall be stored in a weather-tight structure. Provide for the safety and good condition of all the work until final acceptance of the work by the district and replace all damaged or defective work, materials and equipment before requesting final acceptance.

1.8 CUTTING AND PATCHING

WD 23414	Filmore UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

Perform cutting and patching of the construction work which may be required for the proper installation of the electrical work. Patching shall be of the same material, thickness, workmanship and finish as existing and accurately match surrounding work to the satisfaction of the district. Cutting structural members shall not be done without notifying the Engineer and obtaining approval.

1.9 IDENTIFICATION

- A. Cabinets, pull boxes, and other apparatus used shall be properly identified by means of descriptive nameplates or tags permanently attached to the apparatus and wiring.
- B. Nameplates shall be engraved laminated phenolic. Shop drawings with dimensions and format shall be submitted before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates shall not be used.
- C. Provide black-on-white laminated plastic nameplates engraved in minimum 1/4" high letters to correspond with the designations on the drawings. Provide other or additional information on nameplates where indicated.
- D. Wire and Cable Identification
 - 1. Provide identification on individual cable.
 - 2. Identification shall be provided at each termination location, junction box and equipment enclosure.
 - a. Each identification tag location shall indicate the following information: IDF and Port number.
 - 3. Install identification after installation/pulling of wire/cable is complete, to prevent loss or damage to the identification.

1.10 TESTING

- A. The Contractor shall obtain an Bicsi certified testing laboratory that will provide all instrumentation and tests on the Data cables as hereinafter described and further directed by the district. The test shall be performed after the completion of cable installation. All tests shall be recorded and documented and submitted to the Engineer for review.

1.11 ELECTRICAL WORK CLOSEOUT

- A. Prepare the following items and submit to the Engineer before final acceptance.
 - 1. Two copies of all test results as required under this section.

WD 23414	Filmore UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

		ELECTRICAL GENERAL PROVISIONS
		26 00 10 - 6

2. Two copies of local and/or state code enforcing authorities' final inspection certificates.
3. Copies of as-built record drawings as required under the General Conditions, pertinent Division One Sections and Electrical General Provisions.
4. Two copies of all receipts transferring portable or detachable parts to the district when requested.
5. Notify the District in writing when installation is complete and that a final inspection of this work can be performed. In the event any defect or deficiencies are found during this final inspection they shall be corrected to the satisfaction of the Engineer before final acceptance can be issued.
6. All dry wall work and painting shall be completed within the electrical rooms.

END OF SECTION

WD 23414	Filmore UNIFIED SCHOOL DISTRICT	9-22-2023
	Sierra High School-Baseball Field Improvements	

**SECTION 31 10 00
SITE CLEARING**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Protecting existing vegetation to remain.
 2. Removing existing vegetation.
 3. Clearing and grubbing.
 4. Stripping and stockpiling topsoil.
 5. Removing above- and below-grade site improvements.
 6. Disconnecting, capping or sealing site utilities.
 7. Temporary erosion- and sedimentation-control measures.

1.02 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.03 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 Earth Moving.
1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- 3.03 TREE AND PLANT PROTECTION**
- A. General: Protect trees and plants remaining on-site according to requirements in Section 015639 Temporary Tree and Plant Protection.
 - B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
- 3.04 EXISTING UTILITIES**
- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
 - C. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections and Section 024116 Structure Demolition and Section 024119 Selective Demolition.
- 3.05 CLEARING AND GRUBBING**
- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, 1-inch and larger, to a depth of 18 inches below exposed finish grade.
 - 2. Use only hand methods for grubbing within protection zones.
 - B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.
- 3.06 TOPSOIL STRIPPING**
- A. Remove sod and grass before stripping topsoil.
 - B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
- 3.07 SITE IMPROVEMENTS**
- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- 3.08 DISPOSAL OF SURPLUS AND WASTE MATERIALS**
- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 22 00 GRADING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.
- C. Related Sections:
 - 1. Section 31 23 00 – Excavation, Backfilling, and Compaction.
 - 2. Section 32 11 23 – Base Course.

1.02 SYSTEM DESCRIPTION

- A. General:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.
 - 4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on buried utilities and pipelines.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall conform to requirements specified in this and related sections.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect and maintain installed stakes until their removal is required for the Work. Provide

replacement grade or location stakes lost or disturbed.

- B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.02 ROUGH AND FINE GRADING

- A. Rough grade area sufficiently high to require cutting by fine grading:
 - 1. Grade area for bituminous surfacing and other paving to the indicated grades, equal to the section of the indicated base and pavement.
 - 2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.
 - 3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.
 - 4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten, and roll to obtain required density and indicated finish grades.
 - 5. Tolerances: Finish grades shall be within a tolerance of 0.05 inch per foot above or below grades indicated. Provide an average grade as indicated.
- B. Base or Subgrade:
 - 1. After subgrade has been constructed to approximate required grades, scarify to a depth of at least 6 inches:
 - a. After scarifying, process loosened material to a finely divided condition and adjust moisture content to optimum condition by addition of water, addition and blending of dry suitable material, or by drying of existing material.
 - b. Subgrade material shall be compacted by tamping, sheepsfoot rollers or pneumatic tire rollers. Required relative compaction shall be 95 percent minimum for the top 6 inches below subgrade.
 - c. Install base course in accordance with Section 02319: Base Course.
 - 2. Tolerance of completed grades of base or subgrade shall not vary more than 0.03 inch per foot from grades indicated. Provide an average grade as indicated.

3.03 SHORING

- A. Provide shoring as necessary to support earth sides of excavations properly and safely, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of governing California Building Code and Safety Orders of State of California, Division of Industrial Safety; Title 8, Subchapter 4, Article 6, Sections 1530 and 1541.
- C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.04 EXCESS MATERIAL DISPOSAL

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

3.05 PROTECTION

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

END OF SECTION

**SECTION 31 23 00
EXCAVATION, BACKFILLING AND COMPACTION**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.

- B. Section Includes:
 - 1. Excavating, backfill, and compacting for paved areas.
 - 2. Installation of fill materials.

- C. Related Sections:
 - 1. Section 31 22 00 - Grading.
 - 2. Section 32 11 23 - Base Course.
 - 3. Section 32 12 17 - Site Concrete Paving.
 - 4. Section 32 12 18 - Site Concrete Paving Reinforcement

1.02 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.03 SUBMITTALS

- A. Imported Soils: A geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain initial product Sample for testing in accordance with the terms of sub-section 3.05 of this section.

1.04 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition, except as modified herein.

1.05 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect.

PART 2 - PRODUCTS**2.01 BASE MATERIALS**

- A. Concrete Slabs on Grade: Provide "Crushed Aggregate Base "as specified in the Standard Specifications for Public Works Construction, Section 200: "Rock Materials," with $\frac{3}{4}$ inch maximum size aggregates. Provide 6 inch thick base, unless noted otherwise.
- B. Bituminous Surfacing: As indicated on Drawings and specified in Section 32 11 23 - Base Course.

2.02 FILL AND BACKFILL MATERIALS

- A. Fill and backfill materials shall be previously excavated materials or imported fill material, free of clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
- B. Fill material exhibiting a wide variation in consistency and/or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
- C. Imported Fill Material:
 - 1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
 - 2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.
- D. Other Fill Materials: Brick rubble and broken concrete originating from the Project site may be legally disposed of off the Project site or incorporated in fill, if reviewed by a geotechnical engineer, retained by the Owner as an Owner Consultant. Unless otherwise required, no such materials may be imported from outside the Project site.
- E. Permeable Backfill:

1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80-100
No. 100	0-8
No. 200	0-3

2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed by the Architect.

PART 3 - EXECUTION

3.01 SITE PREPARATION

Not applicable.

3.02 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect adjacent existing improvements including landscaping against damage.

3.03 EXISTING UTILITY LINES

Not applicable.

3.04 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.

3.05 FILL

- A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.
- B. Provide fill materials as specified in Part 2 – Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.

- C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 01 40 00.
- D. Imported fill materials shall be sampled by a geotechnical engineer, retained by the Owner as an Owner Consultant, for compliance with the requirements of Part 2 of this section.
- E. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall submit all samples to a DSA approved independent approved testing laboratory for testing.
- F. Initial sampling shall be performed by the geotechnical engineer, retained by the Owner as an Owner Consultant, before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain both the initial and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory for testing.
- G. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing tested for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
- H. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the PI, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR and the DSA. Upon completion of the Work of this section, the independent testing laboratory and geotechnical engineer shall submit a verified report to the DSA as required by Title 24, CCR.
- I. Bills of lading or equivalent documentation will be submitted to the IOR on a daily basis.
- J. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.06 INSTALLATION OF MATERIALS

- A. Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but no more than 1 in 20. Provide adequate drainage at all times during construction of the Work of this section.

3.07 COMPACTING

- A. Each layer of fill material shall be compacted by tamping, sheepsfoot rollers, or pneumatic- tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.
- B. Unless otherwise indicated, compact each layer of earth fill to a relative compaction of at least 95 percent.
- C. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each compacted layer before installing the next succeeding layer.

3.08 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.
- B. The geotechnical engineer, retained by the Owner as an Owner Consultant, will sample imported fill materials from their designated source before delivery to the Project site.
- C. Installation of backfill shall be observed by the geotechnical engineer, retained by the Owner as an Owner Consultant.
- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavation Work before the installation of fill and/or other materials.
- E. Compaction: Test compaction in accordance with ASTM D 1557, Method C.

3.09 PROTECTION

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

3.10 CLEANING

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

END OF SECTION

SECTION 31 23 16
EXCAVATION, BACKFILLING and COMPACTING for PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.

- B. Section Includes:
 - 1. Excavating, backfill, and compacting for paved areas.
 - 2. Installation of fill materials.

1.2 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.3 SUBMITTALS

- A. Imported Soils: A geotechnical engineer, retained by the Owner as a Owner Consultant, shall obtain initial product Sample for testing in accordance with the terms of sub-section 3.05 of this section.

1.4 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition, except as modified herein.
- B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 32 24 00.

1.5 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect.

PART 2 - PRODUCTS

2.1 BASE MATERIALS

- A. Concrete Slabs On Grade: Provide "Crushed Aggregate Base " as specified in the Standard Specifications for Public Works Construction, Section 200: "Rock Materials," with $\frac{3}{4}$ inch maximum size aggregates. Provide 3 inch thick base, unless noted otherwise.
- B. Bituminous Surfacing: As indicated on Drawings and specified in Section 32 11 23 - Base Course.

2.2 FILL AND BACKFILL MATERIALS

- A. Fill and backfill materials shall be previously excavated materials or imported fill material, free of clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.
- B. Fill material exhibiting a wide variation in consistency and/or moisture content shall be blended and/or aerated to stabilize and upgrade the material.
- C. Imported Fill Material:
 - 1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
 - 2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200 mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

- D. Other Fill Materials: Brick rubble and broken concrete originating from the Project site may be legally disposed of off the Project site or incorporated in fill, if reviewed by a geotechnical engineer, retained by the Owner as an Owner Consultant. Unless otherwise required, no such materials may be imported from outside the Project site.
- E. Permeable Backfill:
1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80-100
No. 100	0-8
No. 200	0-3
 2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
 3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
 4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed by the Architect.

PART 3 - EXECUTION

3.1 SITE PREPARATION

- A. Clear the Project site as required in Section 31 10 00: Site Clearing.

3.2 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect adjacent existing improvements including landscaping against damage.

3.3 EXISTING UTILITY LINES

- A. Protect existing utility lines from damage or displacement.
- B. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of 2 feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.

3.04 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.

3.05 FILL

- A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.
- B. Provide fill materials as specified in Part 2 – Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
- C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 32 24 00.
- D. Imported fill materials shall be sampled by a geotechnical engineer, retained by the Owner as an Owner Consultant, for compliance with the requirements of Part 2 of this section.
- E. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall submit all samples to a DSA approved independent approved testing laboratory for testing.
- F. Initial sampling shall be performed by the geotechnical engineer, retained by the Owner as an Owner Consultant, before importing material to the Project site. Identify the location of the source site in addition to the address, name of the person and/or entity responsible for the source site. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain both the initial and additional samples from the identified site and shall submit all samples to the approved independent testing laboratory for testing.
- G. The geotechnical engineer, retained by the Owner as an Owner Consultant, shall perform additional sampling during import operations. If the total quantity of import is determined to be greater than 1000 cubic yards of material, one sample shall be obtained and submitted for testing tested for each 250 cubic yards of imported material. If the total quantity of import is determined to be less than 1000 yards, one sample shall be obtained and submitted for testing for each 100 cubic yards of imported material.
- H. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the PI, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR and the DSA. Upon completion of the Work of this section, the independent testing laboratory and geotechnical engineer shall submit a verified report to the DSA as required by Title 24, CCR.

- I. Bills of lading or equivalent documentation will be submitted to the IOR on a daily basis.
- J. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.6 INSTALLATION OF MATERIALS

- A. Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the geotechnical engineer, retained by the Owner as an Owner Consultant, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but no more than 1 in 20. Provide adequate drainage at all times during construction of the Work of this section.

3.7 COMPACTING

- A. Each layer of fill material shall be compacted by tamping, sheepsfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.
- B. Unless otherwise indicated, compact each layer of earth fill to a relative compaction of at least percent.
- C. When fill materials, or a combination of fill materials, are encountered or provided which develop densely packed surfaces as a result of installation or compacting operations, scarify each compacted layer before installing the next succeeding layer.

3.8 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality as required in Part 2, and observe installation and compaction of fill materials.
- B. The geotechnical engineer, retained by the Owner as an Owner Consultant, will sample imported fill materials from their designated source before delivery to the Project site.
- C. Installation of backfill shall be observed by the geotechnical engineer, retained by the Owner as an Owner Consultant.
- D. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavation Work before the installation of fill and/or other materials.

- E. Compaction: Test compaction in accordance with ASTM D 1557, Method C.

3.09 PROTECTION

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

3.10 CLEANING

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

END OF SECTION

**SECTION 32 11 23
BASE COURSE**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Installation of base material.
- C. Related Sections:
 - 1. Section 31 10 00: Site Clearing.
 - 2. Section 32 22 00: Grading.
 - 3. Section 31 23 00: Excavation, Backfilling, and Compaction
 - 4. Section 32 12 17: Site Concrete Paving

1.02 SUBMITTALS

- A. Prior to import, Contractor shall submit written certification to OAR that crushed Miscellaneous Base (CMB) does not contain Polychlorinated biphenyls (PCB) above laboratory detection limits when tested in accordance with EPA Method 8082, and obtain written approval from OAR and FUSD prior to import at the subject site, refer to article 2.02 for sampling frequency.,
- B. Crushed aggregate base (CAB) shall consist of native rock without naturally occurring asbestos or recycled materials. The Contractor shall submit written documentation, which identifies the source, volume, and proposed transport date of the material for review and approval by OAR and FUSD prior to importing the material. A statement on company letterhead from the source, stamped by either a California Professional Geologist or Engineer, which states that the subject materials are native rock, do not contain any recycled materials and that the source does not mine ultramafic materials, a source of natural occurring asbestos shall be
- C. included in the submittal to OAR and FUSD. The Contractor may request

variance from testing by Section 01 40 00 for CAB. To be considered for a variance, the Contractor shall submit a documentation package, which includes all of the aforementioned information at least 48 hours in advance of planned import.

1. Frequently used suppliers:
 - a. Hansen Aggregates, Irwindale, California.
 - b. Vulcan Materials, Reliance Company, Irwindale, California.
 - c. Vulcan Materials Durbin, Irwindale, California.
- D. Product Data: Submit material source, technical information and test data for base materials. Gradation and quality certifications shall be dated within 30 days of the submittal.
- E. Sample: Submit Sample of proposed base course material.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

1.04 QUALITY ASSURANCE

- B. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 UNTREATED BASE MATERIALS

- A. The following base materials shall conform to the requirements of the Greenbook: Standard Specifications for Public Works Construction: Section 200 - Rock Materials.
 1. Crushed Aggregate Base.
 2. Crushed Miscellaneous Base.
 - a. CMB meeting requirements of article 1.02, A, may be used on-site for pavement base only.
 - b. CMB may be used off-site when in accordance to the Greenbook.
- B. Materials generated on site shall not be used as a base course material.

2.02 SOURCE QUALITY CONTROL

- A. Sampling and testing of imported and/or exported crushed miscellaneous base (CMB) shall be performed in accordance with the following Table 1 schedule:

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (CY)	Sampling Frequency
0 - 500	1 per 100 CY
501 - 1,000	1 per 250 CY
1,001 – 5,000	1 per 250 CY for first 1,000 CY 1 per 500 CY thereafter
5,001 – 20,000	12 samples for first 5,000 CY 1 per 1,000 CY thereafter
> 20,000	1 per 2,000 CY for first 20,000 CY 1 per 2,500 CY

2.03 MATERIAL APPROVAL

- A. Base material shall be inspected by the PI for gradation and material content prior to installation. The owner may choose to have additional tests performed by a geotechnical engineer, retained by the Owner, before installation.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install base course material in layers not exceeding 4 inches in thickness, unless required otherwise. Grade and compact to indicated levels or grades, cut and fill, water and roll until the surface is hard and true to line, grade and required section. Provide a relative compaction of at least 95 percent, unless otherwise required.
- B. Grade base course to elevations indicated on Drawings, ready to receive surfacing, in accordance with Section 31 22 00: Grading.

3.02 PROTECTION

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

3.03 CLEANUP

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

**END OF
SECTION**

**SECTION 32 12 17
SITE CONCRETE PAVING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Surface finish per Section 32 13 13
- C. Section Includes:
 - 1. Portland cement concrete pavement, cement walks, curbs, gutters, trash pick-up area, ramps, mowing strips, fence post footings, sliding gate concrete tracks, catch basins, pipe bedding and encasements, thrust blocks, transition structures, flagpoles and light standard bases and footings, athletic equipment footings and equipment pads.

1.2 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations and details of concrete site Work.
- B. Product Data: Submit mix designs and manufacturer's technical data for materials and products. Submit 3" x 3" concrete Sample of each specified color.
- C. Material Sample: Submit one concrete bumper to the PI for destructive testing.

1.3 Quality Assurance

- A. Comply with Standard Specifications For Public Works Construction.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Concrete, Mortar and Related Materials: Comply with applicable provisions of Standard Specifications for Public Works Construction, Section 201 - Concrete, Mortar and Related Materials:
 - 1. Concrete: 28-day compressive strength 2,500 psi, unless specified otherwise.
 - 2. Reinforcing Mesh: ASTM A 185, 4x4/W1.4 x W1.4 welded wire mesh.
 - 3. Expansion Joint Filler: Preformed expansion joint filler, bituminous type, complying with ASTM D 994.

- B. Form Materials:
 - 1. Side forms: Douglas fir, Construction Grade or Better or metal forms.
 - 2. Stakes: Douglas fir, Construction Grade or Better or metal stakes.
- C. Concrete Parking Bumpers:
 - 1. Precast concrete, smooth and free of pits and rock pockets, providing a minimum 28-day compressive strength of 3,500 psi. Size at least 7-1/2 inches wide, 5-1/2 inches high and 6 feet long. Reinforce with 2 #5 reinforcing bars. Provide 2-3/4 inch diameter pre-drilled holes for anchor installation.
 - 2. Bumper Anchors: Provide 1/2-inch diameter x 18-inch long galvanized steel pipe.
 - 3. Bumper Adhesive: Provide adhesive recommended by bumper manufacturer/installer for fastening bumpers to concrete pavement.

PART 3 - EXECUTION

3.1 CONSTRUCTION OF FORMS FOR CAST-IN-PLACE STRUCTURES

- A. Concrete Pavement: Install Portland cement concrete pavement in compliance with the Standard Specifications for Public Works Construction, Section 302- Roadway Surfacing.
- B. Miscellaneous Exposed Concrete: Install concrete curbs, walks, gutters, cross gutters, access ramps, driveways, catch basins, yard boxes, vaults and similar structures, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- C. Exposed Concrete Bases: Install bases, such as for post, flagpole, light standards and similar bases, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- D. Post, flagpole, light standard footings below grade, underground conduit bedding, encasements, thrust blocks and similar structures may be placed \directly in excavations conforming to the required sizes.

- E. Reinforcement installation and concrete placement, surface finishes, curing and removal of forms shall be performed in compliance with applicable provisions of Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction. Provide heavy broom finish at slopes exceeding six (6) percent and medium broom finish at slopes up to six (6) percent.

3.02 INSTALLATION OF PARKING BUMPERS

- A. Install bumpers as indicated on the Drawings. On bituminous paving, install anchors through pavement and into the ground a minimum of 12 inches. On concrete pavement, install bumpers in a continuous bed of adhesive.

3.03 CLEAN UP

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

3.04 PROTECTION

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

END OF SECTION

**SECTION 32 12 18
SITE CONCRETE PAVING REINFORCEMENT**

Part 1 GENERAL

1.1 SECTION INCLUDES

- A.** Reinforcing steel bars and accessories for cast-in-place concrete.

1.2 REFERENCES

- A.** ACI 315 - Details and Detailing of Concrete Reinforcing.
- B.** ACI 318 - Building Code Requirements for Reinforced Concrete.
- C.** ASTM A82 – Standard Specification for Steel Wire, Plain, For Concrete Reinforcement.
- D.** ASTM A184 – Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- E.** ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- F.** ASTM A496 – Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- G.** ASTM A497 – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- H.** ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- I.** ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- J.** AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- K.** CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- L.** Chapter 19A, California Building Code.

1.3 SUBMITTALS

- A.** Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B.** Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.4 QUALITY ASSURANCE

- A.** Provide Testing Laboratory with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- B.** Comply with the following as a minimum requirement:
 - 1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 - 2. American Welding Society (AWS)
 - 3. American Concrete Institute (ACI)
 - 4. 4 CBC, Chapter 19A, Concrete
- C.** Source Quality Control: Refer to Division 01 Sections for general requirements and o the following paragraphs for specific procedures. Testing laboratory retained by the Owner shall select test Samples of Bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:
 - 1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.
 - 2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.
- D.** Certification of Welders: Shop and project site welding shall be performed by welding operators certified by AWS.

1.5 DELIVERY, STORAGE AND HANDLING

- A.** Avoid exposure to dirt, moisture or conditions harmful to reinforcing material.
- B.** Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

1.6 COORDINATION

- A.** Coordinate with placement of formwork, formed openings and other Work.

Part 2 PRODUCTS**2.1 MATERIALS**

- A.** Reinforcing Steel: ASTM A 615, or ASTM A706, 60 yield grade deformed low alloy steel for No. 4 bars or larger; 40 yield grade, No. 3 bars for ties and stirrups. Conform to Section 1903A, California Building Code 19A.
- B.** Welding Electrodes: Low Hydrogen grade E70XX for Grade 40, E90XX for Grade 60.

2.2 ACCESSORY MATERIALS

- A.** Tie Wire: Minimum 16 gage black annealed type.
- B.** Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C.** Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.
- D.** Concrete Blocks: Approximately 3 inches dimension each side.

2.3 FABRICATION

- A.** Fabricate concrete reinforcing in accordance with CRSI Manual of Practice and ACI 315 and ACI 318. Wherever possible, make bends to shape in fabricator's shop.
 - (1)** Bars reduced in section will not be accepted.
 - (2)** Bars with kinks are unacceptable.
 - (3)** Bars shall not be heated to facilitate bending or for any other purpose.
 - (4)** Bars with bends not indicated on drawings will not be accepted. Perform no forming in a manner which will damage bars.
- B.** Weld reinforcement in accordance with AWS D1.4.
- C.** Locate reinforcing splices not indicated on Drawings at point of minimum stress.

Part 3 EXECUTION**3.1 PLACEMENT**

- A.** Place, support and secure reinforcement against displacement. Do not deviate from required position. Install concrete blocks to support reinforcement over grade. Smooth face rocks not permitted.
- B.** Do not displace or damage vapor barrier where vapor barrier is specified or indicated on drawings.
- C.** Accommodate placement of formed openings.
- D.** Prior to placing, thoroughly clean reinforcement of all rust, dirt, dust, oil or any other material deleterious to bonding of concrete.

- E.** Accurately place and securely tie reinforcement at all intersections and splices with black annealed wire and securely hold in position during placing of concrete by means of precast concrete block supports. Point wire tie ends away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall conform to the ACI 315.
- F.** During placing of structural concrete slabs, provide a full-time reinforcing steel placer to repair and replace reinforcing to its proper location. Provide additional chairs of the proper size available to place under bars displaced during the concrete pouring operation.
- G.** Dowels for Walls: Securely tie in place prior to placing of concrete. Do not place dowels in concrete after pour.
- H.** Dowels for Slabs: Securely tie in place prior to placing concrete. Per Plans or Drawings. Do not place dowels in concrete after pour.
- I.** Conform to Section 1907A, California Building Code for concrete cover over reinforcement.

3.2 CLEAN UP

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

3.3 PROTECTION

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

END OF SECTION

**SECTION 32 13 13
CONCRETE PAVING**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete paving, bands, curbs, mow strips, steps and walls.
 - 2. Reinforcement.
 - 3. Surface finish.
 - 4. Special curing.
- B. Related sections:
 - 1. Section 31 20 00 - Earth Moving, for backfilling and compacted fill for paving.
 - 2. Section 32 13 73 - Joint Sealants, for paving contraction joint sealing.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Samples: Provide a 4 x 4 foot job site sample of each paving finish specified, for review and approval by Owner's Representative prior to installation. Sample shall represent final appearance of paving, including any stain, sealer or other surface applications. Provide additional samples until finish is considered acceptable by the Owner's Representative, at no additional cost to the Owner. The approved sample shall serve as a standard of appearance for the final work to be produced and shall remain on site until all site concrete has been reviewed and approved by the Owner's Representative.
- D. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.03 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.04 TESTS

- A. Testing and analysis will be performed under provisions of Section 014000 - Quality Requirements.
- B. Make available proposed mix design of each class of concrete to appointed firm for review prior to commencement of work.
- C. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
- D. Tests of cement and aggregates will be performed to ensure conformance with specified requirements.
- E. Three concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed each day.
- F. One additional test cylinder will be taken and be cured on site under same conditions as concrete it represents.
- G. One slump test will be taken for each set of test cylinders taken.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Cement: ASTM C 150 Normal-Type I, gray Portland cement.
 - 2. Blended Hydraulic Cement: ASTM C 595, cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.
- C. Water: Clean, potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.

- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
 - 1. Color: As indicated.
- 2.02 FORM MATERIALS**
- A. Conform to ACI 301.
 - B. Wood or Steel form material, profiled to suit conditions.
- 2.03 STEEL REINFORCEMENT**
- A. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, uncoated finish, fabricated from as-drawn steel wire into flat sheets.
 - C. Reinforcing Bars: ASTM A 615/A 615M; deformed, uncoated finish.
 - D. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
 - E. Tie Wire: Annealed steel, minimum 16 gage size.
 - F. Dowel Bars: ASTM A 615/A 615M, plain-steel bars. Cut bars true to length with ends square and free of burrs, uncoated finish.
 - G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's Manual of Standard Practice from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.
- 2.04 FIBER REINFORCEMENT**
- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 inch long.
- 2.05 ACCESSORIES**
- A. Pre-emergent Herbicide: Surflan.
 - B. Curing Compound: FS TT-C-800, Type 1, 30 percent solids; ASTM C309, Ashford Formula.
 - C. Integral Color (Non-immersion Conditions): Davis Colors, or approved equal.
 - D. Chemical Surface Retarder: 'Top-cast' by Grace Construction Products.
 - E. Liquid Surface Sealer: 'HLQ-125' by SINAK Corporation.
 - F. Patch Bond: Weld-Crete.
- 2.06 RELATED MATERIALS**
- A. Joint Fillers: ASTM D 4819, light weight polyethylene closed cell expansion joint filler.
- 2.07 PAVEMENT MARKINGS**
- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
 - 1. Color: As indicated.
 - B. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
 - 1. Color: As indicated.
- 2.08 WHEEL STOPS**
- A. Wheel Stops: Precast, air-entrained concrete.
 - 1. Color: Gray.
 - 2. Dowels: Galvanized steel, 3/4 inch in diameter, 10-inch minimum length.
 - 3. Adhesive: As recommended by wheel stop manufacturer for application to concrete pavement.
- 2.09 CONCRETE MIXTURES**
- A. Mix concrete in accordance with ASTM C94.
 - B. Prepare design mixtures, proportioned according to ACI 301, with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 6 percent plus or minus 1.5 percent.
 - C. Chemical Admixtures:
 - 1. Use accelerating admixtures in cold weather only when approved by Owner's Representative. Use of admixtures will not relax cold weather placement requirements.
 - 2. Use set-retarding admixtures during hot weather only when approved by Owner's Representative.

- D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 pound/cu. yd.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.
- F. Add air entraining agent to concrete mix for concrete work as necessary.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify compacted subgrade and/or base is ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.
- D. Moisten base to minimize absorption of water from fresh concrete.
- E. Notify Owner's Representative minimum 24 hours prior to commencement of concreting operations.
- F. Proof-roll prepared sub-base surface below concrete paving to identify soft pockets and areas of excess yielding.
- G. Remove loose material from compacted sub-base surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement. Obtain layout approval prior to pour.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete. Use of permanent concrete screed is permissible. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.
- C. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

3.03 REINFORCEMENT

- A. Place reinforcement. Comply with CRSI's Manual of Standard Practice for fabricating, placing, and supporting reinforcement.
- B. Interrupt reinforcement at construction joints.
- C. Place reinforcement to achieve slab and curb alignment as detailed.
- D. Provide dowelled joints at interruptions of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

3.04 JOINTS

- A. General: Form contraction, isolation, and doveled construction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct contraction joints at maximum 5 foot intervals of paving and at right angles to centerline unless otherwise indicated. Align curb, gutter and sidewalk joints when possible.
- B. Doveled Construction Joints: Set construction joints at side, end terminations of paving, between paving areas with differing color/finishes, and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints. In linear paving conditions, provide doveled construction joints at 20-foot intervals unless otherwise shown.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed vertical objects, and where indicated.
- D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.05 CONCRETE PLACEMENT

- A. Comply with ACI 301 requirements for measuring, mixing, transporting, placing, and consolidating concrete.
- B. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- C. Deposit and spread concrete in a continuous operation between predetermined construction joints. Do not push or drag concrete into place or use vibrators to move concrete into place. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to pattern indicated.
- E. Coordinate pours of integral color concrete to ensure consistency of color throughout. Color inconsistency will not be accepted.

- F. For steps, walls or other cast-in-place elements, settle concrete by vibration to eliminate honeycombs. Concrete with visible honeycombs will be rejected.
- G. Screed paving surface with a straightedge and strike off.
- H. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Tolerances in horizontal alignment of hardscape elements such as paving edges, joints, walls and steps shall not exceed 1/4 inch in 10 feet, or 1/2 inch in 50 feet.

3.06 FINISHING

- A. See plan for finishes and finish locations.
- B. Curbs, mow strips and gutters: Light broom, unless otherwise specified.
- C. Finishes:
 1. General: Do not add water to concrete surfaces during finishing operations. Compact and tamp concrete (unless Retardant Finish is specified), to bring 3/8 inch of mortar to surface, float with wood screeds and floats only, and apply following finishes after surface floating. Do not use steel or any plastic screeds, floats or "Fresno" for initial floating and screeding operations. For Retardant Finish, the concrete shall be placed and consolidated so as to completely fill all spaces in the forms; however, tamping will not be permitted because the aggregate must remain near the surface for later exposure.
 2. All concrete finishes shall be as listed on the Drawings. Finishes are as follows:
 - a. Fine-to-Medium-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 - b. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
 - c. Rough Trowel Swirl Finish: Provide rough trowel finish to slab surfaces. After placing slabs, consolidate surface by floating to a uniform, smooth, granular texture.
 - d. Scratch Finish: Provide scratch finish to slab surfaces that are to receive mortar setting beds for precast tile pavers as noted on Drawings.
 - e. Steel Trowel Finish: After surface water disappears and floated surface is sufficiently hardened, steel trowel and re-trowel to smooth, dense, hard finish. After concrete has set sufficiently, re-trowel to a smooth, uniform finish free of trowel marks or other blemishes. Avoid excessive troweling that produces burned areas.
 - f. Sandblast Finish (Dry Sand Method):
 - 1) Contractor shall schedule this work to be executed with as little conflict with other trades as possible. Contractor shall be responsible for the protection or masking of adjacent surfaces, if necessary.
 - 2) Test areas for sample of blasting will be established where surfaces will not be left exposed. Owner's Representative shall be present at time of sample blasting and approve the desired finish.
 - 3) Care shall be taken to protect all adjacent surfaces from damage which are not receiving sandblasting.
 - 4) Sandblasting shall be accomplished using qualified workmen familiar with the proper technique.
 - 5) Sandblasting work shall be by the dry sand method, utilizing appropriate equipment and adequate air pressure. Abrasives shall be washed silica sand free from salt, clay or other foreign materials. Nozzle position during the operation shall be as determined in the making of the approved samples.
 - 6) All concrete areas requiring patching shall be patched, with all rough spots and unevenness in the concrete surface ground smooth before the sandblasting operation is begun.
 - g. Etched or Retardant Finish (with Surface Retarder):
 - 1) All work shall conform to applicable OSHA and EPA standards.
 - 2) Contractor shall schedule this work to be executed with as little conflict with other trades as possible. If necessary, Contractor shall be responsible for the protection of adjacent masonry and concrete surfaces with a film-forming protective coating, 'Face-off' by Grace Construction Products, or approved equal, allowing time for coating to dry prior to pouring concrete.

- 3) Preparatory Work: The concrete should be placed and consolidated so as to completely fill all spaces in the forms. Tamping will not be permitted for Top-cast finish #25 or higher because the aggregate must remain near the surface for later exposure.
- 4) Application of Retarder: Surface retarder shall be applied by qualified workmen familiar with the proper technique. After concrete has been floated or trowel finished and initial bleed water has risen to the surface, apply film-forming top surface retarder, 'Top-cast' by Grace Construction Products or approved equal, at specified gradient, using a low-pressure sprayer with a 0.5 gpm tip at a rate of 200-350 square feet per gallon until surface has a complete hiding coat. Once surface retarder has cured adequately, dependent on weather and site conditions, remove by pressure washing. Remove rinse water and cement matrix from site in accordance with local codes.

h. Finish of all walking surfaces shall be a non-slip finish.

3.07 CONCRETE PROTECTION, CURING AND SEALING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 pound/square feet x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture-retaining-cover curing, curing compound or a combination of these.
- F. Concrete Surface Sealer: All concrete paving shall be sealed with a clear, penetrating concrete sealer. If efflorescence or alkali-staining is evident after the concrete has cured, lightly wash the surface with a mild muriatic acid solution (usually a 10:1 dilution) that has been thoroughly rinsed with water and cleaned with diluted Lithochrome Floor Cleaner by L.M. Scofield, or approved equal. Rinse again and dry thoroughly. After concrete mix has cured for at least one month, the concrete surface shall be thoroughly washed with fresh, clean water. After surface is thoroughly dried, apply 'HLQ-125' as manufactured by SINAK Corporation, per manufacturer's specifications.

3.08 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 3/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
 4. Joint Spacing: 3 inches.
 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 6. Joint Width: Plus 1/16 inch, no minus.

3.09 PAVEMENT MARKING

- A. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 millimeters.

3.10 WHEEL STOPS

- A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.
- B. Securely attach wheel stops to paving with not less than two steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Owner's Representative.

- B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

**SECTION 32 13 73
CONCRETE PAVING JOINT SEALANTS**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Cold-applied joint sealants.
 2. Hot-applied joint sealants.

1.02 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, eight samples of materials that will contact or affect joint sealants. Use manufacturer's standard test method to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.03 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Pavement-Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.04 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Preconstruction compatibility and adhesion test reports.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021.
- B. Preinstallation Conference: Conduct conference at project site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations.

2.02 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crafcoc Inc., an ERGON company; RoadSaver Silicone.
 - b. Dow Corning Corporation; 888.
 - c. Pecora Corporation; 301 NS.
- B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crafcoc Inc., an ERGON company; RoadSaver Silicone SL.
 - b. Dow Corning Corporation; 890-SL.
 - c. Pecora Corporation; 300 SL.
- C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; Urexpam NR-200.

2.03 HOT-APPLIED JOINT SEALANTS

- A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crafcoc Inc., an ERGON company; Superseal 444/777.
- B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Meadows, W. R., Inc.; Sealtight Hi-Spec.
 - b. Right Pointe; D-3405 Hot Applied Sealant.

2.04 JOINT-SEALANT BACKER MATERIALS

- A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.05 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.
- C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of joint-sealant backings.
 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place joint sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 1. Remove excess joint sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- G. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.
- H. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

Section 32 24 00
ENVIRONMENTAL IMPORT/EXPORT MATERIALS TESTING

PART 1 – GENERAL

This Section specifies the requirements for the sampling, testing, transportation and certification of imported fill materials or exported fill materials from school sites.

1.1 SUMMARY

- A. This Specification defines:
 - 1. CONTRACTOR requirements for use of existing, imported or generated materials on school sites.
 - 2. CONTRACTOR requirements for stockpiling materials for use on school sites.
 - 3. CONTRACTOR requirements for exporting materials from a school site including transportation.
 - 4. Testing requirements for all materials imported, exported stockpiled or generated for use on a school site.
 - 5. CONTRACTOR testing and reporting requirements.
 - 6. CONTRACTOR submittal requirements.

1.2 OBJECTIVES

- A. Ensure that fill materials imported to school sites are safe for students, staff and visitors.
- B. Ensure that materials exported from school sites for use at school and non-school sites or offsite disposal/recycling are adequately characterized for lawful disposition.
- C. Ensure that representative data be collected so that analytical determinations can be made in regard to the first two objectives.
- D. Require CONTRACTOR to contact with and pay for the services of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Professional Geologist [PG] or Registered Environmental Assessor II [REA II]) familiar with environmental site assessment and waste classification and disposal requirements.
- E. Require CONTRACTOR to contract with and pay for an independent, approved

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

California Department of Health Services certified testing laboratory to perform sampling and testing of imported, exported and site generated fill materials.

- F. Require CONTRACTOR to pay all fees required by authorities having jurisdiction over area.
- G. Require CONTRACTOR to post bonds required by authorities having jurisdiction over area.

1.3 SUBMITTALS

CONTRACTOR shall submit to OWNER’S Authorized Representative (OAR) for transmittal to FUSD.

- A. A qualifications statement for CONTRACTOR’S independent California certified testing laboratory and required licensed environmental professional (California Professional Engineer [PE civil]), Professional Geologist [PG] or Registered Environmental Assessor II [REA II] prior to the start of Work. CONTRACTOR’S licensed environmental professional must possess recent demonstrated environmental experience in soil sampling and waste classification.
- B. A draft import/export Sampling Strategy Plan (SSP) prepared by CONTRACTOR’S licensed environmental professional for review and concurrence by OAR and FUSD. The objective of the SSP is to obtain representative sample data. The Draft SSP must be submitted at least 72 hours prior to all proposed import/export sampling activities.

At a minimum, the Draft SSP shall include a site map which shows the location of the proposed import/export and the location and number of the proposed stockpile samples. The Draft SSP shall also contain information pertaining to the total volume of the stockpile proposed for sampling and the rationale in support of the proposed sampling approach. Existing

environmental documentation specific to the import/export site shall be utilized by the CONTRACTOR’S environmental professional to support the proposed sampling approach and analytical method suite. For new school sites, this information would include a DTSC approved site investigation report, e.g., Preliminary Environmental Assessment (PEA). It is the responsibility of the CONTRACTOR to request this information in advance from the OAR if they do not already have access to a copy at the jobsite.

Lacking this information or rationale, samples shall be analyzed for all analytical methods described in Section 3.01. Guidance for the minimum number of samples per stockpile volume is provided in Table 1 (supplemental samples may be required by FUSD if pothole stockpile sampling is utilized.) In addition, the draft SSP shall contain all necessary contact information for the import/export site and a proposed schedule for the sampling activities.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

To expedite the review process, the Draft SSP shall be submitted electronically to FUSD in MS WORD format.

Upon revision of the draft SSP by the CONTRACTOR’S licensed environmental professional and acceptance by OAR and FUSD four revised copies of the final SSP will be provided to the OAR for distribution to FUSD and the project file.

- C. A draft Certification/Sample Data Report prepared by CONTRACTOR’S licensed environmental professional for review and concurrence. At a minimum the draft Certification/Sample Data Report shall contain:
 1. A site map showing the location of the stockpile and stockpile sample locations;
 2. A detailed discussion and evaluation of the laboratory results;
 3. A summary of findings and recommendations that provide a determination on the waste classification of the subject materials, based on the representative sample results;
 4. Recommendations for additional steps, if any;
 5. A chain-of-custody forms and all laboratory data with respective QA/QC sheets.

To expedite the review process, the Draft SSP shall be submitted electronically to FUSD in MS WORD format.

Upon revision of the draft Certification Report by the CONTRACTOR’S licensed environmental professional and acceptance by the OAR and FUSD three copies of the final report will be submitted to the OAR for distribution to FUSD and the project file and one copy to FUSD.

- D. The Environmental Compliance Manager shall confirm that the proposed waste classification for the proposed import/export material is appropriate. For materials designated unacceptable for export except to a licensed facility, the Environmental Compliance Manager shall provide information on the necessary waste manifest documentation.
- E. Written documentation (e-mail is acceptable) verifying that all export soil for any soils exported for use at a non-school site, including the final Certification Report prepared by CONTRACTOR’S licensed environment professional, were provided to provide to the proposed recipient prior to export and delivery.
- F. Written documentation, in the form of a memo or email from CONTRACTOR to OAR, prior to import/export, verifying that the hauling contract specifies ‘clean’ trucks and that the actual haul trucks utilized for import/export activities will be clean of visible contamination or deleterious materials.
- G. Written documentation that the trucks went directly from the source location to the recipient location with no detours or stops at other locations and that short

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

loads were not augmented by other materials that were not tested as part of the final import/export SSP. It is the CONTRACTOR'S responsibility to document that no other trips or short-load augmentation occurred and submit the documentation within five (5) business days of the completion of the import/export activities. All import/export transportation activities shall be conducted in accordance with all applicable (local, State, Federal) rules and regulations.

- H. Certification, in the form of haul tickets or completed waste manifests, documenting the volume and recipient of all import/export materials and activities. This documentation shall be coordinated through the OAR, PI and FUSD.
 - 1. For approved import/export to new school sites, unregulated facilities (landfill) or non-school sites, haul tickets may be utilized, but shall contain the following minimum information:
 - Date of haul activity
 - Address of source
 - Address of recipient
 - Load volume
 - Time of departure from source
 - Time of arrival at recipient site
 - Signature of recipient or recipient's agent
 - 2. For export to regulated facilities (landfills, recyclers, etc.), the appropriate waste manifest must be completed and a copy of the executed manifest, signed by the receiving site, must be provided to the OAR. The waste manifest copy, signed by the receiving facility and based on the manifest address, will be sent directly to FUSD.

1.4 APPROVALS

- A. NO import or export of earth or geotechnical grading or filling materials can occur at FUSD sites without PRIOR approval by FUSD.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Imported
 - 1. Soils. Soils proposed for import shall be tested pursuant to the requirements of this Section (32 24 00), unless a variance has been requested by CONTRACTOR and approved by OAR and FUSD prior to the import of the subject materials.
 - 2. Gravels. Clean gravel, consisting of native rock from a commercial source, may be granted a variance from the testing requirements of this Section provided a request for variance is submitted by CONTRACTOR for review

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

and approval at least two weeks prior to import. CONTRACTOR shall provide written documentation, which identifies the source, volume and proposed transport date of the material for review and a letter signed and stamped from either a California Professional Engineer or Geologist stating the quarry does not mine ultra-mafic (i.e. natural asbestos containing) materials. The request for variance requires approval by OAR and FUSD prior to CONTRACTOR importing the materials.

3. Miscellaneous Material. No miscellaneous material containing crushed concrete, asphalt, construction debris, or other potential deleterious materials may be utilized or imported to FUSD project site for use as fill or grading materials of any sort without prior testing by CONTRACTOR pursuant to the subject Section (32 24 00) and approval by the OAR and FUSD.

B. Exported

1. Soils. Soils proposed for export shall be tested pursuant to the requirements of the subject section, unless a variance has been requested by CONTRACTOR and approved by OAR and FUSD prior to the import of the subject materials. (Note: Once soils or other materials for export have been tested, they cannot be disturbed or reused for any purpose without prior approval by the OAR and FUSD.
2. Gravels. Gravels or other natural rock material shall not be exported from a FUSD project without prior testing by CONTRACTOR pursuant to this Section (32 24 00) and/or approval by the OAR and FUSD.
3. Miscellaneous Material. No miscellaneous material or other natural rock material shall not be exported from a FUSD project without prior testing by CONTRACTOR pursuant to this Section (32 24 00) and/or approval by the OAR and FUSD.

C. Site Generated

1. Soils. Soils proposed for export shall be tested pursuant to the requirements of this Section (32 24 00), unless a variance has been requested by CONTRACTOR and approved by OAR and FUSD prior to the export of the subject materials. (Note: Once soils or other materials for export have been tested, they cannot be disturbed or reused for any purpose without prior approval by the OAR and FUSD.
2. Gravels. Gravels or other natural rock materials shall not be exported from a FUSD project site without prior testing by CONTRACTOR pursuant to this Section (32 24 00) and/or approval by the OAR and FUSD.
3. Miscellaneous Material. NO crushed miscellaneous material containing concrete, asphalt, construction debris, or other potential deleterious material that is generated onsite may be used as fill or grading material of any sort at a FUSD project site without prior testing and approval by OAR and FUSD. The onsite use of crushing equipment requires prior concurrence by OAR and FUSD. Crushed asphalt shall be segregated and

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

stockpiled separately.

D. Import and Export of fill Materials:

1. Fees: CONTRACTOR shall pay as required by authorities having jurisdiction over area.
2. Bonds: CONTRACTOR shall post as required by authorities having jurisdiction over area.

PART 3 - EXECUTION

3.1 SAMPLING AND TESTING

- A. CONTRACTOR shall contract with, and pay for, the services of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Professional Geologist [PG] or Registered Environmental Assessor II [REA II]).
- B. CONTRACTOR shall contract with, and pay for, and independent, approved California Department of Health Services certified testing laboratory to perform sampling and testing of imported, exported and site generated fill materials. [Note: Utilization of portable, onsite crushing equipment on FUSD sites also requires prior notification and approval by OAR and FUSD.]
- C. All fill/grading material, unless otherwise specified in writing by OAR and FUSD whether imported or exported, must be tested at the site or origin. Import/export testing and certification process shall include the following steps:
 1. Stockpile all materials for sampling (standard stockpile or backhoe pothole stockpile). Crushed fill materials generated by CONTRACTOR at a school site must be segregated by material. (e.g., separate stockpiles for concrete, asphalt. etc.)
 2. Submit Draft SSP for review and concurrence by OAR and FUSD.
 3. Collect and analyze samples (see Table 1 for number of samples per volume) per SSP. Once fill materials for export have been stockpiled and tested, they may not be used onsite for any purpose without prior approval by OAR and FUSD.
 4. Submit draft import/export sample data report for review and concurrence by OAR and FUSD.
 5. Submit final import/export sample data report (Certification Report to OAR and FUSD for concurrence or proposed waste classification. All certified material not utilized or exported within a period of 90 days will be subject to retesting unless a variance is requested by CONTRACTOR and is approved by OAR and FUSD prior to use or import/export of the subject materials.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

6. Submit required pre import/export documentation/record to the OAR (e-mail).
7. Submit post import/export certifications to the OAR and FUSD.
8. In addition to the preceding, requirements, certifications and submittals as indicated in previous subsections above.

OWNER retains the right to refuse any fill materials proposed for use at a school site.

- D. Import/export fill materials shall be stockpiled by CONTRACTOR (or at export site) and are deemed acceptable for import/export or reuse only when it is demonstrated to the satisfaction of OAR and FUSD that the subject materials meet the requirements of this Section.
- E. As described in Section 1.03B, lacking site-specific data or sample rationale to support a more focused analytical approach; the CONTRACTOR shall analyze all samples for the following substances according to the methods indicated below. Table 3 is a waste classification flowchart for use by CONTRACTOR'S environmental professional. In all cases, detection levels and quality assurance/quality control methods shall be in accordance with standard Method reporting limits and best laboratory practices and the following USEPA (EPA) methods:
 1. Total Petroleum Hydrocarbons, utilizing EPA Method 8015M, for gasoline and diesel.
 2. Volatile Organic Compounds, utilizing EPA Method 8260B/ 5035.
 3. Polychlorinated biphenyls, utilizing EPA Method 8082.
 4. Semi-Volatile Compounds, utilizing EPA Method 8270C.
 5. Organochlorine Pesticides, utilizing EPA Method 8081 A.
 6. Organophosphorus Pesticides, utilizing EPA Method 8141A.
 7. Chlorinated Herbicides, utilizing EPA Method 8151A.
 8. California Code of Regulations Title 22 (CAM 17) Metals, utilizing EPA Method 6010B/7470A.
 9. Hexavalent Chromium, utilizing EPA Method 7199.
 10. Arsenic/Thallium, utilizing EPA Method 6020.
- F. Import/export fill material may be deemed defective for use by FUSD at a school site if any of the following results are obtained.
 1. Total Petroleum Hydrocarbons are present at concentrations exceeding

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

100 milligrams per kilogram (mg/kg) for gasoline and 1,000 mg/kg for oil/diesel and long chain hydrocarbons.

2. Solvents and other volatile organic compounds are present at concentrations exceeding the laboratory reporting limit.
 3. Polychlorinated biphenyls are present at concentrations exceeding the laboratory reporting limit.
 4. Semi-volatile compounds are present at concentrations exceeding the laboratory reporting limit.
 5. Organochlorine pesticide is present at concentrations exceeding the laboratory reporting limit.
 6. Organophosphorus pesticides are present at concentrations exceeding the laboratory reporting limit.
 7. Chlorinated herbicides are present at concentrations exceeding the laboratory reporting limit.
 8. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding site-specific background.
 9. Hexavalent chromium is present at concentrations exceeding 15 mg/kg.
- G. Evaluate concentrations of metals in import fill by conducting the analysis set forth below.
1. Compare the maximum detected metal concentrations in import/export fill samples to the site-specific background levels provided in the site Preliminary Environmental Assessment (PEA) Report. The PEA Report shall be available from the OAR. If any metal concentration exceeds its listed background value, the fill material fails and shall be deemed defective and unacceptable for use unless supported by a site specific health risk assessment.
 2. In addition to section 3.01.G.1, import/export fill shall be deemed environmentally defective and unacceptable for use if any of the following results are obtained:
 - a. Arsenic concentrations exceed 12.0 mg/kg.
 - b. Lead concentration exceeds 255 mg/kg or fails TTLC/STLC.
 - c. Import/Export materials at new school sites with total lead concentrations greater than 50 mg/kg shall be analyzed for leach ability (STLC/TTLC) prior to export. Materials exceeding STLC limits identified in Table 2 are deemed defective and unacceptable for use at school sites.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- d. Import/Export materials at new school sites with total chromium concentrations greater than or equal to 100 mg/kg shall be tested for hexavalent chromium.

- H. All export/import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations (See Table 2). For the purpose of this specification, "contaminated" shall mean any soil or geotechnical material at a concentration, which would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous). OAR must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of OAR and FUSD.

- I. Specification test results and OAR and FUSD approvals shall be valid for a period of 90 days from the date of the subject testing unless a variance is requested by CONTRACTOR and approved by OAR and FUSD. Previously approved materials shall not be utilized or disposed offsite after the 90-day limit without prior review and approval by OAR and FUSD.

- J. Requests for variances to this Specification shall be submitted in writing to OAR and FUSD a minimum of two weeks in advance of need for review and approval. The request for variance must provide all available testing data, a rationale to support the request and to have an active funding line (provided by OAR) to facilitate review by OAR and FUSD will review the request for variance and will provide its preliminary determination within two weeks. Certain requests may require final approval by the Department of Toxic Substances Control (DTSC).

- K. Soils with concentrations above Section screening levels may, upon prior approval by OAR and FUSD, be reused at other school sites if supported by a site-specific human health risk assessment.

3.2 TRANSPORTATION

- A. Details of the samples and testing must be submitted to and approved by OAR and FUSD before transportation.

- B. Haul Routes and Regulations/Restrictions: CONTRACTOR must comply with requirements of project EIR (CEQA) and authorities having jurisdiction over the project area and the proposed activities (e.g. Regional Water Quality Control Board, Department of Toxic Substances Control, etc.).

- C. CONTRACTOR shall pay all fees required by authorities having jurisdiction over area.

- D. Contractor shall pay all fees for disposal and/or processing of contaminated and/or hazardous fill materials at a regulated facility.

- E. CONTRACTOR shall post and pay for all bonds required by authorities having jurisdiction over area.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

END OF SECTION

WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (Cubic Yards)*	Sampling Frequency*
0-500	1 per 100 CY
501-1,000	1 per 250 CY
1,001-5,000	1 per 250 CY for first 1000 CY 1 per 500 CY thereafter
5,001-20,000	12 samples for first 5000 CY 1 per 1000 CY thereafter
> 20,000	MINIMUM 2 per 2000 CY for first 20,000 CY, 1 per 500 CY thereafter
<p>All samples are to be collected, analyzed and accepted before import/export: materials going to licensed facilities must meet sampling criteria from that facility. Pothole stockpile sampling may require discrete depth supplemental sampling in order to achieve representative results. The rationale for sample approach should be discussed in the draft SSP. In situ (in place) sampling by boring or hand auger is not acceptable.</p> <p>*Discuss alternative screening & sampling approached with OAR and FUSD representative for project.</p>	

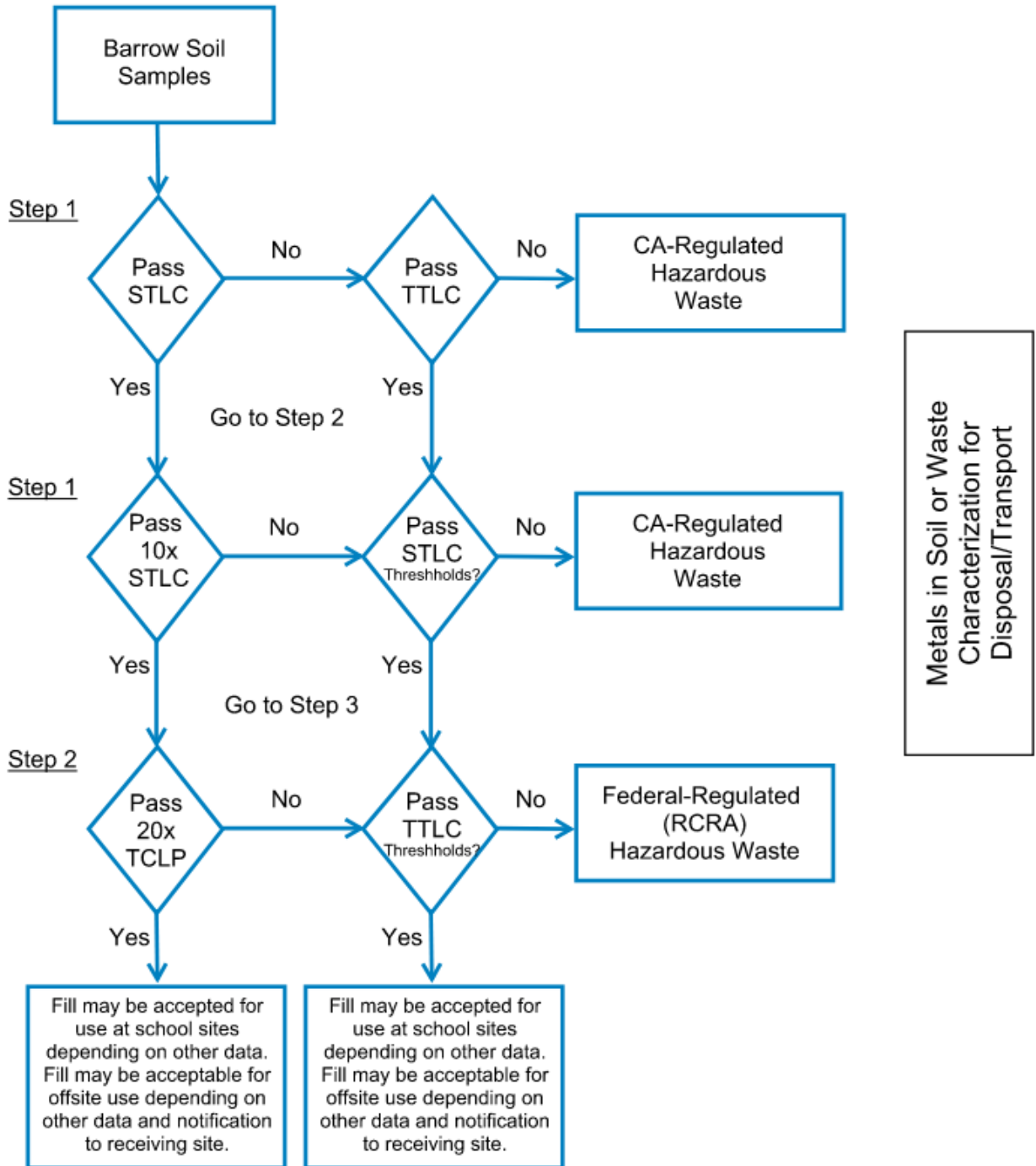
WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023

Chemicals of Potential Concern	TABLE 2 WASTE CHARACTERIZATION				
	Hazardous Waste if Exceed Criteria - TTLC Level* (mg/kg)	Additional WET Leaching Tests if Exceed Hazardous Waste Criteria - 10 times STLC Level** (mg/kg)	California-Regulated Hazardous Waste-Soluble Threshold Limit Concentration - STLC Level (mg/l)	Additional TCLP Leaching Tests if Exceed Hazardous Waste Criteria - 20 times TCLP Level** (mg/kg)	Federally-Regulated (RCRA) Hazardous Waste - Toxicity Characteristics Leaching Procedure - TCLP Level (mg/l)
CAM 17 Metals					
Antimony	500	150	15	NA	NA
Arsenic	500	50	5	100	5
Barium	10,000	1,000	100	2,000	100
Beryllium	75	7.5	0.75	NA	NA
Cadmium	100	10	1	20	1
Chromium	2,500	50	5	100	5
Cobalt	8,000	800	80	NA	NA
Copper	2,500	250	25	NA	NA
Lead	1,000	50	5	100	5
Mercury	20	2	0.2	4	0.2
Molybdenum	3,500	3,500	350	NA	NA
Nickel	2,000	200	20	NA	NA
Selenium	100	10	1	20	1
Silver	500	50	5	100	5
Thallium	700	70	7	NA	NA

Vanadium	2,400	240	24	NA	NA
Zinc	5,000	2,500	250	NA	NA
Chromium (VI)	500	50	5	NA	NA

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

TABLE 3 – WASTE CLASSIFICATION FLOWCHART



WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Chain link fences and gates as indicated.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 3000 - Cast-in-Place Concrete.
 - 3. Section 04 2200 – CMU Masonry
 - 4. Section 31 1000 – Site Clearing.
 - 5. Section 31 2200 - Grading.
 - 6. Section 31 2316 - Excavation and Fill for Paving.
 - 7. Section 32 0117 - Pavement Repair.

1.02 SUBMITTALS

- A. Shop Drawings: Submit dimensioned plans and details indicating extent of fences, locations of gates, and details of attachment and footings. Indicate means and methods for surface preparation and finishing.
- B. Certifications: Manufacturers material certifications in compliance with the ASTM standards referenced in this Section.

1.03 REFERENCES

- A. ASTM A392: Standard 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 A824 – Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.
- D. ASTM F552 - Standard Terminology Relating to Chain Link Fencing.
- E. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- F. ASTM F567: Standard Practice for Installation of Chain Link Fence.
- G. ASTM F626 - Standard Specification for Fence Fittings.
- H. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric.
- I. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
- J. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
- K. ASTM F1083: Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- L. ASTM F1184: Standard Specification for Industrial and Commercial Horizontal Slide Gates.
- M. ASTM F1664 – Standard Specification for Poly Vinyl Chloride (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence.
- N. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction.
- O. UL 325 - UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specialized in manufacturing chain link fence products with at least five years of experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and with at least five year experience.

PART 2 – PRODUCTS

2.01 CHAIN LINK FABRIC

- A. Galvanized Chain Link Fabric: Conforming to ASTM A392, Class 2 zinc coating, 2.00 ounces minimum per square foot of uncoated wire surface, hot-dipped galvanized after weaving, and with top and bottom edges knuckled (kk). Tie wires and hog rings shall conform to ASTM F626, and shall be 9 gage and galvanized.
- B. Chain Link Fabric Requirements:

1. Fabric for perimeter fencing and interior fencing shall be 9 gage woven wire with 2 inch mesh, unless otherwise specified.
2. For perimeter fences 16 feet high, the upper 8 feet of fabric may be 11 gage.
3. Fences 12 feet high or less shall be furnished with single width fabric.
4. Fabric for fencing on top of handball court shall be 9 gage wire minimum with 1 inch mesh.
5. Fabric for fencing of tennis courts shall be full height, single width, 9 gage by 1-3/4 inches mesh chain link fabric.
6. Installed fence fabric shall be free from barbs, icicles, or other projections. Fence fabric with such defects will be deemed defective Work.

2.02

STEEL FENCE FRAMEWORK

- A. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded steel pipe conforming to ASTM F1083, Group IA Heavy Industrial Fence Framework, with a minimum yield strength of 30,000 psi. Minimum 1.8 Oz/ft² hot dipped zinc coating average for interior and exterior.
- B. Schedule of Posts, Rails, Bracings and Footings: Unless indicated otherwise on the drawings, shall be of sizes indicated on the following schedule.

Item	Height	Nominal Pipe Size (inches)	Outside Diameter (inches)	Weight (pounds per foot)	Footings	
					Diameter (inches)	Depth (inches)
Top Rail, Brace Rails and Transom Rails	Up to 10'-0"	1-5/8	1.660	2.27	N/A	N/A
	10'-1" to 16'-0"	1-7/8	1.900	2.72	N/A	N/A
Line Posts	Up to 4'-0"	2-3/8	2.375	3.65	12	36
	4'-1" to 8'-0"	2-3/8	2.375	3.65	24	66
	8'-1" to 10'-0"	N/A	N/A	N/A	N/A	N/A
	10'-0" to 16'-0"	N/A	N/A	N/A	N/A	N/A
	14'-0" to 16'-0"	N/A	N/A	N/A	N/A	N/A
Terminal, Corner, Angle & Pull Posts	Up to 4'-0"	2-1/2	2.875	5.79	12	36
	4'-1" to 8'-0"	2-1/2	2.875	5.79	24	66
	10'-1" to 16'-0"	N/A	N/A	N/A	N/A	N/A
Pedestrian Gate Posts	Up to 8'-0"	2-1/2	2.875	5.79	14	36
Gate Frames	Up to 8'-0"	1-1/2	1.900	2.72	N/A	N/A
Driveway Double-Leaf Swing Gate Posts: Opening						
Up to 17'-3-1/2"	Up to 8'-0"	3 1/2	4	9.11	24	66
17'-4" to 20'-3-1/2"	Up to 8'-0"	3-1/2	4	9.11	24	66

2.03

FITTINGS

- A. Fittings shall be malleable iron conforming to ASTM F626.
- B. Post Caps: Designed to fit snugly over posts with a minimum projection of 1-1/2 inches below top of posts. Post caps shall be manufactured with a curved top.
- C. Eye Tops: Designed to fit over line posts, and for through passage of top rail.
- D. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.
- E. Rail Ends for Top Rails and Brace Rails: With holes to receive 3/8 inch bolts for securing to rail end bands.
- F. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be galvanized machined 3/8 inch by 1 1/2-inch.

- G. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.
- 2.04 TENSION WIRE**
- A. 6 gage marcelled steel wire conforming to ASTM A824, Type II Class 5 zinc coated, 2.00 ounces minimum per square foot of uncoated wire surface. Wavy type wire is not acceptable.
- B. Turnbuckles for installation with Tension Wires: Eye and hook type, drop forged steel, right and left hand threads, at least 3/8 inch screw diameter with at least 4 ½-inches of take-up.
- 2.05 PAINT FOR GALVANIZING REPAIR**
- A. Paints for Refurbishing Galvanizing: Organic zinc-rich paint conforming to ASTM A780. Paints used on the site shall be approved by OWNER's Office of Environmental health and Safety (OEHS).
- 2.06 GROUT**
- A. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications "Rapid set Cement".
- 2.07 GATES**
- A. General:
1. Gate framework shall be fabricated of tubular steel of sizes indicated on the drawings and conforming to ASTM F1083, Group IA, with a minimum yield strength of 30,000 psi. Joints at corners shall be miter cut and continuously welded to sides.
 2. Install fence fabric to side members with tension bars and tension bands as specified, spaced not more than 14 inches apart. Tension bars shall extend full height of gate. Install fence fabric to top and bottom members and to brace rail with wire ties as specified for top rails, spaced not more than 12 inches apart. Chain link fabric shall match adjacent fence system.
 3. Latches and Hinges: Weld gate latches and strikes to gate posts and frames. Weld OWNER provided hinges to posts. Weld 3 hinges on each post for swing gates more than 16 feet wide. Welding shall be performed before gate frames are galvanized, or welds shall be finished as specified below.
 4. Grind welds flush and smooth. Hot-dip galvanize fabricated parts after welding, or be protected by zinc-rich paint in conformance to ASTM A780.
- B. Swing Gates: Galvanized steel welded fabrication in conformance with ASTM F900, fabric size and gage shall match fence. Positive locking gate latch shall be fabricated of 5/16 inch thick by 1 ¾ inch pressed steel galvanized after fabrication. Weldable hinges will be provided by OWNER.
- C. Cantilever Slide Gates: Shall be in conformance to ASTM F1184 Type II, Class 1. Positive locking gate latch shall be fabricated of 5/16 inch thick by 1 ¾ inch pressed steel galvanized after fabrication. Provide manufacturer's standard overhead beam/structure, track, rollers and accessories to support gate panel. Gates shall be designed and fabricated to open or close by applying an initial pull force no greater than 40 pounds. Positive locking latch fabricated of galvanized pressed steel. Galvanized steel drop bars shall be provided on with double gates. Provide safety protective guards for top and bottom external rollers.
- D. Cantilever Internal Roller Gates: Shall be in conformance to ASTM F1184 Type II, Class 2. Length of back frame support section shall be a minimum of 40 percent of the opening. Slide gates shall comply with the performance deflection criteria listed in ASTM F1184. Gates shall be designed and fabricated to open or close by applying an initial pull force no greater than 40 pounds. Internal truck assemblies shall be designed to handle the forces required for gate size opening and height.
- 2.08 CONCRETE**
- A. Comply with requirements of Section 03 3000, Cast-in-Place Concrete. Provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 psi, 5-inch slump, and one inch maximum size aggregate.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Refer to the following Sections for earthwork related work:
1. Section 31 22 00 - Grading.
 2. Section 31 23 16 - Excavation and Fill for Paving.
 3. Section 32 01 17 - Pavement Repair.

3.02 FRAMEWORK INSTALLATION

- A. Install fences as indicated on Drawings.

- B. Space fence posts at equal intervals between terminal, angle, corner, and gate posts, and not more than 10 feet apart measured from center to center of posts. In curved fence sections having a radius of 50 feet or less, space posts not more than 5 feet - 6 inches apart. Install posts so that top of eye of post caps are level with top of fabric.
- C. Install angle or corner posts at each change in direction of 15 degrees or more, at change of 5 percent or more in grade of fencing, and at the beginning and end of curved fence sections.
- D. Install terminal posts at ends of runs of fencing. Install gateposts on both sides of driveway and pedestrian gates. For double-leaf gates, net opening between gate posts shall be gate size as indicated on Drawings, plus 3 ½-inches; for single leaf gates, net opening shall be gate size plus 2 ½-inches.
- E. Embed posts into footing 6 inches less than the depth of the footing unless noted otherwise on drawings.
- F. Where a fence is to be installed on a curb, construct footings with top of footing level with the lower finish grade. Align posts, set plumb and true before placing footings. Remove splattered concrete from exposed pipe surfaces while concrete is still soft. In bituminous surfaced areas, install seal coat on top of concrete footings.
- G. Install fences with top rail. Top rail shall pass through eye tops and be secured at ends with rail-end fittings and bands.
- H. Install fences over 10 feet in height, in addition to top rail, with a full length horizontal mid-rail set at mid-height of fence and rigidly secured to posts with rail end fittings and bands.
- I. In fences higher than 10 feet, install brace rails at angles, corners, and terminals at 1/4 and 3/4 of fence height. Provide one horizontal brace rail in panels adjacent to terminal, angle, corner, and gateposts, install at mid-height of fence and rigidly secured to posts with rail end fittings and bands. Provide horizontal brace rails, as specified, in panels of curved sections having a radius of 50 feet or less. Brace rails are not required in fencing 4 feet or less in height.
- J. Provide a transom rail and fabric at top of pedestrian gate openings. Install transom rail 6 feet 8 inches above high point of grade at gate opening. Ends of transom rails shall be pinned or riveted to rail end fittings with 1/4 inch mild steel rivets. Pin or rivet shall go through rail and peen. Welding on rail ends is not permitted.
- K. Install bottom tension wire a minimum of 3 inches from grade for fencing and secure to fence posts with ties. Provide a turnbuckle for each 150 feet of wire or fractional part thereof. Turnbuckles are not required in runs of 15 feet or less. Install ends of tension wires to posts in a manner to prevent slipping or loss of tension. Wrap should start from fence side of post. Turn end of wire around post tightly twisted at least three times around wire. At turnbuckles, wire through eye and tightly twist end at least three times around wire. Cut tail of bottom wire flush.

3.03 CHAIN LINK FABRIC INSTALLATION

- A. Install fence fabric on outward facing side of posts, except for tennis courts. Install fence fabric with top edge projecting above top rail of fence.
- B. Install bottom of fence fabric to clear finish grades, except on bituminous surface install 3/4 inch above such surface. Locally shape and trench ground surfaces where necessary to provide uniform top and bottom alignment of fence.
- C. Tightly stretch fabric and at terminal, pull corner, angle, and gateposts, secure with tension bars extending full height of fence. Secure tension bars to posts with bolted tension bands spaced not more than 14 inches apart.
- D. Bands and Ties: Install bands and ties in accordance with following schedule:

15 bands on 16 feet fence	16 ties on 16 feet fence
11 bands on 12 feet fence	12 ties on 12 feet fence
7 bands on 8 feet fence	7 ties on 8 feet fence
6 bands on 6 feet fence	6 ties on 6 feet fence
4 bands on 4 feet fence	4 ties on 4 feet fence
- E. Fasten fabric to line posts with wire ties spaced not more than 16 inches apart. Where 6 gage aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.
- F. Fasten fabric to top rails, mid-rails, brace rails, with wire ties spaced not more than 18 inches apart. Bend back ends of tie wires so as not to be a hazard. At bottom tension wire, install hog rings spaced not more than 18 inches apart. Where 2 fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gage wire or 6 gage aluminum ties to midrails.

3.04 WELD GRINDING

- A. Grind all field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with galvanizing repair coating. Install coating in accordance with written recommendations of manufacturer.

3.05 FIELD AND COURT FENCING

- A. Tennis Courts: Perimeter fences for tennis courts shall not be less than 12 feet in height. Instead of providing bottom tension wire, provide with horizontal bottom rail. Remove bottom tension wire or redwood header in existing chain link fences and add bottom rail, if not existing. Install fabric on courtside of posts.
- B. Handball Courts: Posts, rails, chain link fabric and accessories required for a complete installation shall be as specified, except that chain link fabric shall be 9 gage wire minimum by 1 inch mesh.
- C. Baseball and Softball Fields: Chain link fabric for the field fence and backstop shall be installed on the field side. Chain link fabric for batting cages shall be installed on the inner side of the cage. Chain link fabric for the batting cages and backstop hood shall be installed over the framework structure.

3.06 INSTALLATION ON TOP OF CONCRETE WALLS

- A. Posts for fences on top of new concrete or concrete masonry walls shall be installed in 24 gage galvanized iron inserts one inch larger than the outside post diameter. Wall thickness for such installation shall be 8 inches minimum. Depth of embedment of post shall not be less than 15 inches for fence height not exceeding 4 feet. Install post plumb, true, and fill joint space with non-shrink grout, finished flush with top of wall. Remove excess grout and clean posts.
- B. Fencing on Gravity Walls: Post of fence not exceeding 8 feet high shall have a minimum of 15 inches embedment in gravity walls with a top width of 10 inches minimum and side of 1H: 4V. Where the height of gravity wall from top to bottom, within 5 feet from each side of a post, is less than 22 inches, provide concrete fence post footings and embed posts in accordance with the schedule of posts and footings as set forth in this section.
- C. Do not install footings on existing walls without the review of the ARCHITECT.

3.07 HORIZONTAL APPLICATIONS

- A. Spacing of lid joist framing members shall not exceed four feet on center. Joists shall be welded on both ends to supporting chain link framing structure or mechanically fastened to adjacent buildings, as indicated on the drawings.

3.08 ALTERATIONS TO EXISTING FENCING

- A. Resetting Fences:
 - 1. Existing fences shall be reset where finish pavement is raised or lowered more than 6 inches from existing grade. Remove and reinstall entire fence assembly as specified in this Section.
 - a. Where the finish grade is raised 6 inches or less, cut and re-knuckle the existing fence fabric. Adjust tension wire and tie to fabric. Bottom of fence fabric shall be installed $\frac{3}{4}$ " above finish grade.
 - b. Where the finish pavement is lowered 6 inches or less, demolish the fence footing flush with the finish grade and adjust the fabric and its attachments. Bottom of fence fabric shall be installed $\frac{3}{4}$ inches above finish grade.
 - 2. Where existing fencing posts are indicated to be removed, reset or relocated, remove posts including their concrete footings
 - a. Fill footing cavity with sand, compact and cap surface matching existing adjacent material.
 - b. Construct new concrete footings, as specified, in their designated location and set posts as indicated above in Framework Installation Article.
 - 3. Bent posts, rails and accessories shall be replaced with new parts as specified to complete reinstallation. New materials shall closely match design of existing installation. Cut bent portion of posts and weld new sections of equal diameter and thickness. Install splice to inside of all welded section prior to welding. Previously repaired or welded posts shall be replaced.
 - 4. Top rail is required in reinstalled fencing which does not have top rail in its existing condition. Install as specified for new installations.
 - 5. Fabric Removal: Do not remove more than what can be replaced during one day unless a barricade, providing equal security, will be installed in its place. If freestanding temporary fence is used, it shall be clamped and wrap tied.

6. Remove and dispose of off-site concrete debris, chain link, hardware and accessories. Use new hardware and accessories.
7. Gates:
 - a. Remove non-welded type existing hinges and replace with OWNER provided weldable hinges. On existing welded hinges remove bolts and replace with new. Remove existing latches and replace with new.
 - b. Weld gate latches and hinges to posts as indicated for new fencing.
- B. Painting: Disassemble existing fence and all attachment hardware (bands, pipe, and wire) prior to preparation of posts for painting. Replace attachment hardware with new.
 1. Preparation: Prepare exposed steel posts, rails and accessories thoroughly cleaned of rust, oil and foreign materials. Painted galvanized metal shall be stripped to bare metal before applying prime coat.
 2. Priming: Spot prime areas from which the original surface coating had been removed with a metal primer to match adjoining surfaces. Subsequently, install a prime coat to the entire surface to be painted.
 3. First Coat: Install first coat as recommended by the paint manufacturer. Furnish a color that is 10 percent to 15 percent lighter or darker than the finish coat.
 4. Second or Finish Coat: Install finish coat after the first coat has cured.
 5. Install paint in accordance with manufacturer's written recommendations.
 6. Protect adjacent structures, walls, concrete or asphalt from paint.

3.09 INSTALLATION OF GATES

- A. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one inch at top. Construct gates installed in sloping areas to conform to the grade. Provide an opening in each gate for access to locking device or padlock. Knuckle ends of fabric cut for opening to eliminate hazards.
- B. Sliding Gates and Swing Gates: Fabricate and install as indicated on Drawings. Wheel housing shall be designed to fit tightly to roll track and prevent gate from rolling over objects. Unsupported cantilever type roll gates are not acceptable. Install gate stops in accordance with the drawings. Both top and track stops are required.

3.10 COMPLETION

- A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.
- B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.11 PROTECTION

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

3.12 CLEANUP

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

END OF SECTION

**SECTION 32 84 00
PLANTING IRRIGATION – DOMESTIC WATER**

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. It is the intent of the specifications and drawings that the finished system is complete in every respect and shall be ready for operation satisfactory to the Owner.
- B. The work shall include all materials, labor, services, transportation, and equipment necessary to perform the work as in these specifications, and as necessary to complete the contract.

1.02 CONSTRUCTION DRAWINGS

- A. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, site utilities and architectural features.
- B. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications. When an item is shown on the plans but not shown on the specifications or vice versa, it shall be deemed to be as shown on both. The Landscape Architect shall have final authority for clarification. When a conflict occurs between an item shown on the plan and as shown on the specifications, the Landscape Architect shall have final authority for clarification.
- C. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in the design. Such obstructions or differences should be brought to the attention of the Landscape Architect as soon as detected. In the event this notification is not performed, the Irrigation Contractor shall assume full responsibility for any revisions necessary.

1.03 QUALITY ASSURANCE

- A. Provide at least one English speaking person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the manufacturer's recommended methods of installation and who shall direct all work performed under this section.
- B. Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturer of articles used in this contract furnishes directions covering points now shown in the drawings and specifications.
- C. All local, municipal and state laws, rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.
- D. All materials supplied for this project shall be new and free from any defects. All defective materials shall be replaced immediately.

1.04 SUBMITTALS

- A. Materials List:
 - 1. After award of contract and before any irrigation system materials are delivered to the job site, submit to the Landscape Architect a complete list of all irrigation systems, materials, or processes proposed to be furnished and installed as part of this contract.
 - 2. Show manufacturer's name and catalog number for each item, furnish complete catalog cuts and technical data, and furnish the manufacturer's recommendations as to the method of installation.
 - 3. No substitutions will be allowed without prior written acceptance by the Landscape Architect or Owner's authorized representative.
 - 4. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.
- B. Substitutions:

If the Contractor wishes to substitute any equipment or materials for those listed on the irrigation drawings and specifications, he may do so by providing the following information to the Landscape Architect for approval:

1. A written statement indicating the reason for making the substitution and the difference in installed price if the item is accepted.
2. Catalog cut sheets, technical data and performance information for each substitute item.

1.05 EXISTING CONDITIONS

- A. The Contractor shall verify and be familiar with the locations, size and detail of points of connection provided as the source of water, electrical supply, and telephone line connection to the irrigation system.
- B. Irrigation design is based on the available static pressure shown on the drawings. Contractor shall verify static water on the project prior to the start of construction. Should a discrepancy exist, notify the Landscape Architect and Owner's authorized representative prior to beginning construction.
- C. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewer lines, and other utilities as are commonly encountered underground and he shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Landscape Architect who will arrange for relocations. The Irrigation Contractor will proceed in the same manner if a rock layer or any other such conditions are encountered.
- D. The Contractor shall protect all existing utilities and features to remain on and adjacent to the project site during construction. Contractor shall repair, at his own cost, all damage resulting from his operations or negligence.
- E. The Irrigation Contractor shall coordinate with the General Contractor for installation of required sleeving as shown on the plans.

1.06 INSPECTIONS

- A. The Landscape Architect shall be permitted to visit and inspect at all times any part of the work and shall be provided safe access for such visits.
- B. Where the specifications require work to be tested by the Contractor, it shall not be covered over until accepted by the Landscape Architect, Owner's authorized representative, and/or governing agencies. The Irrigation Contractor shall be solely responsible for notifying the Landscape Architect, Owner, and governing agencies, a minimum of 48 hours in advance, where and when the work is ready for testing. Should any work be covered without testing or acceptance, it shall be, if so ordered, uncovered at the Irrigation Contractor's expense.
- C. Inspections will be required for the following at a minimum. Landscape Architect may opt to review photographs of pressure test (with image of pressure gauge and time stamps) and sample dripline layout.
 1. Pressure test of irrigation main line (Three hours at 150 PSI)
 2. Sample layout of dripline irrigation.
 3. Coverage test of irrigation sprinkler system.
 4. Final inspection prior to start of maintenance period
 5. Final acceptance
- D. Site observations and testing will not commence without the record drawings a prepared by the Irrigation Contractor. Record drawings must be complete and up to date for each site visit.
- E. Work which fails testing and is not accepted will be retested.

1.07 STORAGE AND HANDLING

- A. Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installation work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Landscape Architect and Owner.
- B. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings under cover until ready to install. Transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load.

1.08 CLEANUP AND DISPOSAL

- A. Dispose of waste, trash, and debris in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Bury no such waste material and debris on the site. Burning of trash and debris will not be permitted. The Contractor shall remove and dispose of rubbish and debris generated by his work and workmen at frequent intervals or when ordered to do so by the Owner's authorized representative.

- B. At the time of completion the entire site will be cleared of tools, equipment, rubbish and debris which shall be disposed of off-site in a legal disposal area.
- 1.09 TURNOVER ITEMS**
- A. Record Drawings:
1. Record accurately on one set of contract drawings all changes in the work constituting departures from the original contract drawings.
 2. The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the Landscape Architect. Prior to final inspection of work, submit record drawings to the Landscape Architect for review and approval.
 3. Dimensions from/to permanent points of reference such as buildings, sidewalks, curbs, etc. shall be shown. Data on record drawings shall be recorded on a day to day basis as the project is being installed. All lettering on drawings shall be minimum 1/8 inch in size.
 4. Show locations of the following items:
 - a. Point of connection (including water meters, backflow preventors, master control valves, etc.)
 - b. Routing of sprinkler pressure lines (dimensions shown at a maximum of 100 feet along routing and at all changes in direction)
 - c. Gate valves
 - d. Automatic remote control valves
 - e. Quick coupling valves
 - f. Routing of control wires
 - g. Irrigation controllers
 - h. Related equipment (as may be directed)
 5. Maintain record drawings on site at all times. Upon completion of work, transfer all as-built information and dimensions to a clean set of bond prints, using red, waterproof ink.
- B. Controller Charts:
1. Record drawings must be approved by Landscape Architect before controller charts are prepared.
 2. Provide one controller chart for each automatic controller. Chart shall show the area covered by the particular controller.
 3. The chart is to be a reduced copy of the actual "record" drawing. In the event the controller sequence is not legible, when the drawing is reduced, it shall be enlarged to a readable size. Print shall be black and white, with a different color used to indicate the area of coverage for each station.
 4. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 10 millimeters in thickness, with a matte finish.
- C. Operation and Maintenance Manuals:
1. Two individually bound copies of operation and maintenance manuals shall be delivered to the Landscape Architect or Owner's authorized representative at least 10 calendar days prior to final inspection. The manuals shall describe the material installed and the proper operation of the system.
 2. Each complete, bound manual shall include the following information:
 - a. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment including names and addresses of local manufacturer representatives.
 - b. Operating and maintenance instructions for all equipment.
 - c. Spare parts list and related manufacturer information for all equipment.
 - d. Guarantee Statement.
- D. Equipment:
1. Supply as a part of this contract the following items:
 - a. One (1) tool for disassembly and adjustment of each type of sprinkler head used in the irrigation system.
 - b. Padlock and two (2) keys for backflow enclosure (if used).
 - c. Two keys for each automatic controller.
 - d. Two quick coupler keys with a 3/4 inch bronze hose bib, bent nose type with hand wheel and two coupler lid keys.
 - e. One valve box cover key or wrench.
 - f. One 5-foot tee wrench for operating butterfly valves (if used).
 - g. Two (2) extra sprinkler heads of each size and type.

2. The above equipment shall be turned over to Owner's authorized representative at the final inspection.

1.10 COMPLETION

- A. At the time of the pre-maintenance period inspection, the Landscape Architect, Owner's authorized representative, and governing agencies will inspect the work, and if not accepted, will prepare a list of items to be completed by the Contractor. At the time of the post-maintenance period or final inspection, the work will be reinspected and final acceptance will be in writing by the Landscape Architect, Owner's authorized representative, and governing agencies.
- B. The Owner's authorized representative shall have final authority on all portions of the work.
- C. After the system has been completed, the Contractor shall instruct Owner's authorized representative in the operation and maintenance of the irrigation system and shall furnish a complete set of operating and maintenance instructions.
- D. Any settling of trenches which may occur during the one-year period following acceptance shall be repaired. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

1.11 GUARANTEE

- A. The entire sprinkler system, including all work done under this contract, shall be unconditionally guaranteed against all defects and fault of material and workmanship, including settling of backfilled areas below grade, for a period of one (1) year following the filing of the Notice of Completion.
Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense to Owner within ten (10) calendar days of receipt of written notice from Owner. When the nature of the repairs, as determined by the Owner, constitutes an emergency (i.e. broken pressure line) the Owner may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvements, resulting either from faulty materials or workmanship, shall be repaired at the Contractor's expense.
- B. Guarantee shall be submitted on Contractor's own letterhead as follows:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

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

PROJECT NAME:

PROJECT LOCATION:

CONTRACTOR NAME:

ADDRESS:

TELEPHONE:

SIGNED:

DATE:

PART 2 - PRODUCTS

2.01 SUMMARY

Use only new materials of the manufacturer, size and type shown on the drawings and specifications. Materials or equipment installed or furnished that do not meet Landscape Architect's, Owner's, or governing agencies standards will be rejected and shall be removed from the site at no expense to the Owner.

2.02 PIPING

- A. Pressure supply line from point of connection through basket strainer unit shall be Type "K" copper or brass pipe.
- B. Pressure supply lines 3 inches in diameter and larger shall be Class 200 PVC with bell-and-gasket joints. Piping shall conform to ASTM D2241.
- C. Pressure supply lines 2 inches to 2-1/2 inches in diameter shall be Class 315 solvent weld PVC. Piping shall conform to ASTM D1784.

- D. Pressure supply lines 1-1/2 inches and smaller in diameter shall be Schedule 40 solvent weld PVC. Piping shall conform to ASTM D1784.
- E. Non-pressure lines 3/4 inches in diameter and larger downstream of the remote control valve shall be Schedule 40 PVC or as stated on Irrigation Materials Legend on plans. Non-pressure lines 1 inch and larger to conform to ASTM D1784.

2.03 METAL PIPE AND FITTINGS

- A. Brass pipe shall be 85 percent red brass, ANSI, IPS Standard 125 pounds, Schedule 40 screwed pipe.
- B. Fittings shall be medium brass, screwed 125-pound class.
- C. Copper pipe and fittings shall be Type "K" sweat soldered.

2.04 PLASTIC PIPE AND FITTINGS

- A. Pipe shall be marked continuously with manufacturer's name, nominal pipe size, schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion.
- B. All plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASATM D2241 or ASTM D1784.
- C. All PVC fittings shall be standard weight Schedule 80 for constant-pressure mainline fittings and screwed fittings, and Schedule 40 for non-pressure lateral fittings and shall be injection molded of an improved virgin PVC fitting compound. Slip PVC fittings shall be the "deep socket" bracketed type. Threaded plastic fittings shall be injection molded. All tees and ells shall be side gated. All fittings shall conform to ASTM D2466 and D2467.
- D. All threaded nipples shall be standard weight Schedule 80 with molded threads and shall conform to ASTM D1785.
- E. All solvent cementing of plastic pipe and fittings shall be a two-step process, using primer and solvent cement applied per the manufacturer's recommendations. Cement shall be of a fluid consistency, not gel-like or ropy. Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855.
- F. When connection is plastic to metal, female adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base Teflon paste, tape, or equal.
- G. Expanding foam sealant for sleeving and conduit shall be a 2-part, 98% closed sell urethane foam, capable of sealing 3/4" to 6" diameter conduits with multiple pipe and cable configurations. Sealant shall have good adhesion to PVC pipe and cable jacket surfaces with 120 lb. compressive strength (ASTM D1621) and shall be capable of holding 9.5 PSI water pressure continuous and 5 PSI gas or vapor continuous.

2.05 VALVES

- A. Gate Valves:
 - 1. Gate valves shall be of the manufacturer, size, and type indicated on the drawings.
 - 2. Gate valves shall have threaded ASTM B-62 bronze body, bonnet and wedge, silicon bronze stem, and malleable iron handwheel.
 - 3. All Gate valves shall have a minimum working pressure of not less than 150 psi and shall conform to AWWA standards.
- B. Quick Coupler Valves:
 - 1. Quick coupler valves shall be of the manufacturer, size, and type indicated on the drawings.
 - 2. Quick coupler valves shall be brass with a wall thickness guaranteed to withstand normal working pressure of 150 psi without leakage. Valves shall have 3/4 female threads opening at base, with two-piece body. Valves to be operated only with a coupler key, designed for that purpose. Coupler key is inserted into valve and a positive, watertight connection shall be made between the coupler key and valve. Hinge cover shall be the locking type constructed of brass with a rubber-like vinyl cover.
- C. Automatic Control Valves:
 - 1. Automatic control valves shall be of the manufacturer, size, and type indicated on the drawings.
 - 2. Automatic control valves shall be electrically operated.
 - 3. Automatic control valves shall include manual flow adjustment.
- D. Anti-drain Valves:
 - 1. Anti-drain valves shall be of the manufacturer, size and type indicated on the drawings.
 - 2. Anti-drain valves shall have 18-8 stainless steel springs and valve stems with Buna-N seals.
 - 3. Anti-drain valves will have threaded connections the size of the riser or pipe they are to be installed onto, or the next available size. No slip connection anti-drain valves are allowed.

2.06 VALVE BOXES

- A. Valve boxes shall be fabricated from a durable, weather-resistant plastic material resistant to sunlight and chemical action of soils.
- B. The valve box cover shall be green in color and secured with a hidden latch mechanism or bolts.
- C. The cover and box shall be capable of sustaining a load of 1,500 pounds.
- D. Valve box extensions shall be by the same manufacturer as the valve box.
- E. Automatic control valve boxes shall be 16 inch x11 inch x12 inch rectangular size. Valve box covers shall be marked "RCV" with the valve identification number "heat branded" onto the cover in 2-inch high letters/numbers.
- F. Ball valve and quick coupler valve boxes shall be 10-inch diameter circular size. Valve box covers shall be marked with either "BV" or "QCV" with the valve identification "heat branded" onto the cover in 2-inch high letters.

2.07 AUTOMATIC CONTROLLER

- A. Automatic controller shall be of the manufacturer, size, and type indicated on the drawings.
- B. Automatic controller enclosures shall be of the manufacturer, size, and type indicated on the drawings. Enclosure shall be vandal-resistant, ventilated and waterproof.

2.08 ELECTRICAL

- A. All electrical equipment shall be NEMA Type 3, waterproofed for exterior installations.
- B. All electrical work shall conform to local codes and ordinances.

2.09 LOW VOLTAGE CONTROL WIRING

- A. Remote control wire shall be direct-burial AWG-UF type, size in no case smaller than 14 gauge.
- B. Connections shall be either epoxy-sealed packet type or Penn-Tite connectors.
- C. Ground wires shall be white in color. Control wires shall be red (where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" plans located on controller door).

2.10 IRRIGATION HEADS

- A. Sprinkler heads shall be of the manufacturer, size, type, with radius of throw, operating pressure and discharge rate indicated on the drawings.
- B. Pop-up heads and riser heads shall be used.

2.11 DRIP IRRIGATION COMPONENTS

- A. Dripline tubing shall be of the manufacturer, model number and distribution (emitter flow and spacing) indicated on the drawings.
- B. Drip emitters, bubblers and micro-sprays shall be of the manufacturer and model number indicated on the drawings.
- C. Distribution tubing, connectors and insert or compression fittings shall be of the manufacturer and type indicated on the drawings.

2.12 RAIN SENSOR

Rain sensor shall be of the manufacturer, size and type indicated on the drawings.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

- A. Inspections:
 - 1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that irrigation system may be installed in accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Landscape Architect or Owner's authorized representative.
 - 2. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.
- C. Grades:
 - 1. Before starting work, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.
 - 2. Final grades shall be accepted by the Engineer before work on this section will be allowed to begin.
- D. Field Measurements:

1. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.
 2. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions prior to proceeding with work under this section.
 3. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities which are caused by his operations or neglect.
- E. Diagrammatic Intent:
The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. Provide offsets in piping and changes in equipment locations as necessary to conform to structures and to avoid obstructions or conflicts with other work.
- F. Layout:
1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads, valves, backflow preventor, and automatic controller.
 2. Layout irrigation system and make minor adjustments required due to differences between site and drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.
- G. Water Supply
Connections to, or the installation of, the water supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made.
- H. Electrical Service:
1. Connections to the electrical supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made.
 2. Contractor shall make 120 volt connection to the irrigation controllers. Electrical power source to controller locations shall be provided by others.
- 3.02 TRENCHING**
- A. Excavations shall be straight with vertical sides, even grade, and support pipe continuously on bottom of trench. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.
 - B. Provide minimum cover of 24 inches on pressure supply lines 4 inches and larger. Provide minimum cover of 18 inches on pressure supply lines 3 inches and smaller.
 - C. Provide minimum cover of 18 inches for control wires.
 - D. Provide minimum cover of 12 inches for non-pressure lines.
 - E. Pipes installed in a common trench shall have a 6-inch minimum space between pipes.
- 3.03 BACKFILLING**
- A. Backfill material on all lines shall be the same as adjacent soil free of debris, litter, and rocks over 1/2 -inch in diameter.
 - B. Sand backfill material shall be washed, clean, non-plastic, free from deleterious or foreign matter, symmetrical shaped, natural or manufactured from crushed rock, conforming to the grading requirements of ASTM C 144, with 100% passing a 4.75mm sieve and a maximum silt content of 4%
 - C. Backfill shall be tamped in 4-inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Backfill materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to dry density equal to adjacent undisturbed soil and shall conform to adjacent grades.
 - D. Flooding in lieu of tamping is not allowed.
 - E. Under no circumstances shall truck wheels be used to compact backfill.
 - F. Provide sand backfill a minimum of 6 inches over and under all piping under paved areas.
- 3.04 PIPING**
- A. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphalt pavement.
 - B. Cutting or breaking of existing pavement is not permitted, unless specifically indicated on the drawings.
 - C. Carefully inspect all pipe and fittings before installation, removing dirt, scale, burrs and reaming. Install pipe with all markings up for visual inspection and verification.
 - D. Remove all dented and damaged pipe sections.
 - E. All lines shall have a minimum clearance of 6 inches from each other and 12 inches from lines of other trades.
 - F. Parallel lines shall not be installed directly over each other.

- G. In solvent welding, use only the specified primer and solvent cement and make all joints in accordance with the manufacturer's recommended methods including wiping all excess solvent from each weld. Allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling.
- H. PVC pipe shall be installed in a manner which will provide for expansion and contraction as recommended by the pipe manufacturer.
- I. Centerload all plastic pipe prior to pressure testing.
- J. All threaded plastic-to-plastic connections shall be assembled using Teflon tape.
- K. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic-to-metal. All plastic-to-metal connections shall be made with plastic female adapters.
- L. All solvent weld mainline piping is to be secured with minimum one cubic foot thrust blocks at all directional changes. Bell and gasket pipe to have a Leemco joint restraint system installed on all fittings in lieu of thrust blocks.

3.05 CONTROLLER

- A. The exact location of the controller shall be approved by the Landscape Architect or Owner's authorized representative before installation. The electrical service shall be coordinated with this location.
- B. The Irrigation Contractor shall be responsible for the final electrical hook up to the irrigation controller.
- C. The irrigation system shall be programmed to operate during the periods of minimal use of the design area or in accordance with the irrigation schedule provided.

3.06 CONTROL WIRING

- A. Low voltage control wiring shall occupy the same trench and shall be installed along the same route as the pressure supply lines whenever possible.
- B. Where more than one wire is placed in a trench, the wiring shall be taped together in a bundle at intervals of 10 feet. Bundle shall be secured to the mainline with tape at intervals of 20 feet.
- C. All connections shall be of an approved type and shall occur in a valve box. Provide an 18-inch service loop at each connection.
- D. An expansion loop of 12 inches shall be provided at each wire connection and/or directional change, and one of 24 inches shall be provided at each remote control valve.
- E. A continuous run of wire shall be used between a controller and each remote control valve. Under no circumstances shall splices be used without prior approval.
- F. Pull boxes for low voltage control wires shall be provided at a spacing of 480 feet on center along the wire route. An expansion loop of 24 inches shall be provided at each control wire pull box.

3.07 VALVES

- A. Automatic control valves, manual valves, gate valves, and ball valves are to be installed in the approximate locations indicated on the drawings.
- B. Valve shall be installed in shrub areas whenever possible.
- C. Install all valves as indicated on the drawings.
- D. Valves to be installed in valve boxes shall be installed one valve per box.

3.08 VALVE BOXES

- A. Valve boxes shall be installed in shrub areas whenever possible.
- B. Each valve box shall be installed on a foundation of 3/4 inch gravel backfill, 3 cubic feet minimum. Valve boxes shall be installed with their tops 1/2 inch above the surface of surrounding finish grade in lawn areas and 2 inches above finish grade in ground cover areas.

3.09 SPRINKLER HEADS

- A. Sprinkler heads shall be installed as indicated on the drawings.
- B. Spacing of heads shall not exceed maximum indicated on the drawings.
- C. Riser nipples shall be of the same size as the riser opening in the sprinkler body.
- D. Pop-up sprinkler heads shall not be installed using side outlet openings.

3.10 DRIP IRRIGATION

- A. Provide sample layout for one complete drip valve control zone, including all components, dripline and/or emitter spacing for review and approval by Landscape Architect.
- B. Thoroughly flush all driplines and distribution tubing prior to installing drip emitters, air relief valves, flush valves and similar components.
- C. All drip irrigation shall be installed prior to installation of plant material.

3.11 MISCELLANEOUS EQUIPMENT

- A. Install all assemblies specified herein according to the respective detail drawings or specifications, using best standard practices.
- B. Quick coupler valves shall be set approximately 12 inches from walks, curbs, header boards, or paved areas where applicable.
- C. Unless designed as an integral part of the irrigation head, anti-drain valves will be installed under every head. The anti-drain valve will be the same diameter as the riser and be integral to the riser assembly.
- D. Install rain sensors as indicated on the drawings and as recommended by the manufacturer.

3.12 FLUSHING THE SYSTEM

- A. Prior to installation of sprinkler nozzles, the valves shall be opened and a full head of water used to flush out the lines and risers.
- B. Sprinkler nozzles shall be installed after flushing the system has been completed.

3.13 ADJUSTING THE SYSTEM

- A. Contractor shall adjust valves, align heads, and check coverage of each system prior to coverage test.
- B. If it is determined by the Landscape Architect or Owner's authorized representative that additional adjustments or nozzle changes will be required to provide proper coverage, all necessary changes or adjustments shall be made prior to any planting.
- C. Automatic control valves are to be adjusted so that the sprinkler heads operate at the pressure recommended by the manufacturer.

3.14 TESTING AND OBSERVATION

- A. Do not allow or cause any of the work of this section to be covered up or enclosed until it has been observed, tested and accepted by the Landscape Architect, Owner, and/or governing agencies.
- B. The Contractor shall be solely responsible for notifying the Landscape Architect, Owner, and governing agencies, a minimum of 48 hours in advance, where and when the work is ready for testing.
- C. When the sprinkler system is completed, the Contractor shall perform a coverage test of each system in its entirety to determine if the water coverage for the planted areas is complete and adequate in the presence of the Landscape Architect.
- D. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from the plans, or where the system has been willfully installed when it is obviously inadequate, without bringing this to the attention of the Landscape Architect.
- E. Final inspection will not commence without completed record drawings as prepared by the Irrigation Contractor.

3.15 MAINTENANCE

- A. Maintenance period does not start until all elements of construction, planting, and irrigation for the complete project are in accordance with the contract documents for this project.
- B. Request an inspection to begin maintenance period after all landscape elements have been completed in accordance with the contract documents. Maintenance period commences after date of Substantial Completion as determined by the Landscape Architect and confirmed in written notification by the Owner and continues for a minimum period of 90 days.
- C. During the maintenance period the Contractor shall adjust and maintain the irrigation system in a fully operational condition providing complete irrigation coverage to all intended plantings.

3.16 COMPLETION CLEANING

Clean-up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed, and any damage sustained on the work of others shall be repaired to original conditions.

END OF SECTION

**SECTION 32 91 13
SOIL PREPARATION**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 31 10 00 Site Clearing for topsoil stripping and stockpiling.

1.02 DEFINITIONS

- A. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- B. Imported Soil: Soil that is transported to Project site for use.
- C. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. USCC: U.S. Composting Council.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- C. Samples: For each bulk-supplied material in sealed containers labeled with content, source, and date obtained; providing an accurate representation of composition, color, and texture.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Regional Materials: Imported soil, manufactured planting soil, and soil amendments and fertilizers shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

2.02 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. Planting Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil.
- B. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam soil according to USDA textures; and modified to produce viable planting soil.
 - 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Bermuda grass, poison oak, nutsedge, Canada thistle, bindweed, bentgrass, ground ivy, perennial sorrel, and brome grass.

2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 3. Unacceptable Properties: Clean soil of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
 4. Amended Soil Composition: Blend imported, unamended soil with the soil amendments and fertilizers in the quantities as recommended in the soils report to produce planting soil.
- C. Planting-Soil Type: Manufactured soil consisting of manufacturer's basic topsoil blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.
1. Additional Properties of Manufacturer's Basic Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 2. Unacceptable Properties: Manufactured soil shall not contain the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the manufactured soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
 3. Blend manufacturer's basic soil with soil amendments and fertilizers in the quantities as recommended by the soils report to produce planting soil.

2.03 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
 2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 3. Form: Provide lime in form of ground mollusk shells.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 99 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 98 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.04 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 1. Feedstock: Limited to leaves.
 2. Reaction: pH of 6.0 to 7.5.
 3. Salinity: Ensure that saturation extract conductivity does not exceed 3.5 millimohs per centimeter at 25 degrees c. as determined by saturation extract method.
 4. Moisture Content: 35 to 55 percent by weight.
 5. Organic-Matter Content: 30 to 40 percent of dry weight.

6. Particle Size: 95 to 100 percent passing through a 6.33 mm standard sieve; 80 to 100 percent passing through a 2.33 mm sieve.
 7. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.
 8. Ash: 0 to 6 percent dry weight.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of dS/m.
 - C. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
 - D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.05 FERTILIZER

- A. Planting Fertilizer: Pelleted or granular form consisting of the following percents by weight and mixed by commercial fertilizer supplier: 6-nitrogen, 20-phosphoric acid, 20-potash.
- B. Planting Tablets: Provide slow-release type with potential acidity of not more than 5 percent by weight containing the following percents by weight of nutrients listed: 20-nitrogen, 10-phosphoric acid, 5-potash, 2.6 combined calcium, 1.60 combined sulphur, 0.35-iron elemental from ferrous sulfate. Provide in 21 gram tablets manufactured by Agriform or other approved.
- C. Hydroseeding Fertilizer: Provide ammonium phosphate which consists of the following percent by weight and mixed by a commercial fertilizer supplier: 16-nitrogen, 20-phosphoric acid, 0-potash.
- D. Sulfate of potash: 0-0-50.
- E. Single super-phosphate: Commercial product containing 18 to 20 percent available Phosphoric Pentoxide, or other approved.
- F. Urea formaldehyde: 38-0-0.

PART 3 - EXECUTION

3.01 GENERAL

- A. Place planting soil and fertilizers according to requirements of the Agronomic Soils Report recommendations.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.02 BLENDING PLANTING SOIL IN PLACE

- A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.
 1. Mix sulfur with dry soil before mixing fertilizer.
 2. Mix fertilizer with planting soil no more than seven days before planting.
- D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.03 PROTECTION AND CLEANING

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.
END OF SECTION

**SECTION 32 92 00
TURF AND GRASSES**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Seeding.
 - 2. Sodding.
 - 3. Turf renovation.
 - 4. Erosion-control material(s).
 - 5. Grass paving.
- B. Related Requirements:
 - 1. Section 32 84 00 – Planting Irrigation
 - 2. Section 32 93 00 - Plants

1.02 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogenously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete or top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.03 ACTION SUBMITTALS

- A. Product Data: Prior to installation submit for review and approval specifications and product information on items being used on project. Submit bound with list of items as cover sheet. Conform to Section 013300 Submittal Procedures.

1.04 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed.
 - 1. Certification of each seed mixture for turfgrass sod.
- B. Product certificates.
- C. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and hydroseeded areas during a calendar year. Submit before expiration of required initial maintenance period.

1.05 OBSERVATION SCHEDULE

- A. Notify Owner in advance for the following inspections, according to the time specified:
 - 1. Pre-Job Conference – 7 days
 - 2. Final grade review – 48 hours
 - 3. Plant material review – 48 hours
 - 4. Plant layout review – 48 hours
 - 5. Soil preparation and planting operations review – 48 hours
 - 6. Pre-maintenance – 7 days
 - 7. Final inspection – 7 days
- B. No site visits shall commence without all items noted in previous observation reports either completed or remedied unless such compliance has been waived by the Architect.

1.06 QUALITY ASSURANCE

- A. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - 1. The soil testing laboratory shall oversee soil sampling.
 - 2. Report suitability of tested soil for turf growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil for suitable healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
- B. Source Quality:
 - 1. At least days prior to seeding and/or sodding submit documentation that all plant materials are available. Sod is subject to inspection after confirmation of ordering.
 - 2. Materials are subject to inspection at place of growth and upon delivery for conformity to specifications. Inspection, approval and rejection can also take place at other times during progress of work.
 - 3. Request, in writing, inspection of plant materials at place of growth.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and Federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.08 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
 - 1. Seeded Turf: 90 days from date of Substantial Completion.
 - 2. Sodded Turf: 90 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SEED

- A. Grass Seed: Label seed and provide in sealed containers with signed copies from vendor certifying that each container is fully labeled in compliance with State Agricultural Code and is in compliance with minimum requirements of these specifications. Provide fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology: Rules for Testing Seeds" for purity and germination tolerances. Wet, moldy or damaged seed will not be permitted. Provide seed mix per plan.

2.02 TURFGRASS SOD

- A. Turfgrass Sod: Certified, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species per plan.

2.03 INORGANIC SOIL AMENDMENTS

- A. The following soil amendments are to be used for bid purposes only. Specific amendments and fertilizer will be selected and specified after rough grading operations are complete and Contractor has had soil samples tested.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Agricultural Gypsum: Minimum 98 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.
- E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- F. Calcium Carbonate: 95 percent lime as derived from oyster shells.

2.04 ORGANIC SOIL AMENDMENTS

- A. The following soil amendments are to be used for bid purposes only. Specific amendments and fertilizer will be selected and specified after rough grading operations are complete and Contractor has had soil samples tested.
- B. Nitrogen Stabilized: 0.56 to 0.84 percent N based on dry weight for wood residual or rice hulls.
- C. Particle Size: 95 to 100 percent passing 6.35 mm standard sieve; 80 to 100 percent passing 2.33 mm standard sieve.
- D. Salinity: Ensure that saturation extract conductivity does not exceed 3.5 millimohs per centimeter at 25 degrees C. as determined by saturation extract method.
- E. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.
- F. Ash: 0 to 6 percent dry weight.

2.05 FERTILIZERS

- A. Planting Fertilizer: Granular or pelleted fertilizer consisting of the following percents by weight and mixed by commercial fertilizer supplier.
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potash by weight.
- B. Sulfate of potash: 0-0-50.
- C. Single super-phosphate: Commercial product containing 18 to 20 percent available Phosphoric Pentoxide, or other approved.
- D. Urea formaldehyde: 38-0-0.

2.06 PLANTING SOILS

- A. Planting Soil: Ensure silt plus clay content of top soil does not exceed 20 percent by weight, with a minimum 95 percent passing the 2.0 mm sieve. Do not allow the sodium absorption rate SAR to exceed 6. The electrical conductivity (ECE) of the saturation extract cannot exceed 3.0 millimohs per centimeter at 25 degrees C. Ensure boron content is less than 1 part per million as measured on the saturation extract. To ensure compliance with these requirements, submit samples of soil for analysis prior to and following backfilling.

2.07 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2.08 WATER

- A. Provide clean, potable water.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Obtain certification that final grades to 1/10 foot have been established prior to commencing landscaping operations. Provide for inclusion of all amendments, settling, etc. Be responsible for shaping all planting areas as indicted on drawings or as required.

3.02 TURF AREA PREPARATION

- A. The following amendments are to be used for bid purposes only. Specific amendments and fertilizer will be selected and specified after rough grading operations are complete and Contractor has had soil samples tested.
- B. After proper finished grades have been verified or established, cross-rip all planting areas to a depth of 12", condition and fertilize soil in accordance with recommendations of soil testing laboratory and as approved by Owner. The following is for bid purposes only. Uniformly spread and cultivate amendments thoroughly by means of mechanical tiller into top 6 inches of soil. Application rates per 1,000 square feet:

Nitrogen stabilized organic amendment	4 cubic yards
16-16-16 Commercial Fertilizers	15 lbs.
Agricultural Gypsum	100 lbs.
Soil sulphur	20 lbs.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus ½ inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.03 SEEDING

- A. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at total rate of 5 to 8 lb/1000 sq. ft. (2.3 to 3.6 kg/92.9 sq. m).
- C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas from hot, dry weather or drying winds by applying planting soil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm) and roll surface smooth.

3.04 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.05 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowing.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.06 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

END OF SECTION

**SECTION 32 93 00
PLANTS**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Soil Preparation.
 - 2. Planting.
 - 3. Staking.
 - 4. Hydroseeding.
 - 5. Clean up.
- B. Related Sections:
 - 1. Section 32 84 00 – Planting Irrigation
 - 2. Section 32 91 13 – Soil Preparation
 - 3. Section 32 92 00 – Turf and Grasses

1.02 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogenously blending mineral soils or san with stabilized organic soil amendments to produce topsoil or planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria and viruses.
- G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- H. Root Flare: Also called “trunk flare.” The area at the base of the plant’s stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- I. Subgrade: Surface or elevation of subsoil remaining after excavation is complete or the top surface of a fill or backfill before planting soil is placed.
- J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- K. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.03 ACTION SUBMITTALS

- A. Product Data: Prior to installation submit for review and approval specifications and product information on items being used on project. Submit bound with list of items as cover sheet. Conform to Section 01300. For each type of product indicated, including soils.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticide and Herbicides: Include product label and manufacturer’s application instructions specific to the Project.
 - 3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Samples of mineral and / or organic mulch.

1.04 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Material test reports.
- C. Maintenance instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.05 OBSERVATION SCHEDULE

- A. Notify Architect in advance for the following inspections, according to the time specified:
 - 1. Pre-Job conference – 7 days
 - 2. Final grade review – 48 hours
 - 3. Plant material review – 48 hours
 - 4. Plant layout review – 48 hours
 - 5. Soil preparation and planting operations review – 48 hours
 - 6. Pre-maintenance – 7 days
 - 7. Final inspection – 7 days
- B. No site visits shall commence without all items noted in previous observation reports either completed or remedied unless such compliance has been waived by the Architect.

1.06 QUALITY ASSURANCE

- A. Soils Analysis: For each un-amended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - 1. The soil-testing laboratory shall oversee soil sampling.
 - 2. Report suitability of tested soil for plant growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Source Quality:
 - 1. At least 60 days prior to planting submit documentation that all plant materials are available. Materials are subject to inspection after confirmation of ordering.
 - 2. Materials are subject to inspection at place of growth and upon delivery for conformity to specifications. Inspection, approval and rejection can also take place at other times during progress of work.
 - 3. Request, in writing, inspection of plant materials at place of growth. Identify place of growth and quantity of plants to be inspected.
 - 4. As described in the planting notes for tree tagging, the Architect may opt to either visit the tree nursery or review photographs submitted by the Contractor. In either case, visit the nursery and select trees conforming to specifications prior to review by the Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- B. Handle planting stock by root ball.
- C. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
- D. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade mark, and conformance to State law.
- E. Provide copies of receipts for all amendments specified in these specifications or in agronomic soils report.
- F. Deliver plants with legible identification labels. Label trees, evergreens, bundles of containers of like shrubs and groundcover plants. State correct plant name and size indicated on plant list. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.

- G. Protect plant material during delivery to prevent damage to root ball or desiccation of leaves.
- H. Notify Architect 7 days in advance of delivery of plant materials and submit itemization of plants in each delivery.
- I. Store plants in shade and protect from weather.
- J. Maintain and protect plant material in a healthy, vigorous condition.
- K. Exercise care in handling, loading, unloading and storing of plant materials. Replace damaged materials.

1.08 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Warranty Periods from date of end of 90-day maintenance period.
 - a. Trees: 12 months.
 - b. Shrubs, Vines, Ornamental Grasses, Ground Covers, Biennials, and Perennials: 90 days.
 - c. Annuals: 90 days.

1.09 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
 - 1. Maintenance Period for Trees and Shrubs: 90 days from date of Substantial Completion.
 - 2. Maintenance Period for Ground Cover and Other Plants: 90 days from date of Substantial Completion.
- B. Continuously maintain all site areas involved in this contract during the progress of work and during the maintenance period until final acceptance of the work by City. Improper maintenance or possible poor condition of the project at the termination of the scheduled maintenance period may cause postponement of the final completion date of the Contract. Continue maintenance until acceptable to the Owner.
- C. Provide sufficient numbers of workers and adequate equipment to perform work during maintenance period.
- D. Maintenance period does not start until all elements of construction, planting, and irrigation for the complete project are in accordance with the contract documents for this project.
- E. Request an inspection to begin maintenance period after all planting and related work has been completed in accordance with other contract documents. Maintenance period commences after date of Substantial Completion as determined by Landscape Architect and confirmed in written notification by the Owner.
- F. Prior to commencement of maintenance period, ensure that all ground cover and lawn areas have been planted and that all lawn areas show an even, healthy stand of grass seedlings or sod, grass having been mown twice.
- G. Any day or days that there is failure to properly maintain plantings, replace suitable plants, perform weed control or maintain hardscape areas will not be credited as part of the 90 days maintenance. The project will not be segmented into maintenance phases.
- H. Keep paved areas free of silt, dirt, leaves and other planting area debris. Maintain these areas at least broom clean through the duration of the maintenance period, cleaning no less often than once per week.
- I. Guarantee: Guarantee plant material against any and all poor, inadequate or inferior materials and workmanship for one year. Replace plants found to be dead or in poor condition due to faulty materials or workmanship, at no extra cost to owner.
- J. Replacement: Replace materials found to be dead, missing or in poor condition during the maintenance period immediately. The Architect is the sole judge of the acceptability of condition. Make replacements of materials within 15 days after condition develops or written notification from Architect has been sent. Architect has the right to make emergency repairs without releasing Contractor's guarantee and warranty to Architect.
- K. Prior to date of final inspection, acquire approved reproducible prints and finally record from the job record set, all changes made during construction and deliver them to Architect.
- L. Deliver guarantees to Architect.

PART 2 - PRODUCTS

2.01 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Legend shown on Drawings and complying with ANSI Z60.1. Provide plant materials in accordance with the State Department of Agriculture's regulation for nursery inspections, rules and ratings. Provide plants with a normal habit of growth, sound, healthy, vigorous and free from insect infestations, plant diseases, sunscalds, and other disfigurements. Ensure tree trunks are sturdy and have well-hardened systems and vigorous and fibrous root systems which are not root or pot-bound. In the event of disagreement as to condition of root system, the root conditions of the furnished plants in containers will be determined by removal of earth from the roots of not less than two plants, or more than 2 percent of the total number of plants of each species or variety. Where container grown plants are from several sources, roots of not less than two plants of each species or variety from each source will be inspected. In the event that the sample plants inspected are found to be defective, the entire lot or lots of plants represented by the defective samples may be rejected. Plants rendered unsuitable for planting due to this inspection will be considered samples and will be provided at no cost to the Owner.
- B. Size of plants will comply with ANSI Z60.1 and correspond with that normally expected for species and variety of commercially available nursery stock or as specified on drawings. The minimum acceptable size of plants measured before pruning with the branches in normal position, must conform to the measurements specified in the plant list. If approved by the Owner, larger sized plants may be used. If larger plants are approved for use, the ball of earth or spread of roots for each plant will be increased proportionately.
- C. Plants not meeting requirements of these specifications are considered to be defective whether in place or not. They must be immediately removed and replaced with new acceptable and approved plants of the required size, species and variety.
- D. Pruning: Do not prune, trim, top or alter the shape of trees or plants except as approved.
- E. Provide plant material true to botanical and common name and variety as specified in Annotated Checklist of Woody Ornamental Plants in California, Oregon and Washington, published by University of California School of Agriculture (latest edition).
- F. Nursery Grown and Collected Stock: Grow under climatic conditions similar to those in locality of project; container-grown stock in vigorous, healthy condition, not root-bound or with root system hardened off. Use only liner stock plant material which is well established in removable containers or formed homogenous soil sections.
- G. Select trees which are aesthetically desirable and are good examples of the species. Trees with gashes, misshapen trunks or branches, topped leaders, structural defects, badly crossed branches, or other visual defects will not be accepted. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread to assure symmetry in planting.
- H. Seed: Label seed and provide in sealed containers with signed copies from vendor certifying that each container is fully labeled in compliance with State Agricultural Code and is in compliance with minimum requirements of these specifications. Wet, moldy or damaged seed will not be permitted, Provide seed mix per plan.

2.02 PLANTING SOILS

- A. Planting Soil (Import or Amended Top Soil) Ensure silt plus clay content of top soil does not exceed 20 percent by weight, with a minimum 95 percent passing the 2.0 mm sieve. Do not allow the sodium absorption ratio SAR to exceed 6. The electrical conductivity (ECE) of the saturation extract cannot exceed 3.0 millimohs per centimeter at 25 degrees C. Ensure boron content is less than 1 part per million as measured on the saturation extract. To ensure compliance with these requirements submit samples of soil for analysis prior to and following backfilling.

2.03 PLANTER MIX

- A. Planter Mix for all on-structure planters and plant container: provide custom topsoil ("Disney") Mix by EarthWorks Soil Amendments, Inc., (951) 782-0260, to include the followings pre-blended items:
 - 1. Preblended items:
 - a. 85% sandy loam topsoil
 - b. 15% peat moss
 - c. 0.5 lbs. / cy Triple Super Phosphate (0-45-0)

- d. 0.25 lbs. / cy Potassium Sulfate (0-0-50)
 - e. 1 lb. / cy Agricultural Gypsum
 - f. 0.2 lbs. / cy P.A.M. (soil aggregating polymer)
- B. Roof Deck Soil Mix
1. On-structure Planter Soil (Mix "A") – (bottom of planter to 8-inches below finish grade) – per cubic yard of mix.
 - a. 80% Over-structure Planter Sand (optional – 100% sand if weight is not a consideration).
 - b. 20% pumice (optional no pumice).
 - c. 2 lbs. Nitroform (38-0-0, 27% WIN).
 - d. 2 lbs. 12-12-12 General Planting Fertilizer.
 - e. 1 lb. iron sulfate.
 - f. 2 lbs. dolomite lime.
 - g. 2 lbs. calcium carbonate limestone.
 - h. Thoroughly blend mix before placing soil in 12" lightly compacted lifts.
 2. On-structure Planter Soil (Mix "B") – (8-inch layer – place on top of On-structure Planter Soil (Mix "A") up to finish grade) – per cubic yard of mix:
 - a. 70% Over-structure Planter Sand.
 - b. 30% Organic Amendment.
 - c. 2 lbs. Nitroform (38-0-0, 27% WIN).
 - d. 1 lb. iron sulfate.
 - e. 2 lbs. dolomite lime.
 - f. 2 ls. Calcium carbonate limestone.
 - g. Thoroughly blend soil mix before placing soil in one lightly compacted lift.
 3. Over-structure Planter-Sand:
 - a. Washed nursery sand which meets following U.S. Standard Sieve criteria:

Sieve No. (U.S. Standard)	Weight Percent Passing
10	100
18	100
35	92
60	16
100	2.1
140	1.3
270	0.1

2.04 MULCHES

- A. Organic Mulch: Provide medium grind bard, consisting of organic, fibrous, woody bark mixture of varied particle size such that 90 to 100 percent passes 1 inch sieve, 80 59 100 percent passes 1/2 inch sieve, and 20 59 60 percent passes 1/4 inch sieve, or approved equal. Mulch shall be free of contaminants and weed seed and shall have a pleasant musty or moldy soil-like odor. Putrid, ammonia and sour-smelling materials will be deemed unacceptable. Recycled construction materials not be permitted.

2.05 HYDROSEEDING FIBER MULCH

- A. Provide Hydro-mulch as manufactured by Conwed, or other approved equal, composed of wood cellulose fiber and containing no germination or growth inhibiting factors. Ensure a consistent texture which disperses evenly and remains suspended in agitated water. Provide with a temporary green dye and the following percentage property analysis: moisture content 9 plus or minus 0.8; 3 o.d. basis, organic matter 99.2 plus or minus 0.8; ash content 0.8 plus or minus 0.2; pH 4.8 plus or minus 0.5; water holding capacity (grams of H2O per 100 grams of fiber 1150 minimum).

2.06 HYDROSEEDING ADDITIVE (BINDER)

- A. Provide Ecology Control-M-Binder organic seeding additive.

2.07 GUYING AND STAKING MATERIALS

- A. Wood Tree Stakes: lodge pole pine, full treated with Coppernaphthanate Wood Preservative in strict accordance with FS TT-W-572 Type I, Composition B, 2-inch minimal normal size diameter by 10 feet long, minimum, with no split stakes.
- B. Ties: Provide cinch ties, size corresponding to tree box size as manufactured by VIT Company or other approved.

2.08 LANDSCAPE EDGINGS

- A. Wood Edging:
 - 1. Provide 2-inch by 4-inch pressure treated Douglas Fir or Redwood construction grade headerboards. Make splices with 1-inch by 3-inch by 16-inch stakes at intervals of not more than 5 feet. Cut stakes level and set below top of headerboards.
 - 2. On sharp turns and curves, four 1/2 inch by 4-inch laminated boards, or two 1-inch by 4-inch laminated boards may be permitted.
 - 3. Nail stakes and splices with galvanized common nails. Nail as required for solid installation.
 - 4. Provide header as shown on drawings, laid true to line and grade, protect in-place adjacent improvements, shrubbery and other properties. Place stakes on ground cover side of header.
- B. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
- C. Aluminum Edging: Standard-profile extruded-aluminum edging, ASTM B221, Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes,
- D. Plastic Edging: Standard black polyethylene or vinyl edging, horizontally grooved, extruded in standard lengths, with 9-inch steel stakes.
- E. Concrete Mowstrip: 6-inch wide by 6-inch thick concrete mowstrip with 1/2 inch tooled edging and #3 continuous rebar.

2.09 MISCELLANEOUS PRODUCTS

- A. Sand: Provide washed silica sand.
- B. Water: Provide clean, potable water.
- C. Root Barrier: provide UB24-2 by Deep Root Corporation, (800) 458-7668. Install at all trees within 5 feet of concrete paving, curbs or mow strips or as shown on plans. Install barrier with vertical ribs facing forward the tree and with the top edge 1/2 inch above finish grade. Length of root barrier shall extend 10' minimum in each direction from center of tree trunk. Provide linear root barrier adjacent to paving or curbing; root barrier shall not circle the rootball.
- D. Tree Trunk Protector: Provide ArborGard model AG 9-4 by Deep Root Corporation, (800) 458-7668.
- E. Erosion Control Fabric: Provide Rollmax SC-150 rolled erosion control fabric by North American Green, (800) 772-2040.

2.10 QUALITY CONTROL

- A. Provide standard, approved and first-grade quality materials, in prime condition when installed and accepted. Deliver commercially processed and packaged materials in manufacturer's unopened containers bearing the manufacturer's guaranteed analysis. Supply a sample of all supplied materials accompanied by analytical data from an approved laboratory source illustrating compliance, or bearing the manufacturer's guaranteed analysis.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Obtain certification that final grades to 1/10 foot have been established prior to commencing landscaping operations. Provide for inclusion of all amendments, settling, etc. Be responsible for shaping all planting areas as indicated on drawings or as required.
- B. Inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.
- C. Do not begin planting of trees until deficiencies are corrected or plants replaced.

3.02 PLANTING AREA ESTABLISHMENT

- A. Soil Preparation: After proper finish grades have been verified or established, cross-rip all planting areas to a depth of 12 inches, condition and fertilize soil in accordance with recommendations of soil testing laboratory.
- B. At time of planting, ensure that top 2 inches of all areas to be planted or seeded are free of stones, stumps and other deleterious matter 1 inch in diameter or larger, and free from wire, plaster, concrete, wood and similar materials which would cause hindrance to planting or maintenance.
- C. Finish Grading: Make minor modifications to grade as may be necessary to establish required final grade. Ensure that finish grade provides proper drainage of the site and surface drainage is away from building. Final grades are to be 1-inch below adjacent paved areas, sidewalks, valve

boxes, headers, clean-outs, drains, manholes, etc., or as shown on drawings or required by City. Eliminate erosion scars prior to commencing maintenance period.

D. Pre-Plant Weed Control:

1. After irrigation system is operational, use a non-selective systemic contact herbicide as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days.
2. Clear and remove these existing weeds by mowing or grubbing off all plant parts at least 2 inches below surface of soil over entire areas to be planted.
3. After irrigation system is operational, apply water for 10 days as needed to achieve weed germination. Apply contact herbicides and wait as needed before planting. Repeat as required.
4. Maintain weed free site until acceptance by Owner.

3.03 PLANTING INSTALLATION

A. General:

1. The irrigation system shall be operational and approved prior to planting.
2. Perform actual planting only during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved.
3. Distribute in planting areas only as many plants as can be planted and watered that same day.
4. Ensure that containers which are opened and plants removed are handled with care such that ball of earth surrounding roots is not broken and that plants are planted and watered immediately. Do not open containers prior to placing plants in planting areas.

B. Layout: Mark locations for plants and outlines of areas to be planted before any plant pits are dug. Gain City approval. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for planting may be selected by Owner. Accomplish layout with flagged grade stakes indicating plant names and specified container size on each stake. Confirm location and depth of underground utilities and obstructions.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Trim perimeter of bottom leaving center area of bottom raised slightly to support rootball and assist in drainage away from center. Do not further disturb base. Ensure that rootball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately two times as wide as rootball diameter.
2. Do not excavate deeper than depth of the rootball, measured from the root flare to the bottom of the rootball.

B. Subsoil and topsoil removed from excavations may be used as planting soil backfill.

C. Strip and stack approved excavation for planting which is encountered within areas for trenches, tree holes, plant pits and planting beds.

D. Remove from site excess soil generated from planting holes and not used for backfilling.

E. Protect areas from excessive compaction when trucking plants or other materials to planting areas.

3.05 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of rootball according to ANSI Z60.1.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Container Grown: Cut cans on two sides with acceptable can cutter only. Carefully remove rootball from container without damaging rootball or plant. Superficially loosen edge roots on three sides after removing form can.
3. Boxed Trees: Remove bottom of plant boxes before planting. Remove sides without damage to rootball after positioning plant and partially backfilling
4. Boxed Trees: Remove bottom of plant boxes before planting. Remove sides without damage to rootball after positioning plant and partially backfilling.
5. Face plants with fullest growth into prevailing wind.

6. Backfill around rootball in layers, tamping to settle soil and eliminate voids and air pockets. Hold plant rigidly and plumb until soil has been firmed around ball or roots. Raise all plants which settle deeper than the surrounding grade. When planting pit is approximately one-half filled, add water to the top of the planting pit and thoroughly saturate rootball and adjacent soil.
 7. Set planting tablets with each plant on top of rootball while plants are still in their containers so the required number of tablets can be verified. After water has completely drained, place planting tablets as follows or in amounts recommended in soil reports from soil-testing laboratory.
 - 1 tablet per 1-gallon container
 - 2 tablets per 5-gallon container
 - 3 tablets per 15-gallon container
 - 4 tablets per 24-inch box
 - 6 tablets per 36-inch box
 - 8 tablets per 48-inch box
 Place tablets beside the rootball about 1 inch from root tips; do not place tablets in bottom of the hole.
 8. Continue backfilling process. Construct an earthen basin around each plant after backfilling. Provide basin of depth sufficient to hold at least 2 inches of water. Construct basins with amended backfill. Remove basin in all turf areas after initial watering. Water again after placing and tamping final layer of soil.
 9. Limit pruning to minimum necessary. Remove injured twigs and branches. Pruning may not be done prior to delivery of plants. Paint cuts over 3/4 inch in diameter with tree paint.
 10. Stake or guy trees immediately after planting. Install stakes plumb. Locate stakes so that a straight line drawn between the stakes is perpendicular to the prevailing wind direction.
 11. Do not bring iron sulfate into contact with concrete surfaces due to potential staining. Contractor is responsible for cleaning and replacing stained surfaces.
- D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the rootball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the rootball.
- 3.06 TREE, SHRUB, AND VINE PRUNING**
- A. Remove only dead, dying, or broken twigs or branches. Do not prune for shape. Pruning may not be done prior to delivery of plants.
 - B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- 3.07 GROUNDCOVER AND OTHER SMALL CONTAINER PLANTING**
- A. Set out and space ground cover and plants from flats or containers smaller than 1-gallon as indicated on planting plan in even rows with triangular spacing.
 - B. Ensure that groundcover remains in the flats until transplanting. Flats soil must contain sufficient moisture so it will not fall apart when lifting plants.
 - C. Use planting soil for backfill. Plant each rooted plant with its proportionate amount of flat soil.
 - D. Dig holes large enough to allow spreading of roots.
 - E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
 - F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
 - G. Protect plants for damage and trampling.
- 3.08 HYDROSEEDING**
- A. Install large trees and shrubs (1 gallon and larger) if they occur in hydroseeded areas.
 - B. Install trees and shrubs (1 gallon) and groundcovers from flats if they occur in hydroseeded areas.
 - C. Provide seed mixes as shown on plan.
 - D. Apply hydroseed by an approved hydro-mulch company.
 - E. Apply in a form of slurry consisting of cellulose fiber, seed, chemical additives, commercial fertilizer and water. When hydraulically sprayed on soil, ensure that hydro-mulch forms a blotter like ground cover impregnated uniformly with seed and fertilizer and allows the absorption of moisture and rainfall to percolate to the underlying soil.

- F. Prepare the slurry at the site by first adding water to the tank when the engine is at half throttle. When water level has reached height of agitator shaft, provide full circulation, then add seed, followed by fertilizer, than mulch. Only add the mulch to the mixture after the seed and the tank is at least 1/3 filled with water. By the time the tank is 2/3 to 3/4 full, all mulch shall be in. Commence spraying immediately when tank is full.
 - G. Spray uniform visible coat by using the green color as a guide. Apply the slurry in a sweeping motion, in an arched stream so as to fall like rain allowing the wood fibers to build on each other until a good coat is achieved and the material is spread at the required rates.
 - H. Remove slurry not used within two hours from the site.
 - I. Fill out the daily worksheets by the nozzle man with the following information: Seed type and amount, mulch type and amount, number of loads and amount of water, seeding additive type and amount, area covered and equipment used, capacity and license number.
 - J. Do not allow any slurry to be sprayed into any reservoir basin or drainage ditches and channels which may impede the flow of rain or irrigation water. Clean up any spilled slurry.
 - K. After application of hydro-mulch, wash excess material from previously planted materials and architectural features. Avoid washing or eroding mulch materials.
 - L. Ensure that application equipment has a built-in agitation system and operating capacity sufficient to agitate, suspend and mix a slurry containing not less than 40 pounds of fiber mulch plus a combined total of 7 pounds fertilizer solids for each 100 gallons of water.
 - M. Slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will provide a continuous non-fluctuating discharge. Capacity requirement is 1,500 gallons, mounted on a traveling unit, either self-propelled or drawing by a separate unit which will place slurry tank and nozzles within sufficient proximity of areas to be seeded.
 - N. Hydraulic equipment used for pesticide applications shall consist of a clean 150-gallon capacity fiberglass tank, complete with mechanical agitation. Pump volume shall be 10 gallons per minute, while operating at a pressure of 100 pounds per square inch. Distribution lines shall be large enough to carry the volume of water necessary for even chemical distribution. Spray nozzle must cover a 15-foot swath, with a minimum output of 5 gallons per minute at 80 pounds per square inch.
- 3.09 PLANTING AREA MULCHING**
- A. Mulch backfilled surfaces of planting areas with 3 inch layer of mulch except slopes that are 2:1 or steeper, hydroseeded areas, turf areas and bioretention basin bottoms.
- 3.10 CLEAN-UP**
- A. After all planting operations are complete; remove all trash, excess soil, empty plant containers, and rubbish from the property. Repair scars, ruts and other marks in the ground and leave ground in a neat and orderly condition.
 - B. Leave the site in a broom-clean condition and wash down all paved areas within the project site. Leave walks in a clean and safe condition.
- 3.11 LANDSCAPE MAINTENANCE**
- A. Weed and cultivate all areas at intervals of not more than 10 days.
 - B. Perform watering, mowing, rolling, edging, trimming, fertilization, spraying, pest control, and cleaning as may be required.
 - C. Street gutters and curbs are to be included.
 - D. Maintain adequate protection for people and property, and be financially responsible for damages and injuries. Notify the Architect immediately should damage occur as a result of maintenance operations and provide repair or remuneration.
 - E. Between the 15th and 20th calendar day of the maintenance period, reseed or resod all spots or areas within the lawn where normal turf growth is not evident.
- 3.12 TREE AND SHRUB CARE**
- A. Watering: Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering, use a water wand to break force of water.
 - B. Pruning:
 1. Prior to any pruning, obtain written approval from the Architect to proceed.
 2. Trees:

- a. Propose tree pruning to the Architect should there be health or structural reasons for doing so, including the need to eliminate structurally unsound growth, reduce potential for wind toppling or wind damage, or maintain growth within limited space.
 - b. Tree pruning that is required during the Maintenance Period for tree health or structural reasons, or as direct by the City, shall be performed in accordance with ANSI A-300 ISA standards.
 - c. Major pruning of deciduous trees shall be during their dormant season.
 - 3. Shrubs:
 - a. The objectives of shrub pruning are the same as for trees. Do not clip shrubs into balled or boxed forms unless such is required by the design.
 - b. Make pruning cuts to lateral branches or buds or flush with trunk. Stubbing will not be permitted.
 - C. Staking and guying: Ensure that stakes and guys remain in place through acceptance and monitor to prevent girdling of trunks or branches and to prevent rubbing that causes bark wounds. All nursery stakes shall be removed.
 - D. Weed control: Keep all areas free of weeds. Use recommended legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Use mulches per specifications to help prevent weed seed germination.
 - E. Insect and disease control: Maintain a reasonable control with approved materials.
 - F. Fertilize as specified by the agronomic soils testing recommendations and as follows for bid purposes
 - 1. Commencement of maintenance period – 6 pounds per 1,000 square feet with top dress fertilizer.
 - 2. At the end of first 30 days of maintenance period – 6 pounds per 1,000 square feet with top dress fertilizer.
 - 3. At end of maintenance period and at 30 day intervals should maintenance period be extended for any reason – 6 pounds per 1,000 square feet with fertilizer mix.
 - 4. Avoid applying fertilizer to the rootball and base of main stem: rather, spread evenly under plant to dripline. Rates will vary from about a cup of nitrate fertilizer (depending upon nitrogen percentage) around a newly installed small plant to about ½ pound of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.
 - G. Replacement of plants: Replace dead, dying and missing plants with plants of a size, condition and variety acceptable to the Architect.
- 3.13 GROUND COVER CARE**
- A. Weed control: Control weeds, preferably with pre-emergent herbicides, but also by hand or with selective systemic herbicides. Hoe weeds as little as possible since this may result in plant damage.
 - B. Watering: Water enough that moisture penetrates throughout root zone and only as frequently as is necessary to maintain healthy growth.
 - C. Trash: Remove as it accumulates, but no less often than weekly.
 - D. Edging and trimming: Edge groundcover to keep in bounds.
 - E. Replace dead and missing plants.
- 3.14 LAWN AND TURF CARE**
- A. Turf must be well-established prior to final acceptance.
 - B. Watering: Water lawns at such frequency as weather conditions required to replenish soil moisture below root zone.
 - C. Weed control: If needed, control broad leaf weeds with selective herbicides.
 - D. Mowing:
 - 1. Perform mowing at such times of the day or week as may be requested by the Owner so as not to impede the Owner's operations. Mowing times may be at times other than normal working hours or days. Perform work at Owner's convenience.
 - 2. Clean up grass clippings during and after mowing, and remove legally from site. Use of blowing type equipment in lieu of sweeping or vacuuming is not acceptable.
 - E. Renovating:
 - 1. If required, remove thatch by verticutting preferable in the Fall of the year, but otherwise in the Spring. At this time, fertilize with nitrate and over-seed if needed. Over-seeding must precede pre-emergent herbicides by at least 4 to 6 weeks. Normally, this means that

lawns which have been invaded by crabgrass would be renovated and over-seeded in the Fall and treated for crabgrass control in the following late Winter.

2. Clean up grass clippings during and after mowing, and remove legally from site. Use of blowing type equipment in lieu of sweeping or vacuuming is not acceptable.

3.15 IRRIGATION SYSTEM

- A. Inspection: Check all systems for proper operation. Lateral lines must be flushed out after removing the last sprinkler head or two at each end of the lateral. Adjust heads as necessary for unimpeded coverage and no overspray.
- B. Controllers: Set and program automatic controllers for seasonal water requirements. Give Owner a key to controllers and instruction on how to turn off system in case of emergency as specified in other sections of these specifications.
- C. Repair all damages to irrigation system. Make all repairs within one watering period.

END OF SECTION

SECTION 33 14 16
SITE WATER DISTRIBUTION SYSTEM

PART 1- GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Site water distribution systems located at least 5 feet outside the building perimeter, extending to an existing water line or meter.
- C. Related Sections:
 - 1. Section 31 23 00: Excavating, Backfilling and Compaction.
- A. Shop Drawings: Submit site plan indicating locations of lines, valves, and related appurtenances.
- B. Product Data: Manufacturer's catalog data for materials. Include technical data for accessories, gaskets, joints and couplings.
- C. Certificates: Certificates attesting that tests set forth in referenced publications have been performed, and the performance requirements have been satisfied.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. ANSI:
 - a. ANSI B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
 - b. ANSI B18.5.2.1M Metric Round Head Short Square Neck Bolts. c.
 - 2. ASME:
 - a. ASME B16.3 Malleable Iron Threaded Fittings.
 - b. ASME B16.4 Cast Iron Threaded Fittings.
 - c. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - d. ASME B16.26 Cast Copper Alloy Fitting for Flared Copper Tubes.
 - e. ASME B18.2.2 Square and Hex Nuts (Inches Series).
 - f. ASME B18.5.2M Metric Round Head Square Neck Bolts.
 - 3. ASTM:
 - a. ASTM A 47 Ferric Malleable Iron Castings.
 - b. ASTM A 48 Gray Iron Castings.
 - c. ASTM A 53 Pipe, Steel, Black and Hit-Dipped, Zinc-Coated Welded and Seamless.
 - d. ASTM A 307 Carbon Steel bolts and Studs, 60,000 psi Tensile Strength.
 - e. ASTM A 563 Ductile Iron Castings.
 - f. ASTM A 563 Carbon and Alloy Steel Nuts.
 - g. ASTM B 61 Steam or Valve Bronze Castings.
 - h. ASTM B 62 Composition Bronze or Ounce Metal Castings.
 - i. ASTM B 88 Seamless Copper Water Tube.
 - j. ASTM C 94 Ready-Mixed Concrete.
 - k. ASTM D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.
 - l. ASTM D 1785 Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
 - m. ASTM D 2235 Solvent Cement for ABS Plastic Pipe, and Fittings.
 - n. ASTM D 2241 PVC Plastic Pipe Fittings, Schedule 40.
 - o. ASTM D 2282 ABS Plastic Pipe.
 - p. ASTM D 2466 PVC Plastic Pipe Fittings, Schedule 80.
 - q. ASTM D 2468 ABS Plastic Pipe Fittings, Schedule 40.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- r. ASTM D 2564 PVC Plastic Piping Systems.
- s. ASTM D 2774 Underground Installation of Thermoplastic Pressure Piping.
- t. ASTM D 2855 Making Solvent-Cemented Joints with PVC Pipe and Fittings.
- u. ASTM D 3139 Joints Pressure Pipes Using Flexible Elastomeric Seals.
- v. ASTM F 402 Safe Handling Of Solvent Cements, Primer and Cleaners Used for Joining Thermoplastic Pipes and Fittings.
- w. ASTM F 477 Elastomeric Seals for Joining Plastic Pipes.
- 4. American Water Works Association (AWWA) Standards:
 - a. AWWA C104/A21.4 Cement-Mortar Lining For Ductile-Iron Pipe and Fittings For Water
 - b. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches, for Water and Other Liquids.
 - c. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron pressure Pipe and Fittings.
 - d. AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
 - e. AWWA C500 Gate Valves for Water and Sewage Systems.
 - f. AWWA C503 Wet- Barrel Fire Hydrants.
 - g. AWWA C508 Swing-Check Valves for Waterworks Service, 2 inches through 24 inches NPS.
 - h. AWWA C509 Resilient-wedge seated Gate Valves for Water and Sewerage Systems.
 - i. AWWA C511 Reduced-Pressure Principal Backflow-Prevention Assembly.
 - j. AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - k. AWWA C651 Disinfecting Water Mains.
 - l. AWWA C 800 Underground Service Line valves and Fittings.
 - m. AWWA C900 PVC Pressure Pipe, 4 inches through 12 inches, for Water Distribution.
 - n. AWWA M23 PVC Pipe - Design and Installation.
- 5. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:
 - a. MSS SP-80 Bronze Gate, Globe, Angle and Check Valves.
- 6. Uni-Bell PVC Pipe Association (UBPPA):
 - a. UBPPA UNI-B-3 Installation of PVC Pressure Pipe.
 - b. UBPPA UNI-B-8 Direct Tapping of PVC Pressure Water Pipe.
 - c. UBPPA UNI-B-13 Standard Performance Specification on joined restrained devices for use with Poly Vinyl Chloride (PVC) Pipe.
- 7. Underwriters Laboratories Inc. (UL):
 - a. UL 246 Hydrants for Fire-Protection Service.
 - b. UL 262 Gate Valves for Fire-Protection Service.
 - c. UL 312 Check Valves for Fire-Protection Service.
 - d. UL 789 Indicator Posts for Fire-Protection Service.
- 8. National Pollutant Discharge Eliminations System (NPDES):
 - a. Comply with storm water requirements of general permit for storm water discharges when flushing pipe systems including storm drains and maintaining logs.
- B. Provide all valves from the same manufacturer.
- C. No pipe, pipe fitting, or any other fitting or fixture intended to convey or dispose water for human consumption for drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of Assembly Bill AB1953. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25%.

1.04 PRODUCT HANDLING

- A. Store items above ground on platforms, skids, or other required supports.
- B. Protect materials from direct sunlight.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- C. Protect coating and linings on piping, fittings, and accessories from damage. Repair and/or replace damaged coatings or linings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe:
 - 1. Pipe sizes up to 2.5 inches shall be copper water tubing, Type L hard, ANSI H23.1, ASTM B 88, IAPMO IS. Muller Brass, Cambridge-Lee Halstead, or equal.
 - 2. If soil report indicates corrosive condition, an approved protective wrap shall be used to completely isolate and protect all underground copper tubing and extend past the surface a minimum 12 inches. The excess wrapping shall be trimmed down and taped to copper tubing with 10 mill PVC pipe tape at grade level of concrete or asphalt.
 - 3. Underground pipe sizes 3 inches and larger shall be PVC water main pipe material complying with ASTM D 1784 Cell Class 12454B and AWWA C900. Piping shall be plain end or gasket bell end, pressure class 200 (DR14) with cast iron pipe equivalent OD.
 - 4. Stainless steel pipe, sizes 2 inch and larger may be used above or below ground with the approval of the Architect in lieu of copper, ductile iron, or plastic. Stainless steel pipe shall be schedule 10 or 304 above ground and schedule 316 below ground conforming to ASTM A312. Flanges shall be HR carbon steel plated conforming to ASTM A36. Flange exterior coating shall be Zink plated conforming to ASTM B633- 85. Welding wire/rod shall be 308L SS wire rod conforming to ASME SF A5.9.
 - a. Underground connections shall be welded s. s. pipe or made with a welded flange connection. Above ground connections may be with either flange or grooved Victaulic type coupler. Victaulic couplers shall be classified according to ANSI/NSF 61.
- B. Poly Vinyl Chloride (PVC) Water Main Fittings shall be gray-iron or ductile iron conforming to AWWA C110/A21.10 or AWWA C153/A21.53 and shall have cement mortar lining conforming to AWWA C104/A21.4, standard thickness unless otherwise indicated on Drawings. Fittings shall be mechanical joints.

2.02 PVC JOINTS AND JOINTING MATERIALS:

- A. Pipe joints shall be push on as specified in ASTM D 3139.
- B. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111/A21.11.
- C. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling installation.
- D. Gaskets for push on joints for pipe shall conform to ASTM F 477.
- E. Gaskets for push on joints and compression type joints or mechanical joints for connections between pipes and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.
- F. Sleeve-type mechanically coupled joints may be provided instead of push- on joints on plain-end PVC plastic joints. Comply with requirements of ASTM D 3139.

NOTE: Gate vales in a domestic plumbing system intended to convey water for human consumption shall comply with quality assurance, article 1.03C of this specification.

2.03 GATES VALVES FOR PVC:

- A. Non-rising stem type with resilient wedge gates or iron body bronze wedge gates and mechanical joint ends conform to AWWA C500.
- B. Non-rising stem type with mechanical joints ends shall conform to AWWA C509.

WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023

- C. Valves designed for a working pressure of 175 psi shall be inside-screw type with operating nut, and resilient wedge type gate. Valve shall be provided with mechanical joints as required for the pipe to which it is intended to connect.
- D. Valves with UL listing of 262 shall conform to AWWA C500. Valves shall open by counter-clockwise rotation of valve stem.
- E. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.
- F. Sleeve type mechanical couplings may be provided instead of mechanical and push on joint ends.
- G. Valve ends and gaskets for connection to sleeve type mechanical couplings shall conform to specified requirements for the joint or coupling.
 - 1. Gate Valves in Valve Pits:
 - 2. Outside screw and yoke rising stem type valves with resilient wedge gates and flanged ends shall conform to AWWA C500.
 - 3. Outside screw and yoke rising stem type valves with flanged ends shall conform to AWWA C509.
 - 4. Outside screw and yoke type Valves with double disc gates or split- wedge type gate and flanged ended ends shall be designed for 175 psi and conform to UL 262.
 - 5. Provide valves with hand wheels that open by counterclockwise rotation of the valve stem.
 - 6. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.
 - 7. Check Valves for PVC:
 - 8. NOTE: Check valves in a domestic plumbing system intended to convey water for human consumption shall comply with quality assurance, article 1.03C of this specification.
 - 9. Valves shall be swing-check type conforming to AWWA C508 or UL 312.
 - 10. Valves shall be provided with cast iron or steel body and cover, flanged ends and clear port opening.
 - 11. Valves shall be designed for a working pressure of 175 psi.
 - 12. Fire Hydrants:
 - 13. Before procurement, verify approval issued by the County of San Bernardino or Fire Department having jurisdiction.
 - 14. Hydrants shall be wet barrel types conforming to AWWA C503 or UL 246.
 - 15. Only 1¾ inch pentagonal nuts are to be provided on stems and protective caps.
 - 16. Specified hydrants:
 - 18. Clow/Rich# 850 or 860
 - 19. James Jones #J3700 Fluted Barrel
 - 20. LB Ironworks #702 Lido or 425
 - 21. Valve Boxes: 14-3/4"x20"x12" cast concrete with cast iron, traffic grade
 - 22. cover marked "WATER" (for use over water valves).
 - 23. Brooks 36-H MB w/ No. 36-T cast iron cover EISEL 363.5.
- H. Mechanical Thrust Restraint:
 - 1. Restraint shall be incorporated into the follower gland.
 - 2. Restraint shall consist of individually actuated wedges that increase resistance to pull out as internal pressure or external forces increase.
 - 3. Gland shall be ductile iron conforming to ASTM A 536.
 - 4. Provide twist off nuts and tee-head bolts of the same size to ensure proper actuating of restraint devices.
 - 5. Restraining device shall be provided with pressure rating equal to that of the pipe on which it is installed.
 - 6. Restraining gland shall be UL listed.
 - 7. Mechanical thrust restraint devices shall be EBAA Iron "Megalug", or equal.

WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023

I. Restraint Device Adapters:

1. Restrained flange adapters shall be provided instead of threaded or welded flange spool pieces on plain end of ductile iron or PVC pipe.
2. Flange adapters shall be manufactured of ductile iron conforming to ASTM A 536 and be provided with flange bolt circles compatible with ANSI/AWWA C115/A21.15.
3. Restraint of flange adapter shall consist of a multiple number of individually actuated gripping wedges to maximize restraint capability.
 - a. Torque limiting actuating screws shall be provided to insure proper initial set of gripping wedges.
 - 1) Flange adapter shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow at least 0.6 inch of gap between end of pipe and mating flange without affecting integrity of seal.
 - (a) Flange adapter shall be provided with a safety factor of at least 2:1 for rated pressure.
 - (1) Restraint device adapters shall be EBAA Iron "Megaflange", or equal.
 - (2) Tracer Wire for Nonmetallic Pipes: Tracer wires shall be electrically continuous #14 copper tracer wire, Type TW, blue plastic covered for domestic water and red for fire sprinkler. (Aluminum wire is prohibited). Provide in sufficient length to be continuous over each installed section of nonmetallic pipe.
 - (3) Pipe markers shall be a concrete plaque inscribed with the word "WATER."
 - (4) Water Service Line Materials:
 - (5) Copper Tubing: Copper tubing shall conform to ASTM B 88, Type L.
 - (6) Fittings for Copper Tubing: Fittings for solder-type joints shall conform to ANSI B16.18 or ASME/ANSI B16.22. Fittings for compression-type joints shall conform to ASME/ANSI B16.26, flared tube type.
 - (7) Water Service Line Appurtenances:
 - (8) Corporation stops shall be ground key type; manufactured of bronze conforming to ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder- joint or flared tube compression type joint connection. Threaded ends for inlet and outlet of corporation stops shall conform to AWWA C800; coupling nut for connection to flared copper tubing and shall conform to ASME/ANSI B16.26.
 - (9) Goosenecks shall be type K copper tubing. Joint ends for goosenecks shall be as required for connecting to corporation stop and service line. Where multiple gooseneck connections are required for individual service, connect goosenecks to service line through brass or bronze branch connection; the total clear area of branches shall be at least equal to clear area of service line. Length of goosenecks shall be as indicated or required.
 - (10) Curb or service stops shall be ground key, round way, inverted key type; bronze, conforming to ASTM B 61 or ASTM B 62; and rated at 150 psi. Ends shall be as required for connection to service piping. Arrow shall be cast into body of curb or service stop indicating direction of flow.
 - (11) a. Gate valves 2.5 inches and larger shall be MSS SP-80, Class 150, solid wedge, or resilient wedge gate, and non-rising stem. Valves shall be provided with flanged end connections. Provide hand wheel operators if easily accessible. Provide operating nut if inside a vault, pit or valve box.
 - (12) Gate valves in valve pits 2 inches, and smaller shall be MSS SP- 80, Class 150, bronze, solid wedge, inside screw, rising stem. Valves shall

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

be provided with flanged end connections or threaded end connections with union on one side of valve and hand wheel operator.

- (14) Valve boxes shall be provided at each gate valve installed underground. Valve boxes shall be a size suitable for valve on which it is installed.
 - (15) Water meter indicated on Drawings will be installed by water purveyor for the area, unless noted otherwise.
 - (16) Strainers:
 - (17) STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blow out piping, same size as blow out plug:
 - (18) 2" and smaller: C.M. Bailey #100-A, bronze, 250 lb., or ductile iron with fusion bonded epoxy coating.
 - (19) 2 1/2" and larger: Watts 77F-DI-FDA-125 lb., or other ductile iron fusion bonded epoxy coated flanged strainer, conforming to ASTM A-312 for the strainer body, and ASTM A-240 for the stainless steel strainer element. (No iron body strainer shall be used on potable water that is not fusion bonded epoxy coated inside and out.)
 - (21) C.M.BAILEY ARMSTRONG WILKINS WATTS
 - (22) STR-2 "Y" pattern, cast iron bodies, 125 psi, monel screen 16 sq. mesh. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2", flanged ends for 2 1/2" and larger perforations, in accordance with the following:
 - (23) BAILEY #100 ARMSTRONG RP & C KECKLEY
 - (24) STR-3 Bucket type, flange, semi-steel body, 125 psi, stainless steel screen with 1/8" diameter perforations (mounted above grade for water service). All sizes, (for mains serving fire sprinkler risers):
 - (25) BAILEY #1 ZURN 150 Series RP 7 C WATTS 97FB- FSFE
 - (26) STR-42" and larger: Watts 077-F-SS Stainless steel flange type strainer, or equal conforming to ASTM A-312 for strainer body, ASTM A-240 for the SS strainer element and ASTM A-36 for base flange material.
- J. Backflow Preventer Assemblies:
- 1. Assembly shall be provided with flanged connections, ductile iron with fusion bonded epoxy coated construction, bronze, or stainless steel.
 - 2. Backflow preventer shall be suitable for cold water working pressure of 175 psi.
 - 3. Internal parts shall be designed for replacement without removing valves from line.
 - 4. Double check backflow preventer assembly shall consist of two independently acting spring cam or poppet style check valves, 2 shut- off valves and 4 test cocks. Check valve shall be designed to provide drip tight closure against reverse flow, low pressure drop at maximum flow capacity. Spring-loaded checks shall cause valve to seal against a higher inlet pressure than outlet pressure when there is no flow.
 - 5. Double check backflow preventer assembly shall meet AWWA Standard C510-89.
 - a. Assembly shall be:
 - b. Ames 2000ss Febco 850 Watts 709 Wilkins 350, or equal.
 - 1) Reduced pressure backflow preventer assembly shall consist of two check valves located between two shut-off vales with an area of reduced pressure between two check valves and a relief device arranged to discharge to atmosphere.
 - (a) Comply with AWWA Standard C511.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- (1) Fluctuation in piping pressure shall not cause cycling. Backflow preventer shall automatically maintain low pressure zone to positively prevent backflow of water into system. Assembly shall automatically indicated failure of any part vital to backflow prevention by the continuous discharge relief device.
- k. Reduced pressure backflow preventer assembly shall be Cla-Val Model RP-4, or equal.
 - 1. Backflow prevention assemblies (devices), shall be tested and certified by a certified backflow tester, and a test report shall be provided to the water agency having jurisdiction. Testing shall be performed in the presence of the PI.

PART 3 – EXECUTION

3.01 EXCAVATION, BACKFILLING AND COMPACTING

(CONFORM TO REQUIREMENTS IN SECTION 31 23 00 - EXCAVATION, BACKFILLING AND COMPACTION)

- 1. Project site water lines shall terminate approximately 5 feet from buildings, unless otherwise indicated on Drawings. Temporarily cap or plug terminals for future connection to building.
 - 2. CLEARANCES OF WATER LINE
 - a. Building or Structures: 2 feet.
 - b. Parallel to Sewer Line:
 - 1) Water line 4 inches or less in diameter shall not be installed in a common trench with the building sanitary drain unless the bottom of the water line is at least 12 inches above the top of the building sanitary drain or where the water line is installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the building sanitary drain.
 - 2) Water mains 6 inches and larger in diameter shall be separated from the Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, in accordance with the requirement of the State of California, Human and Welfare Agency, Department of Health Services.
 - (a) Crossing Sewer Line:
 - (1) A water main shall be separated from sanitary sewer in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2), unless modified herein.
 - (2) Install water main a minimum of 12 inches clear, above or below a sanitary sewer.
 - (3) 3. A water main 6 inches or greater in diameter, crossing under a Project site sanitary sewer line, shall be installed with all their joints located at least 10 feet away from each side of the sanitary sewer line.
 - (4) A water main 6 inches or greater in diameter, crossing over a Project site sanitary sewer line, shall be installed with all their joints located at least 4 feet away from each side of a purple pipe or sanitary sewer line.
 - (5) Install all water mains no closer than 10 feet horizontally clear from the edge of sewage leach fields, seepage pits, and septic tanks.
- B. PIPE INSTALLATION AND JOINING
 - 1. Remove fins and burrs from pipe and fittings.
 - 2. Clean piping, fitting, valves, and accessories before installing. Maintain items in a clean condition.
 - 3. Provide proper facilities for lowering sections of pipe into trenches. Do not drop into piping, fittings, or other materials into trenches. Accurately cut pipe and install without springing or

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

forcing. Replace any piping or fitting that does not provide sufficient space for proper installation of joining material.

4. Blocking or wedging between bells and spigots is not permitted. Install bell and spigot pipe with bell end pointing in the direction of flow.
5. Install piping to the lines and grades indicated or required. Low points and dips are not permitted. Support piping at proper elevation and grade with secure and uniform supports. Wood support blocking is not permitted. Where sand cement slurry will not be furnished for backfill, install piping so that full length of each section of pipe and each fitting will solidly rest on pipe bedding. Excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated or required for installation. Provide proper allowances and devices for expansion and contraction of piping and systems.
6. Maintain trenches free of standing water until pipe joints have been installed.
7. At the end of each day close open ends of pipe with temporary caps of the same material as the pipe.
8. Do not install piping when trench or weather conditions prevent proper installation.

C. INSTALLATION OF TRACER WIRE AND PIPE MARKERS

1. Tracer Wire: Install continuous length of tracer wire for full length of each run of nonmetallic pipe. Fasten wire to top of pipe in such a manner that it will not be displaced during construction operations. Wire shall be fastened to pipe at not greater than 20-foot intervals. Wire shall terminate above finished grade with a
 - a. 12 inch lead taped around each riser. Provide a tracer wire to grade under a permanent marker where straight-line transitions of metallic to non-metallic pipe are installed.
 - 1) Underground Pipe Markers: Provide markers at grade where non-metallic pipe is installed and for each horizontal change in direction.
 - (a) CONNECTIONS TO EXISTING WATER LINES
 - (1) After PI has inspected installation, perform connections to servicing water lines. Schedule service shutdown for connecting new system at a time causing minimum disruption.
 - (2) Use a tap or drilling machine with valve and mechanical joint type sleeves for connections to waterlines under pressure, only if all other means of scheduling a shutdown time have been unsuccessful, and with the approval of the responsible engineer, and PI.
 - (3) Bolt sleeves around mains; bolt valve conforming to AWWA C500 to branch. Open valve, attach drilling machine, perform tap, close valve, and remove drilling machine, without interruption of service. Notify the PI in writing at least 5 days prior to the date of scheduled connections.
 - (4) INSTALLATION OF PVC PLASTIC WATER MAINS
 - (5) Unless otherwise indicated, install pipe and fittings as specified and in accordance with UBPPA UNI-B-3 and AWWA M23, Chapter 7, "Installation".
 - (6) Jointing:
 - (7) Provide push on joints with elastomeric gaskets specified for this type of joint, furnishing either elastomeric-gasket bell-end pipe or elastomeric- gasket couplings. For pipe-to-pipe push on joint connections, provide pipe with push on joint ends furnished with factory installed bevel; for push on joint connections to metal fittings, valves and other accessories, square cut spigot end off pipe end.
 - (8) Provide push on joint lubricant recommended by manufacturer.
 - (9) Install push on joints for pipe-to-pipe connections in accordance with UBPPA UNI-B-3 and AWWA M23, Chapter 7, "Installation."

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- (10) Install push on joints for connection to fittings, valves, and other accessories in accordance with requirements of UBPPA Uni-B-3 and with applicable requirements of AWWA C600.
- (11) Compression-type joints/mechanical-joints with gaskets, glands, bolts, nuts and internal stiffeners shall be installed in accordance with the requirements of UBPPA UNI-B-3 and AWWA C600 and Appendix A to AWWA C 111/A21.11.
- (12) Square cut spigot off end of pipe for
- (13) compression-type joint/mechanical-joint connections and do not re-level.
- (14) Sleeve-type mechanical couplings shall be provided in strict accordance with coupling manufacturer's recommendations using internal stiffeners as specified for compression-type joints.

C. PROVIDE MECHANICAL THRUST RESTRAINT DEVICES FOR ANCHORAGE AND PIPING UNLESS THRUST BLOCKS ARE INDICATED ON THE DRAWINGS. THRUST BLOCKS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF UBPPA UNI-B-3 EXCEPT THAT SIZE AND LOCATION OF BLOCKS SHALL BE AS INDICATED. THRUST BLOCKS SHALL BE PROVIDED AS SPECIFIED IN SECTION 32 12 17: SITE CONCRETE PAVING.

3.02 INSTALLATION OF VALVES

- A. PROVIDE GATE VALVES CONFORMING TO AWWA C 500 AND UL 262 IN ACCORDANCE WITH AWWA C600 FOR VALVE AND FITTING INSTALLATION AND WITH RECOMMENDATIONS OF AWWA C500 APPENDIX "INSTALLATION, OPERATION, AND MAINTENANCE OF GATE VALVES".
- B. PROVIDE GATE VALVES CONFORMING TO AWWA C 600 IN ACCORDANCE WITH AWWA C 509 FOR VALVE AND FITTING INSTALLATION AND WITH RECOMMENDATIONS OF AWWA C 500 APPENDIX "INSTALLATION, OPERATION, AND MAINTENANCE OF GATE VALVES".
- C. PROVIDE GATE VALVES ON PVC WATER MAINS IN ACCORDANCE WITH AWWA M23 CHAPTER 7, "INSTALLATION."
- D. PROVIDE CHECK VALVES AND FITTINGS IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF AWWA C600 UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- E. PROVIDE GATE AND CHECK VALVE JOINTS AS SPECIFIED FOR THE TYPE OF JOINTS BETWEEN PIPE AND FITTINGS.

3.03 INSTALLATION OF HYDRANTS

- A. INSTALL HYDRANTS ACCORDING TO REQUIREMENTS OF AWWA C 600 FOR HYDRANT INSTALLATION AND AS INDICATED. PROVIDE JOINTS AS SPECIFIED FOR THE TYPE OF JOINTS BETWEEN PIPE AND FITTINGS.
- B. INSTALL HYDRANT WITH A 6-INCH KEY GATE VALVE BETWEEN 4 AND 10 FEET FROM THE HYDRANT.

3.4 INSTALLATION OF BACKFLOW PREVENTERS

- A. INSTALL REDUCED PRESSURE BACKFLOW PREVENTERS TO COMPLY WITH THE LOCAL AUTHORITY HAVING JURISDICTION.

A. WATER SERVICE LINE CONNECTION TO WATER MAINS

- 1. Connect service line to main by corporation stop and gooseneck. Install service stop as indicated on the Drawings. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B8 and AWWA M23, Chapter 9, "Service Connections".
- 2. Special Requirements for Plastic Piping: Unless otherwise indicated, install pipe and fittings in accordance with ASTM D 2774 and ASTM D 2855. Handle solvent cements for plastic pipe jointing in accordance with ASTM F 402. Install joints according to ASTM D 2855. Install other joints to materials other than pipe materials in accordance with plastic pipe manufacturer's recommendations.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

3. Connect plastic pipe service lines to corporation stops and gate valves according to plastic pipe manufacture’s recommendations.
 - a. INSTALLATION OF STRAINERS:
 - 1) Strainers shall be installed on each water main downstream of the meter, above grade at the pressure regulating station. When a pressure regulating station (assembly) is not provided, “wye” type flange strainer shall be provided, with a shut off valve on the inlet and the outlet side.
 - (a) If the water main is serving fire sprinkler risers or hydrants, then an approved fire service strainer shall be used: Watts 97DB-FSFE or equal.
 - 2) DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
 - (a) When water piping has been installed and tested, sterilize system before use and/or Substantial Completion.
 - (b) Inject solution of liquid chlorine or sodium hypochlorite and water containing at least 50 PPM of free chlorine into a system in a manner to ensure that entire system is completely filled with solution. During this procedure operate valves and test outlets for residual chlorine. Continue injection until outlets indicate at least 59 PPM of free chlorine.
 - (c) After injection, isolate system and hold solution in retention for a period of at least 8 hours. Perform tests for residual chlorine after retention. If such tests indicate less than 50 PPM of residual chlorine, repeat entire procedure. After satisfactory sterilization has been verified, flush entire system until all traces of chlorine have been removed or until chlorine content is no greater than in existing water supply.
 - 3) ELECTROLYSIS PREVENTION
 - (a) A minimum 6 inch long brass nipple shall be installed at locations specified or as required. Flanges shall be provided with a complete insulating component consisting of; gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at locations indicated or as required. Dielectric fittings are prohibited.
 - (b) Where steel or cast iron below grade connects to copper or brass piping above grade, the transition from steel or cast iron pipe to copper or brass pipe shall be installed in an above grade accessible location.
 - (c) Underground connections between dissimilar metals shall be in accessible yard boxes.
 - (d) Above ground dielectric connections shall be exposed.
 - (e) ABANDONING WATER LINES AND STRUCTURES
 - (f) Water lines and all appurtenances to be abandoned in place shall be cut and removed from all areas where new Work is being installed.
 - (g) Cap or plug abandoned existing drain lines below grade in a yard box and according to UPC.
 - (h) TESTS AND INSPECTIONS
 - (i) Provide labor, equipment, materials, test equipment and incidentals required for performing required field tests.
 - (j) Tests shall not be performed for 5 days after concrete thrust blocks have been installed.
 - (k) Testing Procedure: Water mains and service lines shall be tested in accordance with applicable specified standard.
 - (l) Test PVC plastic water system in accordance with UBPPA UNI-B-3 for pressure and leakage. The amount of leakage from PVC piping shall not exceed the amounts given in UBPPA UNI-B-3, except that no leakage is permitted for joints installed with sleeve type mechanical couplings.
 - (m) Test water service lines in accordance with applicable requirements of AWWA C 600. No leakage is permitted.

WD 23414	SIERRA HIGH SCHOOL	10/06/2023
	BASEBALL FIELD IMPROVEMENTS	

- (n) Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of at least 50 psi greater than the maximum working pressure of tested system, but no less than 200 psi hydrostatic test pressure for system piping of 2 inches in diameter and larger. Provide and maintain hydrostatic test pressure for at least 2 hours to ensure no leakage of any portion of piping or appurtenances under pressure test.

END OF SECTION

WD 23414	SIERRA HIGH SCHOOL BASEBALL FIELD IMPROVEMENTS	10/06/2023